EAGLE MOUNTAIN
PUMPED STORAGE PROJECT
PRE-APPLICATION DOCUMENT
VOLUME 1, PUBLIC INFORMATION

FERC Project No. 12509

January 2008

Submitted by:
Eagle Crest Energy,
P.O. Box 2155, Palm Desert, CA 92261
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1 Introduction

Eagle Crest Energy Company (ECE) is filing with the Federal Energy Regulatory Commission (FERC or Commission) its Notice of Intent (NOI) and Pre-Application Document (PAD) for the proposed Eagle Mountain Pumped Hydroelectric Storage Project (FERC Project 12509) (Project).

The Project is a 1,300-megawatt (MW) pumped storage hydroelectric project located in Riverside County, California (Figure 1-1, Volume 1). The Project is located at the site of the Eagle Mountain Mine and will use two inactive mining pits for the upper and lower reservoirs (Figure 1-2, Volume 1).

ECE applied to FERC for a preliminary permit for the proposed Project in June 2004. FERC issued the preliminary permit in March 2005, which expires in March 2008. The permit secures and maintains priority of application for a license for the Project under the Federal Power Act, allowing ECE time to collect the data and perform the acts required to determine the feasibility of the Project and to support an application for a license. Such studies have been ongoing and results are described in this document.

The Project is the same hydroelectric pumped storage project for which the Commission previously granted ECE a preliminary permit on June 15, 2001 (Project No. 11862). ECE also submitted an original license application in 1994, as amended in 1998 and 1999. At that time, the Project was designated FERC Project No. 11080. FERC dismissed this license application without prejudice in July 1999 because a water quality certification was not obtained from the State of California (State) within the set timeframe.

ECE is proposing to move forward with a License Application for the Project using the Traditional Licensing Process (TLP). The formal request to FERC to use the TLP process rather than the default process, known as the Integrated Licensing Process (ILP), is also being filed at this time.

This PAD provides engineering, operational, economic, and environmental information about the Project and Project area resources that are reasonably available at this time. Due diligence has been exercised to collect existing available information in order to identify and evaluate potential impacts to Project area resources from Project construction and operation.

The Eagle Mountain PAD is organized into two volumes: Volume 1 – Public Information and Volume 2 – Critical Energy Infrastructure Information (CEII). ECE has filed all PAD volumes with the Commission and will provide Volume 1 to any interested entity. Volume 2 must be obtained directly from the Commission via a written request.
CEII is information about proposed or existing critical infrastructure that (1) is exempt from disclosure under the Freedom of Information Act (FOIA), (2) relates to the production, generation, transportation, transmission, or distribution of energy, (3) could be useful to a person planning an attack on the infrastructure, and (4) does not simply give the location of the critical infrastructure. Privileged information is usually confidential business information or cultural resource reports submitted under 18 C.F.R. §388.112.

More information about these document classes can be obtained on the FERC website at http://www.ferc.gov/legal/ceii-foia/ceii/nip.asp.
2 Process Plan and Schedule

The formal pre-filing consultation commences with the filing of this PAD. This PAD is being distributed to all the appropriate federal, State, and interstate resource agencies and tribes. In addition, ECE is establishing a website, www.eaglemountainenergy.us, for dissemination of Project information. Volume 1 of the PAD is available for download from this site.

FERC requires that copies of all relevant written communications, meeting summaries, reports, and Project documents be maintained as a Formal Consultation Record. The documents in the Formal Consultation Record are available for public viewing at the project website www.eaglemountainenergy.us. The Record will also be made available in hard copy at the Indio Library, 200 Civic Center Mall, Indio, CA 92201, and the Palo Verde Valley District Library, 125 W. Chanslorway, Blythe, CA 92225.

Any member of the public may make requests for documents in the Public Reference File by contacting GEI Consultants, Inc. (GEI), 10860 Gold Center Drive, Suite 350, Rancho Cordova, CA 95670, 916-631-4500 ATTN: Ginger Gillin. CEI and Privileged documents are not in the Public Reference File and must be requested directly from FERC. Document requests will require adequate processing time. Those requesting extensive document copying may be charged for processing costs. Use of copyrighted materials will be subject to the related appropriate legal restrictions. ECE will transmit and receive licensing-related communications and other written materials in electronic format (MS Word, MS Excel, Adobe Acrobat .PDF) when possible, consistent with federal and State paper reduction policies, and in accordance with FERC Order No. 604. ECE requests that all such documents intended for inclusion in the Formal Consultation Record be referenced “ECE Eagle Mountain Hydroelectric” and sent to GEI at the address above.

ECE will hold a joint meeting on March 11, 2008, in Palm Desert, California. At the joint meeting, ECE and GEI will explain the proposal and potential for environmental impacts, review the information provided in the PAD, and discuss data to be obtained and studies to be conducted as part of the consultation process. FERC regulations require that the meeting be recorded or transcribed.

The joint meeting will include opportunities to view the project from aerial photography and satellite imagery. Due to the lack of access, Eagle Crest Energy will provide the opportunity for on-the-ground viewing at a distance from Eagle Mountain on March 12, 2008. Notice of this meeting and site visit is being sent to all pertinent agencies, tribes, and members of the public.
Following the joint meeting, the agencies, tribes, and public have 60 days in which to comment on the proposal. These comments should include requests for studies to be performed or information to be provided by the applicant.

The licensing schedule will be completed once FERC has ruled on ECE’s request to use the TLP. That decision will affect the timing of other licensing milestones beyond May 2008.

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<td>October 26, 2007</td>
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<td>File Pre-Application Document with FERC, with copies to agencies and Tribes</td>
<td>January 10, 2008</td>
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<td>File Notice of Intent</td>
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<td>File Request for Traditional Licensing Process (TLP)</td>
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3 Project Location, Facilities, and Operations

Name, business address, and telephone number of persons authorized to act as agent for the applicant.

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3.1 Existing and Proposed Project Facilities

The Eagle Mountain Energy Company proposes to develop the Eagle Mountain Pumped Storage Project (the Project) located near the towns of Eagle Mountain and Desert Center in Riverside County, California (Figure 3-1, Volume 1). The proposed Project is a hydroelectric pumped storage project that will provide system peaking capacity and electrical system regulating benefits to Southwestern electric utilities.

The Project will use off-peak energy to pump water from the lower reservoir to the upper reservoir during periods of low electrical demand and generate on-peak energy by conveying water from the upper to the lower reservoir through the generating units during periods of high electrical demand. Low demand periods occur during weekday nights and throughout the weekend. High demand periods occur during daytime periods of each weekday, with maximum day demands expected during the summer months. The Project will provide daily peaking capacity, as well as load following ability, system regulation through spinning reserve, and standby generating capacity that will be available on an immediate basis. In the event of a system outage, pumped storage is also an ideal source of “black start” capacity.

The Project will nominally provide up to 1,300 MW of generating capacity, developed with four reversible pump-turbine units, with each unit rated at 325 MW under the maximum
gross head (1,572 feet). The minimum gross head between the upper and lower reservoirs is 1,147 feet. The minimum Project output is estimated to be approximately 950 MW.

The upper and lower reservoirs will be formed from existing mining pits; however, two small dams will be required at the upper reservoir to create the proposed volume of energy storage. The proposed energy storage volume will permit operation of the Project at full capacity for 9 hours each weekday, with 8 hours of pumping each weekday night and additional pumping during the weekend to fully recharge the upper reservoir. The amount of active storage in the upper reservoir will be 17,700 acre-feet, which is based on 18.5 hours of energy storage at the maximum generating discharge.

Water stored in the Upper Reservoir will provide approximately 22,200,000 kilowatt hour (kWh) of on-peak generation.

The mine is no longer in operation. Tunnels will be constructed to interconnect the upper and lower reservoirs to convey the water, and the generating equipment will be located in an underground powerhouse located between the two reservoirs.

A 500 kV transmission line is proposed to convey energy to and from the Project. The Project switchyard will be located above ground and connected to the underground powerhouse by a cable tunnel. A new 500 kilovolt (kV) transmission line will extend from the high-voltage side of the switchyard eastward to the Midpoint Substation near Blythe, CA as discussed in later sections.

The Project does not utilize any natural river or lake. Neither the upper nor lower reservoirs will be located on a surface water course. The reservoirs will receive only incidental runoff from a small surrounding area. The initial filling of the reservoirs and the annual makeup water supply during operation will be supplied from wells tapping a nearby groundwater source (Figure 3-2, Volume 1). Site access is currently planned by Kaiser Road, a public county road, to the entrance to property owned by and leased from Kaiser Resources.

Plans have been developed by others to use portions of the inactive mine site for a landfill serving the Southern California urban areas. The pumped storage project has been formulated with the assumption that the landfill will exist, as currently proposed by the landfill developers. The landfill and pumped storage projects are compatible in that neither would materially interfere with the construction or operation of the other.

The layout, dimensions, equipment characteristics, and ratings may change during the detailed design phase of the Project. However, such changes are not expected to have material impacts on the concept of the Project or on its environmental impacts. Project drawings considered to be CEII are found in Volume 2 of this document, but are referenced in Volume 1.
a. Physical composition, dimensions, and general configuration of any dams, spillways, penstocks, canals, powerhouses, tailraces, and other structures proposed to be included as part of the project or connected directly to it.

Conceptual-level drawings for the Eagle Mountain Pumped storage Project are presented on Figure 3-3 and on Figures V2-1 through V2-8 which are provided in Volume 1 and Volume 2 of the PAD, respectively. The principal features of the Project will include the following:

- Upper Dams and Reservoir
- Lower Reservoir
- Inlet/Outlet (I/O) Structures
- Water Conveyance Tunnels
- Vertical Shaft
- Surge Control Facilities
- Underground Powerhouse
- Access and Cable Tunnels
- Switchyard
- Transmission Line
- Water Supply Facilities

A summary of the significant project components is provided in Table 3-1.

<table>
<thead>
<tr>
<th>Project Feature</th>
<th>Feature Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydroelectric Plant</strong></td>
<td></td>
</tr>
<tr>
<td>Total Rated Capacity</td>
<td>1,300 MW</td>
</tr>
<tr>
<td>Number of Units</td>
<td>4 (Reversible)</td>
</tr>
<tr>
<td>Unit Rated Capacity</td>
<td>325 MW</td>
</tr>
<tr>
<td>Maximum Plant Discharge</td>
<td>11,600 cfs</td>
</tr>
<tr>
<td>Pump/Turbine and Motor/Generator Unit Data</td>
<td></td>
</tr>
<tr>
<td>Rated Head</td>
<td>1410 ft</td>
</tr>
<tr>
<td>Rated Turbine Output</td>
<td>319 MW</td>
</tr>
<tr>
<td>Maximum Turbine Flow</td>
<td>2,900 cfs</td>
</tr>
<tr>
<td>Operating Speed</td>
<td>333.3 rpm</td>
</tr>
<tr>
<td>Generator Rating</td>
<td>347 MVA</td>
</tr>
<tr>
<td><strong>Low Pressure Upper Tunnel</strong></td>
<td></td>
</tr>
<tr>
<td>Diameter</td>
<td>35 ft</td>
</tr>
<tr>
<td>Length</td>
<td>4,200 ft</td>
</tr>
<tr>
<td><strong>Shaft</strong></td>
<td></td>
</tr>
<tr>
<td>Diameter</td>
<td>35 ft</td>
</tr>
<tr>
<td>Length</td>
<td>1,333 ft</td>
</tr>
<tr>
<td><strong>High Pressure Upper Tunnel</strong></td>
<td></td>
</tr>
<tr>
<td>Diameter</td>
<td>35 ft</td>
</tr>
</tbody>
</table>
### Table 3-1: Significant Data for Eagle Mountain Pumped-Storage Project

<table>
<thead>
<tr>
<th>Project Feature</th>
<th>Feature Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tailrace Tunnel</strong></td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>1365 ft</td>
</tr>
<tr>
<td>Diameter</td>
<td>35 ft</td>
</tr>
<tr>
<td>Length</td>
<td>6,835 ft</td>
</tr>
<tr>
<td><strong>Powerhouse Cavern</strong></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>150 ft</td>
</tr>
<tr>
<td>Length</td>
<td>500 ft</td>
</tr>
<tr>
<td>Width</td>
<td>50 ft</td>
</tr>
<tr>
<td><strong>Upper Reservoir</strong></td>
<td></td>
</tr>
<tr>
<td>Dam Type</td>
<td>Roller-compacted concrete (RCC)</td>
</tr>
<tr>
<td>Volumes</td>
<td></td>
</tr>
<tr>
<td>Total Reservoir Capacity</td>
<td>20,000 ac-ft</td>
</tr>
<tr>
<td>Inactive Storage</td>
<td>2,300 ac-ft</td>
</tr>
<tr>
<td>Active Storage</td>
<td>17,700 ac-ft</td>
</tr>
<tr>
<td>Operating Levels</td>
<td></td>
</tr>
<tr>
<td>Minimum Operating Level</td>
<td>El. 2485</td>
</tr>
<tr>
<td>Maximum Operating Level</td>
<td>El. 2343</td>
</tr>
<tr>
<td>Water Surface Areas</td>
<td></td>
</tr>
<tr>
<td>Water Surface Area at El 2,343 feet</td>
<td>49 acres</td>
</tr>
<tr>
<td>Water Surface Area at El 2,485 feet</td>
<td>193 acres</td>
</tr>
<tr>
<td>Dimensions of Dams</td>
<td>(URD-2 and URD-1)</td>
</tr>
<tr>
<td>Structural Heights</td>
<td>60 ft and 120 ft</td>
</tr>
<tr>
<td>Top Widths</td>
<td>20 ft (both dams)</td>
</tr>
<tr>
<td>Crest Lengths</td>
<td>1100 to 1600 ft</td>
</tr>
<tr>
<td>Crest Elevation</td>
<td>El. 2490 (both dams)</td>
</tr>
<tr>
<td><strong>Lower Reservoir</strong></td>
<td></td>
</tr>
<tr>
<td>Dam Type</td>
<td>None</td>
</tr>
<tr>
<td>Volumes</td>
<td></td>
</tr>
<tr>
<td>Total Reservoir Capacity</td>
<td>21,900 ac-ft</td>
</tr>
<tr>
<td>Inactive Storage</td>
<td>4,300 ac-ft</td>
</tr>
<tr>
<td>Active Storage</td>
<td>17,700 ac-ft</td>
</tr>
<tr>
<td>Operating Levels</td>
<td></td>
</tr>
<tr>
<td>Minimum Operating Level</td>
<td>El. 926</td>
</tr>
<tr>
<td>Maximum Operating Level</td>
<td>El. 1092</td>
</tr>
<tr>
<td>Water Surface Areas</td>
<td></td>
</tr>
<tr>
<td>Water Surface Area at El 926 feet</td>
<td>64 acres</td>
</tr>
<tr>
<td>Water Surface Area at El 1,092 feet</td>
<td>164 acres</td>
</tr>
</tbody>
</table>
Upper Dams and Reservoir

The Upper Reservoir for the Project will be the Central Pit of the former Eagle Mountain Mine. The bottom of the pit is at elevation (El.) 2,230 feet. The active portion of the reservoir is planned between El. 2,340 and El. 2,476 feet. The volume between these elevations is 17,700 acre-feet, and the respective surface areas are 50 and 188 acres.

The existing low points of the pit rim are at El. 2,380 and El. 2,440. To obtain the required volume of storage at water surface El. 2,462, it will be necessary to construct two dams along the perimeter of the pit, as shown on Figure V2-4, Volume 2. These dams are identified as URD-1 and URD-2. Key data on the dams are provided in Table 3-2.

<table>
<thead>
<tr>
<th>Table 3-2. Key features of the upper reservoir dams.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>URD-1</strong></td>
</tr>
<tr>
<td>Max. WS Elevation</td>
</tr>
<tr>
<td>Freeboard</td>
</tr>
<tr>
<td>Dam Crest Elevation</td>
</tr>
<tr>
<td>El. Of Low Point on Dam Axis</td>
</tr>
<tr>
<td>Estimated Structural Height</td>
</tr>
<tr>
<td>Crest Width</td>
</tr>
<tr>
<td>Crest Length</td>
</tr>
<tr>
<td><strong>URD-2</strong></td>
</tr>
<tr>
<td>Max. WS Elevation</td>
</tr>
<tr>
<td>Freeboard</td>
</tr>
<tr>
<td>Crest Elevation</td>
</tr>
<tr>
<td>Elev. of Low Point on Dam Axis</td>
</tr>
<tr>
<td>Estimated Structural Height</td>
</tr>
<tr>
<td>Crest Width</td>
</tr>
<tr>
<td>Crest Length</td>
</tr>
</tbody>
</table>

The dams could be constructed of either rockfill or roller-compacted concrete (RCC). The original proposal was to construct the dams with rockfill and to provide an upstream concrete facing for seepage control and wave protection. Based on the apparent quality of the waste rock and expected cost advantages, the current concept is to construct the two dams using RCC. Typical sections for the two dams are provided on Figure V2-4, Volume 2. Dam construction will require preparation of the foundation to remove any waste materials from mining, overburden, and weathered rock to expose firm, un-weathered bedrock prior to placement of dental and leveling concrete and the RCC lifts. For project planning, we assumed 10 feet of excavation would be required for the foundation. Normal freeboard was assumed to be 10 feet between the normal high-water level and the dam crest, providing ample room to store the runoff from the small tributary watershed during the inflow design flood, which will be the probable maximum flood (PMF). No spillway will be needed.
because the dams, which will be RCC, could withstand overtopping during an over-pumping event, without serious consequences.

The downstream slope of the dam was assumed to be 0.8 (H) to 1 (V), with no chimney section. This is considered to be a conservative dam section for normal and extreme loading conditions, pending results of detailed geologic and geotechnical investigations to be completed during final design. The upstream face of the dam would be formed with grout-enriched RCC and later covered with a membrane liner to control seepage. The preliminary design concept envisions a drainage gallery to accept flows from foundation drains provided to control uplift. The foundation would most likely require grouting for seepage control, and we assumed a double row grout curtain with depths equal to the height of the dam along the dam axis. Final design of the RCC will follow criteria established for RCC gravity dam design developed for other RCC dams in California (such as the recently completed Olivenhain Dam in San Diego County) and fully comply with all requirements of the FERC and the California Division of Safety of Dams (DSOD).

Control of seepage from the upper reservoir will be important to minimize water losses and to reduce the amount of reservoir water that reaches the aquifer. Available geologic information suggests that the rock formations, in which the upper reservoir is located, are fairly “tight” and seepage is not expected to be significant as indicated in Section 4.2 of the PAD. The interior of the mine pit has not been mapped to identify likely areas of concentrated seepage. Therefore, the exact methods of seepage control are not known at this time. However, placement of a blanket of fine tailings left over from the mining operations as well as localized grouting and shotcrete placement are the most likely methods. Once access to the pit can be obtained, geologic mapping will be performed and seepage control methods will be defined with greater certainty.

**Lower Reservoir**

The Lower Reservoir for the Project will be the East Pit of the former Eagle Mountain Mine. The bottom of the pit is at El. 700 feet and the existing low point of the rim is 1,100 feet. The active portion of the reservoir is planned between El. 910 and El. 1,092 feet. The volume between these elevations is 17,700 acre-feet, and the respective surface areas are 53 and 144 acres. The entire active reservoir volume can be contained within the pit; therefore, construction of dams will not be necessary at the Lower Reservoir.

Partial lining of the Lower Reservoir will most likely be required. The east end of the mine pit is in alluvial material which, if not lined, would likely result in excessive seepage. Therefore, the eastern end of the pit will be blanketed with fine tailings. A minimum depth of three feet of fine tailings is planned, with placement of the tailings at stable slopes for expected loading conditions. Most of the fine tailings for reservoir lining will come from a large pile of potentially unstable tailings on the south bank of the pit, which will have to be moved. Depending upon the impermeability of this material, it may also be necessary to top
it with a layer of the finer tailings from the nearby tailings ponds. In addition to this general blanketing at the eastern end of the pit, some localized blanketing with fine tailings may be required at other isolated locations. The interior of the mine pit has not been mapped to identify other likely areas of concentrated seepage. Therefore, the exact methods of seepage control are not known at this time. Localized grouting and shotcrete placement are the most likely methods. Once access to the pit can be obtained, geologic mapping will be performed and seepage control methods will be defined with greater certainty.

**Inlet/Outlet Structures**

The I/O structure at the Upper Reservoir will be located at the east end of the reservoir. An excavated approach channel will be required to connect the minimum level of the reservoir with the I/O structure, which will have an invert at El. 2287.5. The Upper Reservoir I/O will be equipped with a fixed-wheel gate for emergency closure and tunnel inspection.

The I/O structure at the Lower Reservoir will be located near the west end of the reservoir and will be constructed in the sloping bank of the pit. The invert of the I/O structure will be at El. 856.5. A fixed-wheel gate will be provided in the structure for emergency closure and for tailrace tunnel inspection.

**Water Conductors**

A system of water conductor tunnels will convey the water from the Upper Reservoir to the underground powerhouse and from the powerhouse to the lower reservoir in the generating mode. Flow will be reversed in the pumping mode of operation.

From the Upper Reservoir I/O structure, an upper ("low head") pressure tunnel will extend approximately 4,400 feet to a 1,225-foot-deep vertical shaft connecting the upper tunnel to the lower ("high head") tunnel; the lower pressure tunnel will extend 1,500 feet to a penstock manifold; and four penstocks will extend approximately 700 feet to the turbine inlet valves at the powerhouse.

From the powerhouse, the four individual tailrace tunnels will extend approximately 300 feet to a tailrace manifold, and the main tailrace tunnel will extend 8,500 feet from the manifold to the Lower Reservoir I/O structure.

The upper pressure tunnel and the main tailrace tunnel will most likely be excavated by tunnel boring machine (TBM). The finished tunnel diameter will be 35 feet. For planning, we have assumed that the upper tunnel will be concrete lined; however, depending on rock quality, the upper tunnel may be not be lined throughout its entire length. A steel-lined manifold will connect the lower pressure to the penstocks. The four penstocks will be completed to a finished diameter of 15 feet and will be steel lined.
The four tailrace tunnels upstream of the concrete-lined tailrace manifold will be completed to a finished diameter of 15 feet. These tunnels will be concrete lined. The main tailrace tunnel from the manifold to the Lower Reservoir will be completed by TBM or drill and blast methods. This tunnel will be concrete lined to a finished diameter of 35 feet.

**Vertical Shaft**

A concrete-lined vertical shaft with a diameter of 35 feet will be constructed to connect the upper and lower pressure tunnels.

**Surge Control Facilities**

Surge control facilities will be required upstream and downstream of the powerhouse. Preliminary design of these facilities will be developed during the license application after preliminary hydraulic transient analyses are prepared.

**Underground Powerhouse**

The underground powerhouse cavern will be approximately 50 feet wide, 150 feet high, and 500 feet long. A separate transformer gallery a short distance downstream from the powerhouse. The powerhouse substructure and superstructure will be constructed of cast-in-place reinforced concrete. Substructure and superstructure configurations will be dictated by final mechanical and electrical equipment arrangements. A drain system will be provided around the powerhouse walls to carry collected seepage to the powerhouse drainage sump pit. An unloading and erection bay will be located at one end of the unit bays, accessed by the main access tunnel. Space for the control room, workshop, and office- and personnel-related space will be located in the two upper levels at the end of the cavern adjacent to the erection bay. The major equipment will be handled by bridge cranes, which will run on rails the length of the unit bays and the erection bay.

**Access and Cable Tunnels**

Access to the underground powerhouse will be through a main access tunnel. This will be a vehicular tunnel that is 28 feet wide and 28 feet high. The tunnel portal will be south of the powerhouse. The invert elevation at the portal will be approximately 1,050 feet, and it will enter the powerhouse at El. 837 feet. The length will be 6,200 feet and the slope 3.4 percent. The tunnel will be shotcrete lined and will have a concrete roadway on the invert. Rockbolts or other rock support will be used as required where areas of weak or broken rock are encountered. The top portion of the tunnel will carry the ventilation duct.

A combination cable/emergency access tunnel will extend from the transformer gallery to the surface at El. 1,380 feet, a distance of 5,300 feet; the last 300 feet will be a vertical shaft. The tunnel and shaft will be shotcrete lined, and the tunnel will have a paved invert. The
tunnel will be 14 by 14 feet, and the shaft will be 13 feet in diameter and will contain a man lift to the surface.

Switchyard

The switchyard will be located south of the powerhouse, outside the boundaries of the proposed landfill. It will be located on a level site at approximate El. 1,380 feet. It will be 500 by 800 feet, with a gravel surface. The area will be surrounded by a security fence, and security and maintenance lighting will be provided. The switchyard will be connected to the powerhouse with 500 kV cables passing from the transformer gallery through a tunnel and shaft to the switchyard. The cables exiting the tunnel will terminate in the outdoor switchyard and be connected through protective breakers and associated switches to a 500 kV transmission line. The switchyard will contain all necessary disconnect switches, protective equipment, and metering equipment.

Transmission Line

The Project proposes to construct, operate, and maintain a new, approximately 46-mile-long, transmission line from a new substation/switching station southeast of the Project switchyard, the general location of which is shown on Figure 3.3, Volume 1. The transmission line would proceed southeast adjacent to an existing transmission line right-of-way for approximately 46 miles. At this point the line would turn south and proceed approximately 1 mile to the point where it terminates at the proposed Midpoint 500 kV Substation/Switching station, which is planned to intercept an existing 500 kV Palo Verde-Devers transmission line, owned by Southern California Edison (SCE).

500 kV Steel Lattice Tower Structures – A single-circuit, self-supporting steel lattice tower structure is proposed for the Proposed Project, if configured for 500 kV operation. Tower heights would vary from 100 to 180 feet above the ground surface depending on terrain and associated “span lengths” (i.e., distances between transmission line support structures). The average span length would be approximately 1,200 feet, or about 4.4 towers per mile of line. Span lengths would generally range from a minimum of 400 feet to a maximum of 1,400 feet. However, the exact quantity and placement of the structures would depend on the final detailed design of the transmission line, which would be influenced by site-specific factors such as terrain, land uses, and possible environmental constraints within the right-of-way.

Each tower would support three phases consisting of three sub-conductors per phase. Each tower would be supported by four legs that would be bolted to caisson foundations approximately 22 feet deep and 4 feet in diameter.

Water Supply Facilities

Water to initially fill the reservoirs and yearly make-up will be pumped from groundwater within the Chuckwalla Valley. Three wells will be utilized to provide fill during the first two
years of the project. After initial filling is complete, two of the three wells will be abandoned and the third will remain to provide yearly makeup water to replace losses due to seepage and evaporation. The applicant proposes to utilize either existing wells or new wells to be installed within or adjacent to a central collection pipeline corridor. The proposed conceptual locations of the three wells and the proposed water pipeline corridors are shown on Figure 3-2, Volume 1.

Desalination

The source of water supply to fill and maintain the Eagle Mountain reservoirs will come from groundwater. Concerns exist that because of evaporative losses, reservoirs will gradually increase in salt concentration, and by seepage become a potential source of groundwater contamination. The project proposes to include a desalination facility that will maintain salinity levels in the reservoirs (total dissolved solids -- TDS) comparable to groundwater quality. A plan map of the proposed facilities is contained in Figure 3-3, Volume 1.

Groundwater will be extracted from the Chuckwalla wells and therefore the northwestern Chuckwalla Valley. Water quality data from those wells were used for assumptions about the source water quality. While the total replacement water need is estimated to be 2,360 acre-feet per year evaporation and seepage, only the evaporation component (1,760 acre-feet per year) enters into the estimation of water treatment requirements. The reverse osmosis (RO) treatment would remove water from the upper reservoir at a rate of 3 million gallons per day (MGD) and remove sufficient TDS to maintain the in-reservoir TDS at the same average concentration of the source water, approximately 450 parts per million (PPM), based on available data for the Chuckwalla wells. Approximately 4 million pounds of salts would be removed from the reservoir each year.

Based on information from existing facilities, brackish water desalination uses approximately 1,300 – 3,250 kWh of energy per acre-foot, dependent largely on the source water quality, plant capacity, and technology used. Assuming that the energy need is at the low end because of the high-quality initial water source, annual energy needs for RO treatment would be about 4.4 GWh assuming water would be pumped through the RO membranes. However, the actual energy consumption for RO at Eagle Mountain will be near zero because the available pressure head of 1500 feet will drive water through the RO membranes rather than using energy to pump water through the membranes.

b. Normal maximum water surface area and normal maximum water surface elevation (msl), gross storage capacity of any impoundments.

Reservoir elevation-area-capacity curves for the Upper and Lower Reservoirs are provided on Figure 3-4 and 3-5, Volume 1. Key reservoir data are summarized in Table 3-3.
Table 3-3. Key data on upper and lower reservoirs.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Upper Reservoir</th>
<th>Lower Reservoir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Normal Pool</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Surface El. (ft, msl)</td>
<td>2343</td>
<td>926</td>
</tr>
<tr>
<td>Storage (acre-feet)</td>
<td>2300</td>
<td>4200</td>
</tr>
<tr>
<td>Surface Area (acres)</td>
<td>49</td>
<td>64</td>
</tr>
<tr>
<td>Maximum Normal Pool</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Surface El. (ft, msl)</td>
<td>2485</td>
<td>1092</td>
</tr>
<tr>
<td>Storage (acre-feet)</td>
<td>20,000</td>
<td>21,900</td>
</tr>
<tr>
<td>Surface Area (acres)</td>
<td>193</td>
<td>164</td>
</tr>
</tbody>
</table>

c. The number, type, and minimum and maximum hydraulic capacity and installed (rated) capacity of any proposed turbines or generators to be included as part of the project.

The underground powerhouse will contain 4 equal-size reversible, vertical shaft, pump-turbine units. Preliminary unit sizing has been based on typical performance characteristics obtained from information published by the Corps of Engineers and Bureau of Reclamation as well as experience of engineers working on the Project.

The project size (1,300 MW) was selected based on the previous license application and the preliminary permit. Market studies will establish the final installed capacity. The previous work on the Project considered 3 equal-size units. The currently proposed configuration envisions 4 units, each capable of 325 MW at maximum head. Unit sizes in the 300 to 350 MW range are fairly common throughout the United States (for example Bath County, Ludington, and Raccoon Mountain) and abroad.

The hydraulic capacity of each turbine will be approximately 2,900 cfs (11,600 cfs total). The desired hydraulic capacity and rated capacity of the pump-turbine and the motor-generator will be selected during the technical feasibility studies supporting the license application. Further refinements will be made during final design and when specific manufacturers’ information and data about the equipment are obtained.
d. The number, length, voltage, and interconnections of any primary transmission lines proposed to be included as part of the project including a single-line diagram.

Table 3-4 summarizes the various transmission components of the Project. The single-line diagram is found in Figure V2-9, Volume 2.

<table>
<thead>
<tr>
<th>Table 3-4 Summary of Proposed Transmission Line Project Components</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proposed Route and Right-of-Way</strong></td>
</tr>
<tr>
<td>• Transmission Line Length: approximately 46 miles.</td>
</tr>
<tr>
<td>• Connection Point: A new substation/switching station at Eagle Mountain.</td>
</tr>
<tr>
<td>• Connection Point: The Proposed Midpoint Substation adjacent to the existing Palo Verde-Devers 500-kV line owned by SCE.</td>
</tr>
<tr>
<td>• Right-of-Way Width: 200 feet. The right-of-way width would be reduced in specific locations to mitigate potential impacts to resources (e.g., historic trails, adjacent land restrictions, existing roads and highways, and biological and cultural resources).</td>
</tr>
<tr>
<td>• Total Right-of-Way Acreage: approximately 1,260 acres (does not include construction access roads).</td>
</tr>
<tr>
<td><strong>Transmission Line Facilities (500 kV, single circuit)</strong></td>
</tr>
<tr>
<td>• Conductors: One, three-phase AC circuit consisting of three 1.5 to 2-inch ACSR conductors per phase.</td>
</tr>
<tr>
<td>• Minimum Conductor Distance from Ground: 35 feet at 60°F and 32 feet at the maximum operating temperature.</td>
</tr>
<tr>
<td>• Shield Wires: Two 1/2 to 3/4-inch-diameter wire(s) for steel lattice.</td>
</tr>
<tr>
<td>• Transmission Line Tower Types:</td>
</tr>
<tr>
<td>- Steel Lattice Tower along entire route.</td>
</tr>
<tr>
<td>- Structure Heights (approximate): Steel Lattice – 100 to 180 feet.</td>
</tr>
<tr>
<td>• Average Distance between Towers: Steel Lattice – 1,200 feet.*</td>
</tr>
<tr>
<td>• Total Number of Towers (approximate): 225 – 265.*</td>
</tr>
<tr>
<td><strong>Substation Facilities</strong></td>
</tr>
<tr>
<td>• A new substation/switching station at Eagle Mountain requiring a total area of approximately 25 acres would be constructed.</td>
</tr>
<tr>
<td>• Midpoint Substation: Facilities would be expanded at the Proposed Midpoint Substation, Southwest of Blythe, California, to accommodate interconnection of the Proposed Project transmission line.</td>
</tr>
<tr>
<td><strong>Communications Facilities</strong></td>
</tr>
<tr>
<td>• Systems: Digital Radio System, microwave, VHF/UHF radio, fiber optics.</td>
</tr>
<tr>
<td>• Functions: Communications for fault detection, line protection, SCADA, two-way voice communication.</td>
</tr>
</tbody>
</table>

*The exact quantity and placement of the structures depends on the final detailed design of the transmission line, which is influenced by the terrain, land use, and economics. Alignment options may also slightly increase or decrease quantity of structures.
e. An estimate of the dependable capacity, average annual and average monthly energy production in kilowatt hours (or mechanical equivalent).

The proposed Project is pumped storage and it will be operated to meet peak energy demands in Southern California and potentially in Arizona and Nevada. The project, as currently being planned, will provide 1,300 MW of output that is 100 percent dependable and dispatchable to satisfy energy needs during peak demand periods. Assuming a plant capacity factor of 20 percent, which is typical of conventional pumped storage projects, average annual energy production of the Project is projected to be 2,100 GWh.

The Project would provide 17,700 acre-feet of usable storage for on-peak generation. This is equivalent to 18.5 hours of generation at the total turbine hydraulic capacity of 11,600 cfs and 24,050 MWh of energy production. This amount of energy could be provided during a single 18.5-hour period if needed. More typically, 10,400 MWH would be provided during an 8-hour period of on-peak generation each weekday.

### 3.2 Current and Proposed Operations

The Project will operate as a typical hydroelectric pumped storage facility to convert low-value off-peak energy into high-value on-peak energy in response to demands from the electrical system. The capacity of the project, nominally 1300 MW, is 100 percent dependable and can be dispatched in response to peak demands and to replace capacity that may be lost in the system due to outages of other peaking and base-load plants.

The amount of energy storage required for the Project has been based on the following factors and assumptions.

<table>
<thead>
<tr>
<th>Plant Hydraulic Capacity</th>
<th>11,600 cfs</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-Peak Weekday Generation</td>
<td>9 hours</td>
</tr>
<tr>
<td>Off-Peak Weekday Pumping</td>
<td>8 hours</td>
</tr>
<tr>
<td>Cycle Efficiency</td>
<td>0.75</td>
</tr>
<tr>
<td>Charge-to-Discharge Ratio</td>
<td>1.10</td>
</tr>
<tr>
<td>Energy Storage</td>
<td>18.5 hours</td>
</tr>
</tbody>
</table>

The cycle efficiency accounts for machine efficiency and hydraulic losses in both the pumping and generating portions of the operating cycle. Cycle efficiency is expressed as the overall efficiency of the generating cycle times the overall efficiency of the pumping cycle. For example, if the overall generating efficiency is 85 percent and the overall pumping cycle
efficiency is 85 percent, the cycle efficiency is 72.2 percent. The estimated cycle efficiency of Eagle Mountain is 75 percent.

The charge-to-discharge ratio is the ratio of the unit’s average pumping load to its rated generating capacity. This parameter is a characteristic of the pump-turbine design and how the unit is rated. Typically this ratio is in the range of 1.1 to 1.2. The estimated charge-to-discharge ratio at Eagle Mountain is 1.10.

Project operation typically will involve release of water from the Upper Reservoir through the hydroelectric facilities during peak demand periods each weekday, which is then stored in the Lower Reservoir. At night, water will be pumped using off-peak energy from the Lower Reservoir into the Upper Reservoir. On weekends, any storage that had not been returned to the Upper Reservoir will be pumped using off-peak energy.

The Project is expected to have a plant capacity factor in the range of 20 percent. Plant capacity factor is often expressed as the total annual generation divided by the potential full-load generation if the plant were running 100 percent of the time. Pumped storage plants typically have low capacity factors because they only operate on peak. A factor of 20 percent is typical for pumped storage. Therefore, average annual on-peak generation is expected to be approximately 2,100 GWh. The use of off-peak energy for pumping is estimated to be approximately 2,800 GWh.

Significant wind and solar projects exist or are planned for development in the Project area. More than 2,000 MW of wind power have been built in California, and more capacity is planned. The San Gorgonio Pass area of central Riverside County has 359 MW of wind generation capacity (California Energy Commission, 2006). This area is less than 100 miles from the Project. There are also eight solar projects now planned for the Chuckwalla Valley, one within 5 miles of the Project, with over 1000 MW estimated total capacity proposed (Bureau of Land Management, personal communication, October 2007).

There are beneficial synergies between a pumped storage development and non-firm energy from wind and, potentially, solar projects. Wind power is only generated when the wind is blowing, and that does not always correspond to times of power demand. “Control power” is needed for times of high wind when the electrical grid cannot absorb the excessive power, and energy should be stored for times of insufficient wind.

Pumped hydropower stores energy by using surplus power for pumping water from a lower level to a higher level. Thus, the Eagle Mountain Project can serve as a “battery” for nearby wind farms, enhancing the efficiency of this renewable energy source. In addition, energy generation from pumped storage can be rapidly adjusted to match demand, enhancing the overall reliability of the transmission system.

These synergies will be explored in detail during the license application process and fully considered in evaluating the economic and financial feasibility of the Project.
3.3 **Existing License**

ECE will be submitting an application for a new license; no existing license applies to this project.

3.4 **Plans for Future Development or Changes**

All facilities are new relative to hydroelectric development and there are no existing water storage, conveyance, and hydroelectric facilities that will be modified by the proposed Project.
4 Existing Environment and Resource Impacts

4.1 General Basin Description

The Project is a 1,300 MW pumped storage facility to be located within the eastern portion of Riverside County, California, at the closed Eagle Mountain iron ore mine complex. The Project is surrounded by a mix of private and publicly owned lands. Joshua Tree National Park (JOTR) lies within approximately three miles to the north and south, and approximately nine miles to the west.

The Project is within the Eagle Mountains, at the eastern terminus of the Transverse Ranges physiographic province. The Transverse Ranges are unusual in that they trend east-west rather than north-south as do most ranges in the western United States. The Transverse Ranges province extends about 325 miles from Point Arguello and San Miguel Island on the west coast of California to the Coxcomb Mountains on the east (Norris and Web 1976).

The Project area is located in an arid desert region, characterized by very little annual precipitation and high temperatures (Figures 4-1 and 4-2, Volume 1). Average annual precipitation at the Project site is approximately 3.8 inches (Western Regional Climate Center 2007). Rainfall is typically seasonal with winter storms occurring from October through March and intense summer thunderstorms occurring from July to September. Very little or no rain falls from April to June (Figure 4-1, Volume 1). Monthly average temperature from 1961 to 1990 was approximately 74 degrees F. July is typically the warmest month with an average maximum temperature of 105 degrees Fahrenheit (°F), while the coldest month over the same reporting period was January with an average maximum temperature of 65 degrees °F (Western Regional Climate Center 2007).

The Project is located in the eastern portion of the Eagle Mountains at an elevation ranging from 1,000 to 2,900 feet above sea level, based on the national geodetic vertical datum of 1929. Outside of the Project site, peaks reach an elevation of about 4,000 feet above sea level. The Eagle Mountains are an east-west trending range within the Basin and Range physiographic province of the United States. Surface drainage flows from the site to the east into the Chuckwalla Valley, an alluvium-filled basin covering approximately 870 square miles. Valley elevations range from approximately 1,050 feet above sea level near the Project site to about 650 feet above sea level near the center of the valley. Site topography is dominated by former iron mine pits resulting from extensive human modification of the landscape for mineral extraction.

The proposed Project is located on the northern edge of the Colorado Desert in Southern California, close to the transition zone between the Colorado and Mojave Deserts. The Colorado Desert borders three other distinctly different deserts: the Mojave to the north; the
Great Basin to the east; and the Sonoran to the south. The Colorado and Mojave desert regions can be divided into three major plant belts depending on elevation: pinon (above 4,200 feet); yucca (from 3,000 to 4,200 feet); and creosote (below 3,000 feet) (Miller and Stebbins 1964). All components of the proposed Project lie entirely within the low elevation creosote plant belt.

The Eagle Mountain open-pit iron ore mine was operated by Kaiser Steel Corporation (Kaiser) on a full-time basis from 1948 (County of Riverside and BLM 1996). Kaiser recovered 940 million tons of material from four pits (East, Central, Black Eagle Pit North, and Black Eagle Pit South), of which 712 million tons was waste rock. The mine pits exhibit steep sidewalls and near-horizontal benches. The waste rock is stored on site in overburden piles or disposal areas adjacent to the mining pits. The fine mine tailings – sand, silt, and clay – remaining from ore concentrating operations are kept in impoundments constructed on site (County of Riverside and Bureau of Land Management 1996). Over 5,500 acres were disturbed during mining operations.

In the Project vicinity, surface waters exist only as runoff following heavy rains. The principal natural water course in the Project area is the ephemeral Eagle Creek, which rises in a fairly extensive watershed with a tributary area of approximately 4,620 acres consisting of high mountain peaks located south of the Central Pit. The ephemeral Bald Eagle Creek has a tributary area of 1,210 acres north of the East Pit (Mine Reclamation Corporation 1997). Historically, Eagle Creek and Bald Eagle Creek converged and runoff was dispersed as sheet wash along an alluvial fan to the southeast of the now abandoned town of Eagle Mountain. Development of the Eagle Mountain Mine and industrial area disrupted the natural drainage. Eventually, runoff from Bald Eagle Creek and Eagle Creek was diverted into the western bowl of the East Pit. The total area draining to the East Pit is 6,300 acres. The East Pit is of sufficient volume to retain the 24-hour 100-year storm event (Mine Reclamation Corporation 1997).

Several tailings basins constructed to the southeast of the East Pit act as individual retention basins for precipitation, and no runoff is generated from these areas. Runoff generated from the former ore processing, maintenance, and warehouse areas just north of the town of Eagle Mountain is intercepted by existing rock and earthen channels and conveyed eastward along Kaiser Road and dispersed to desert land to the southeast. Earth and rock berms have been constructed to protect the community (Mine Reclamation Corporation 1997).

There are no perennial, natural surface bodies of water in the Chuckwalla Valley (SCS, 1990). Some intermittent springs exist in the northwest portion of the valley; however, none are recorded as year-round, permanent springs. No wetlands or fish resources exist within the proposed Project boundaries.

The Colorado River Aqueduct (CRA) crosses near the Project site to the southeast. The CRA is a 242-mile water conveyance system that transports water from the Colorado River at Lake
Havasu to Lake Mathews, Riverside County, California. It is owned and operated by the Metropolitan Water District of Southern California (MWD) and supplies drinking water for communities of Southern California. The aqueduct is uncovered (except for siphons) in the northern portion of the Chuckwalla Valley, then covered from approximately 0.25 miles north of the proposed lower reservoir to the Eagle Mountain Pumping Station, approximately four miles south of the Project site.

Most activity at the Eagle Mountain Mine pre-dated the California Surface Mining and Reclamation Act (SMARA) so the mine area was not subject to modern mine reclamation requirements. In 1976, Kaiser prepared a mine reclamation plan for the area that required limited reclamation activities, removing equipment and buildings, and restricting public access (Mine Reclamation Corporation 1997).

Mine Reclamation Corporation has leased 4,654 acres of the Eagle Mountain Mine site for development as a non-hazardous solid waste landfill (Class III). The Eagle Mountain Mine reclamation plan was amended in 1997 to account for the landfill project. The amended reclamation plan calls for the ultimate use of the site to be open desert land (Mine Reclamation Corporation 1997). However, the landfill project is on hold, pending resolution of legal issues associated with a land exchange between Kaiser and BLM. In the meantime, no further mine reclamation work is required or scheduled.

The landfill project and the pumped storage project are separate and compatible projects. Development of the Project will not preclude development of the landfill on the adjacent lands.

### 4.2 Geology and Soils

#### 4.2.1 Data or Studies Summaries

Extensive geologic investigations have been performed for the Eagle Mountain Site. Mineralogical studies were conducted prior to and during operation of the iron ore mining activities at the site. In the early 1990s, comprehensive site investigations were performed during landfill siting studies. The results of those investigations were summarized in the Eagle Mountain Pumped Storage Project Application for FERC License (EMEC, 1994), which was based largely on the Report of Waste Discharge for the Eagle Mountain Landfill and Recycling Center by GeoSyntec Consultants (GeoSyntec) in 1992. Additional summary site investigations were performed by GeoSyntec in 1996. The descriptions of geology and geologic hazards provided in this report are primarily a re-presentation of information contained in those original documents for potential site development.
4.2.2 Description of Environment

4.2.2.1 General Geologic Setting

The project site is located in the northeast 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 4-3, Volume 1). 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. 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 are typically found along the northeast limb of this anticline. The iron ore deposits are comprised of magnetite and hematite, which were formed by the replacement of carbonate meta-sedimentary rocks.

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 (EMEC, 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 approximately five miles, both to the north and south of the site, while northwest-trending faults are present 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 Holocene deformation as indicated by the unbroken alluvial deposits that overlie them (EMEC, 1994).

The site is cut by a series of northeast-trending dikes. The dikes have near-vertical dips and lie at approximately right angles to the northwest trending faults. Where exposed, dikes that cross the northwest-trending faults are not offset by the faults (EMEC, 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 (EMEC, 1994). Range-
front faults do not appear to be present along the eastern side of the Eagle Mountains.

4.2.2.2 Project Area Geology

Bedrock geologic units present at the site can be generally classified as either igneous or 
meta-sedimentary. The igneous rocks are principally comprised of Mesozoic-age quartz 
monzonite. The meta-sedimentary units include quartzites, meta-arkoses, and marbles 
formed by metamorphism and/or hydrothermal-alteration or sandstones, conglomerates, 
arkoses, and carbonate rocks deposited in the Paleozoic or Precambrian age. 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 4-4, Volume 1.

4.2.2.3 Formational Rock Stratigraphy

4.2.2.3.1 Meta-Sedimentary Rock Units

The meta-sedimentary units dip to the northeast in the site area, with dips ranging from 30 to 
60 degrees (EMEC, 1994). The meta-sedimentary units can be subdivided into six distinct 
units, which include three quartzite units, two marbles, and a schistose meta-arkose. These 
units, beginning with the oldest and proceeding to the youngest, are described by GeoSyntec 
(1992) [in EMEC, 1994] as follows:

- **Lower Quartzite**: This unit consists of a vitreous white to light-gray quartzite that is 
  very coarse-grained and massive with bedding obscured or obliterated. This quartzite 
  is compositionally supernature, commonly consisting of 98 to 99 percent quartz. The 
  thickness of the unit is 1,000 feet (300 m) or more.

- **Schistose Meta-arkose**: This unit consists of a gray, medium-grained, meta-arkose 
  with schistose structure. Iron oxide staining throughout the unit has locally produced 
  reddish-and purplish-brown colors. The unit has high percentages of quartz, feldspar, 
  sericite, and clay, with minor amounts of chlorite, biotite, apatite, and opaque 
  minerals. The thickness of the unit ranges from 20 to 200 feet (6 to 60 m).

- **Lower Marble**: This unit consists of marble that is white, very coarse-grained with 
  ferriferous layers of hematite-dolomite. The unit thickness ranges from 20 to 200 feet 
  (6 to 60 m). The minerals magnetite and hematite are abundant in the iron ore zone, 
  and gangue minerals associated with the ore are mainly pyrite, actinolite, and 
  tremolite. Other associated minerals include diopside, serpentine, calcite, gypsum, 
  and garnet.

- **Middle Quartzite**: This unit consists of quartzite that is green and dark gray, fine- to 
  medium-grained, vitreous, and banded. Conglomerate containing pebbles and 
  cobbles of quartz and quartzite occurs in layers and lenses up to 10 feet (3 m) thick
that are interbedded with cross-bedded quartzite near the base of this rock unit. Hematite imparts a characteristic rusty-brown stain to weathered rock in this unit. The thickness of the unit ranges from 150 to 400 feet (45 to 120 m). Banded varieties of quartzite are also present primarily due to the presence of diopside.

- **Upper Marble**: This unit consists of dolomite marble that is white to light-gray on fresh surfaces and grayish orange to buff on weathered surfaces. The rock is a very coarse-grained, recrystallized dolomitic marble with grains up to 1 cm across, and is thin- to thick-bedded to massive. The thickness of the unit ranges from 50 to 400 feet (15 to 120 m). An iron ore zone has formed within the unit as a function of hydrothermal replacement of host rocks. The metallic mineralization in the ore zone is magnetite and hematite. Gangue minerals associated with the ore are pyrite, actinolite, and tremolite.

- **Upper Quartzite**: This unit consists of quartzite that is mottled gray and bluish gray, vitreous, fine- to coarse-grained, medium-bedded to massive with low-angle sets of tangential planar cross-laminations. This unit is compositionally mature, consisting of 95 percent or more quartz. The rock contains thin interbeds of meta-arkose and conglomeratic lenses comprised of pebbles and cobbles of quartzite. The thickness of the unit is several hundred feet.

### 4.2.2.3.2 Igneous Rock Units

Igneous rocks at the Eagle Mountain site include several varieties of granitic rocks including porphyritic quartz monzonite, diorite, monzonite porphyry, granodiorite, and granite (EMEC, 1994). These rock types are collectively referred to as "granitic rocks." In addition to the granitic rocks, two discrete sets of igneous dikes cut across the site. GeoSyntec (1992) [in EMEC, 1994] described the igneous rocks units as follows:

- **Granitic Rocks**: This generalized rock unit consist of subunits including, from youngest to oldest: 1) biotite monzonite that is coarse-grained and typically contains 25 to 35 percent quartz; 2) biotite monzonite that is coarse-grained and porphyritic with abundant quartz and alkali feldspar; 3) sphene-biotite-hornblende granodiorite that is medium-grained; 4) quartz-poor monzonite that is coarse-grained; and 5) hornblende-biotite, quartz-poor, monzonite that is coarse-grained and porphyritic. Some subunits exhibit gneissic banding.

- **Dikes**: Two systems of dikes were mapped within the proposed project site. One system consists of mafic dikes oriented in a general northwest-southeast direction. The other comprises light- to medium-gray andesite and andesite porphyry dikes that trend northeast-southwest. Andesite dikes in the Chuckwalla/Chocolate Mountains, to the southeast of the proposed site, were dated at 25 to 29 million years old.
Age dating of the mafic dikes was completed as part of the fault investigations completed by Proctor (1993) [in EMEC, 1994]. Two samples were collected for radiometric dating. Results of these tests indicated ages of 124±3 MY and 234±6 MY (EMEC, 1994).

4.2.2.4 Surficial Deposits

4.2.2.4.1 Natural Alluvial Deposits

Surficial geology of the Eagle Mountain area is shown on Figure 4-5 Volume 1. Unconsolidated alluvial deposits are found in several locations within the site area. The alluvial deposits include sands, silts, gravels, and debris-flow deposits (EMEC, 1994). The most significant 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. Some of these deposits are exposed in the east wall of the east pit, in an area that would underlie the lower reservoir (EMEC, 1994). Elsewhere within the area of the pumped storage project, alluvial deposits are confined to laterally discontinuous, generally thin deposits along the bottoms of the canyons (EMEC, 1994).

Extensive investigations of the alluvial deposits were completed by GSi/water (GeoSyntec, 1992) [in EMEC, 1994]. Investigations included analysis of aerial photography, surface mapping, trenching, geophysical surveys, and drilling. The following four alluvial units were identified by GSi/water:

- **Unit I**: This unit is composed predominantly of flat elongate cobbles (85 percent), boulders (5-10 percent), and fines (silt and clay-size particles), sand, and gravel (±5 percent). This unit forms an extensive dark red-brown to nearly black desert pavement that is nearly devoid of vegetation.

- **Unit II**: This unit is similar to Unit I, but has more fines, sand, and gravel (15 percent) with some desert pavement. This unit is reddish-brown and supports low-lying desert shrubs.

- **Unit III**: This unit contains greater percentages of sand and fines than Units I or II. The clasts are typically more angular in shape. This unit has little or no desert pavement and supports moderately dense desert vegetation.

- **Unit IV**: This unit is similar to Unit III, but is located in stream-bed channels and supports thicker floral growth, including shrubs and palo verde.

These units are irregularly layered on top of one another within the alluvial wedge east of the mountain front. Individual units are typically elongated in an east-west direction and reflect the location of the primary depositional channel at the time of deposition. The total thickness of the alluvial fan is on the order of a few tens of feet near the mountain front. It thickens
steadily to the east, reaching a maximum thickness of more than 2,000 feet in the eastern part of the Chuckwalla Valley (EMEC, 1994).

Alluvial deposits in the western portion of the site are confined to the canyon bottoms (EMEC, 1994). These deposits are typically composed of sandy gravel, but may vary locally from sand and gravelly sand to gravel. These deposits are discontinuous and range in thickness from 0 to 50 feet. The thickest deposits are found near the mouths of canyons. Older alluvial deposits in the upper portions of the canyons may be locally cemented (EMEC, 1994).

An ancient alluvial fan is exposed near the base of the north wall in the East Pit of the Eagle Mountain Mine (EMEC, 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 East Pit, debris flow deposits rest directly on bedrock (EMEC, 1994).

### 4.2.2.4.2 Mining By-Product Deposits

Mining by-products generated by the former Kaiser operations were deposited in numerous areas near the site (Figure 4-5, Volume 1). These by-products 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 mining waste materials are described below:

- **Overburden**: Overburden materials removed during mining operations were stockpiled at several locations in the site area. The largest piles of overburden are located on the eastern edge of the site, to the northeast of the East Pit, along the northern rim of the East Pit, adjacent to the former haul road about midway between the Central and East Pits, and to the southeast of the Central Pit. The total volume of overburden materials on-site is estimated to be in excess of 100 million cubic yards (EMEC, 1994). Grain-size testing on these materials indicated a locally variable mix of sands, gravels, cobbles, and boulders, with up to 26 percent silt and clay.

- **Fine Tailings**: The hydraulically placed fine tailings were placed in six separate settling ponds to the southeast of the Central Pit. Total volume of these materials is estimated to potentially be over 19 million cubic yards (EMEC, 1994). Laboratory testing (GeoSyntec, 1992) [in EMEC, 1994] indicated the fine tailings vary in composition, ranging from silty sand and sandy silt to clayey silt to silty clay. In general, soils with higher sand content are located near the slurry discharge point while finer grained soils are present in the distal portions of each pond. Based on available test results, the fine tailings are suitable for use as a reservoir liner or for construction of a low-permeability central core in embankments proposed for the upper reservoir site (EMEC, 1994).
### Coarse Tailings

Coarse tailings were placed at several locations around the site, although the largest deposit lies immediately south of the East Pit. The total volume of coarse tailings in this stockpile is estimated to be about 50 million cubic yards (EMEC, 1994). A testing program for the coarse tailings (GeoSyntec, 1992) [in EMEC, 1994] indicated the majority were classed as clean gravels or sandy gravels containing significant percentages of cobbles and boulders and few fines. Based on the available test data, the coarse tailings were judged to be suitable for use in embankment construction (EMEC, 1994).

### Geologic Structures

Several steeply dipping, pre-Holocene faults have been mapped at the site. These faults were investigated in detail by Proctor (1993) and Shlemon (1993) during landfill siting studies completed by GeoSyntec (1992) [in EMEC, 1994]. The most prominent faults at the site are the Bald Eagle Canyon fault, which trends northwest-southeast along Bald Eagle Canyon, and an unnamed parallel fault about 4,600 feet (1,400 m) to the west. The faults do not cut overlying Quaternary sediments, or, in the case of the latter fault, a cross-cutting andesite dike (EMEC, 1994).

Several bedrock joint systems have been mapped at the site (EMEC, 1994). The most prominent joint set trends northwest-southeast, parallel to the trend of the Bald Eagle Canyon fault. A second joint set is oriented approximately perpendicular to the first, and trends northeast-southwest. Less-developed joint systems with east-west and north-south trends were also noted in the fault studies, as was a set of shallowly dipping joints of varying strike (EMEC, 1994).

### Mineral Resources

#### Ore Deposits and Mining History

The central project area occupies an ore mineral-rich zone of the Eagle Mountains. Iron is the most important ore found within both the primary minerals of this zone, magnetite and pyrite, and within the secondary minerals, hematite and geothite (DuBois and Brummett, 1968) [in EMEC, 1994].

The central project area occupies a portion of the inactive Eagle Mountain Mine. This facility began operations in 1948 to extract iron ore from these deposits. During the life of the mining operation, 940 million net tons of rock were mined from the pits. With the closure of Kaiser’s Fontana, California steel mill, the Eagle Mountain mine lost its principal market, forcing the mine’s closure as well (Mine Reclamation Corporation 1997). Ore crushing and concentrating facilities were subsequently dismantled and the mining equipment sold. By 1986, most of the mine’s infrastructure had been abandoned (Kaiser and MRC, 1991) [in EMEC, 1994].
The proposed project would utilize two of the three inactive pits at the Eagle Mountain Mine site: the East Pit and the Central Pit. The western-most of the three pits, the Black Eagle pit, is outside the proposed central project area and would not be affected by construction and operation of the pumped storage hydroelectric facility, access roads, or transmission line.

4.2.2.7 Iron Ore Resources

Approximately 170 million short tons of iron ore reserves, considered economically recoverable at the time the mine was closed, remain on the entire Eagle Mountain Mine site (Mine Reclamation Corporation, 1997). Eagle Mountain iron ore reserves are magnetite mixed with pyrite, or magnetite and hematite with small amounts of pyrite. The grades of ore remaining on the site are not a salable, direct shipping ore grade, but would have to be crushed and concentrated to produce salable products (Mine Reclamation Corporation, 1997). Following suspension of mining operations, equipment and structures were removed from the mine site; consequently no means exists on site to convert ore into a salable product (Mine Reclamation Corporation, 1997). Thus, a new concentration facility would need to be built if large-scale mining activity were to resume at Eagle Mountain (Kaiser and MRC, 1991) [in EMEC, 1994].

The reserves located in the alluvial resource area in the East Pit are the best candidates for future iron ore mining at Eagle Mountain. Approximately 13 percent of the remaining open pit ore reserves are located in this area. These deposits contain a low average iron content; the iron could be concentrated at a relatively inexpensive facility. However, iron ore mining at Eagle Mountain was completely dependent on the availability of rail transportation. The rail line has been inactive since 1986 (Mine Reclamation Corporation, 1997).

The mineral rights to these placer deposits are 100 percent state reserved (EMEC, 1994). As of 1994, the California State Lands Commission had granted a mineral extraction lease permit to Kaiser (EMEC, 1994). However, activation of placer mining is complicated by the present lack of equipment or a mining infrastructure at Eagle Mountain (EMEC, 1994).

4.2.2.8 Soil Resources

Soils potentially impacted by the proposed project include those that would be affected by construction of the major project facilities within the proposed generating facility area, those that would be traversed by the proposed transmission line, and those crossed by the water supply corridor.

4.2.2.8.1 Proposed Generating Facility Area

Detailed soils mapping within this area had not been conducted by 1994. The soils map (Figure 4-6, Volume 1) produced by EMEC (1994) was based on soils mapping by the United States Soil Conservation Service (SCS) in the Desert Center area (Kim, 1993); a SCS soil survey for the Coachella Valley area (Knecht, 1980); and studies by EMEC, including
August 1993 field observations, interpretation of 1:24,000 scale topographic maps, and aerial photo interpretation.

The soils within the project area have developed in a mid-latitude, low desert environment at elevations ranging from 1000 to 2800 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 (EMEC, 1994).

The referenced reports indicate that the proposed generating facility area has been divided into five soil mapping units (EMEC, 1994), which are described below:

- **Typic Torripsamments, sandy, mixed, hyperthermic, 2 to 5 percent slopes:** These soils are very deep, excessively drained, sand and loamy sand horizons formed in alluvial fan deposits at the foot of the Eagle Mountains. The water erosion hazard of these soils is moderate because of minimal vegetative protection.

- **Typic Torripsamments, sandy, mixed, hyperthermic, 5 to 15 percent slopes:** These soils are deep, excessively drained, sand and loamy sand horizons formed in alluvium within the valley bottoms of the Eagle Mountains. The water erosion hazard of these soils is moderate because of minimal vegetative protection.

- **Lithic Torripsamments, sandy skeletal, mixed - Rock Outcrop complex, 15 to 75 percent slopes:** In addition to rock outcrops, this complex includes 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.

- **Mine Dumps/Tailings:** Soils in these areas consist of mixed cobbles and soil deposited by human activity. These deposits have not been stable long enough to develop characteristic soil profiles.

- **Mine Pits:** The pit excavations are characterized by disturbed rock outcrops or a thin mantle of mixed soil and cobbles deposited by human activities.

**4.2.2.8.2 Water Supply Corridor**

Current published regional SCS soils surveys in eastern Riverside County are limited to the Coachella Valley Area (Knecht, 1980), located tens of miles southwest of the Eagle Mountain site, and the Palo Verde Area (Elam, 1974), similar distances east of the site near Blythe. Therefore, detailed soil mapping of the water supply corridor in the western Chuckwalla Valley has not been performed. The few areas that were examined along the route by EMEC (1994) were typically characterized by irrigated agriculture. In their report,
EMEC (1994) also used site-specific mapping in the Desert Center Area by Kim (1993) [in EMEC, 1994] to provide a general picture of soils along the water conveyance corridor.

Soils within the water supply corridor have developed in a mid-latitude, low desert environment at elevations ranging from 500 to 2,500 feet MSL. The basin slopes gently from the northwest to the southeast. Vegetation is typically Sonoran desert shrubland, creosote bush shrub, with some desert dry wash woodland, and irrigated farmland (EMEC, 1994).

The proposed pipeline route follows an existing transmission line corridor (Figure 4-7, Volume 1). Kim (1993) [in EMEC, 1994] described these soils as Carsitas gravelly loamy sand. The Carsitas series consists of excessively drained, very deep soils formed in alluvium from granitic parent material. These soils have low runoff, moderately rapid to rapid permeability.

The proposed water supply corridor meets Kaiser Road and proceeds through a desert basin environment crossed by numerous washes (EMEC, 1994). The soils of this area are gravelly loamy sands with particle size decreasing with distance from the mountains. Kim (1993) [in EMEC, 1994] suggests that the sandy surface horizon typically extends five to six feet in depth.

### 4.2.2.8.3 Transmission Line Corridor

The proposed transmission line corridor extends to the southeast and east along the southern side of Chuckwalla Valley, ending short of Palo Verde Mesa near Blythe (see Figure 4-8 Volume 1). Limited soils mapping was performed by Kim (1993) in the Desert Center Area, south of the western end of the corridor. EMEC’s (1994) review of this information suggested that soils near the water supply corridor, which parallels the transmission line corridor through the west end of Chuckwalla Valley, is overlain by Carsitas gravelly loamy sand formed in alluvium. The Carsitas series consists of excessively drained, very deep soils (five to six feet depth) with low runoff potential and moderately rapid to rapid permeability.

Soils along the transmission line corridor have developed in a mid-latitude, low desert environment at elevations ranging from 400 to about 1400 feet MSL. Slopes range from gently sloping to nearly level as the corridor extends southeast down into Chuckwalla Valley, where it generally follows the contour on the valley’s south side. This area is likely overlain by the same Carsitas series soils.

Regional geology maps (Figure 4-4, Volume 1) indicate that the eastern nine miles of the corridor are underlain by dune sand. Dune sands are typically clean, fine to coarse sands, derived from recent alluvium, that are subject to eolian erosion/drift. Where migratory, these sands are excessively drained, have negligible runoff and rapid permeability, and are sparsely vegetated. Where sheets of dune sand are more stable, soils of the Rositas series can form.
These soils are also excessively drained and have negligible to low runoff and rapid permeability but can support some Sonoran desert shrubland.

4.2.2.9 Earthquakes and Faults

Landfill siting studies completed by Kaiser and MRC (1991) [in EMEC, 1994] and GeoSyntec (1996) included seismic hazard assessments to evaluate the potential for surface ground displacement from movement of active and potentially active faults, and for strong shaking from active faults, potentially active faults, and from non-specific area sources of seismicity. Active faults (Bryant, et al., 2007) are defined as faults along which seismically induced (tectonic) displacement has occurred in the past 11,000 years (the Holocene epoch). Potentially active faults are defined as faults along which tectonic displacement has occurred between 11,000 and 1.6 million years before present (ybp) (the Pleistocene epoch). Inactive faults are defined as faults along which tectonic displacement has not occurred in the past 1.6 million years (since the beginning of the Quaternary period).

4.2.2.10 Regional Faults

There are numerous active and potentially active faults and fault zones located within 100 miles (161 km) of the site (Figure 4-9, Volume 1). Based on the Fault Activity Map of California (Jennings, 1994), the nearest active faults to the Eagle Mountain site are the Hot Springs fault and the paralleling San Andreas fault (Coachella segment), located about 30 miles (48 km) and 33 miles (53 km) southwest of the site, respectively. The Alquist-Priolo Earthquake Zoning Act (Bryant, et al, 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 Eagle Mountain site are the Hidden Springs Fault, located 29 miles (47 km) to the southwest, the aforementioned Hot Springs fault, and the mid-east portion of the Pinto Mountain fault, located 32.5 miles (52 km) to the northwest. Potentially active faults from the late Quaternary 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 an enechelon segment located about 4 miles (6 km) north of the site; the Salton Creek fault, about 23.5 miles (38 km) to the southwest; and eastern segments of the Pinto Mountain fault, located 30.5 miles (49 km) northwest of the site. In addition to these fault-specific sources, previous investigations of seismic exposure at the Eagle Mountain site (EMEC, 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. Table 4-1 identifies the faults and non-specific source zones considered in this seismic assessment, the closest distance from each
source to the site, the length of each fault or area of each non-specific source zone, and the maximum event magnitude.
## Table 4-1  Significant Seismic Sources within 100 km of the Eagle Mountain Site

<table>
<thead>
<tr>
<th>Fault or Fault Zone</th>
<th>Closest Distance Miles (km)</th>
<th>Length or Area 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Length (km)</td>
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<tr>
<td></td>
<td></td>
<td>or Area 2 (km²)</td>
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<tr>
<td></td>
<td></td>
<td>Maximum Credible Earthquake²</td>
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<tr>
<td></td>
<td></td>
<td>Recurrence Interval (years)</td>
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<tr>
<td></td>
<td></td>
<td>M ≥ 4.5</td>
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<tr>
<td></td>
<td></td>
<td>M ≥ (Mmax - 0.50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maximum Credible Earthquake Peak Horizontal Acceleration³</td>
</tr>
<tr>
<td>Blue Cut Fault</td>
<td>4 (6)</td>
<td>L – 52 (83)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.5</td>
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<tr>
<td></td>
<td></td>
<td>39.5</td>
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<tr>
<td></td>
<td></td>
<td>12,500</td>
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<td></td>
<td></td>
<td>0.48</td>
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<tr>
<td>Pinto Mountain Fault</td>
<td>28 (45)</td>
<td>L – 50 (80)</td>
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<td></td>
<td></td>
<td>7.2</td>
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<tr>
<td></td>
<td></td>
<td>7.2</td>
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<tr>
<td></td>
<td></td>
<td>2,290</td>
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<td></td>
<td></td>
<td>0.10</td>
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<tr>
<td>Southeast Transverse Ranges Zone</td>
<td>3 (5)⁴</td>
<td>A – 2,602 (6,737)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.75</td>
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<td></td>
<td>2.3</td>
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<tr>
<td></td>
<td></td>
<td>166</td>
</tr>
<tr>
<td>San Bernardino Mountains Zone</td>
<td>56 (90)</td>
<td>A – 832 (2,156)</td>
</tr>
<tr>
<td>Eastern Mojave Zone</td>
<td>7 (11)</td>
<td>A – 8,500 (22,008)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.0</td>
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<td>6.2</td>
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<td></td>
<td></td>
<td>778</td>
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<tr>
<td>Sonoran Zone</td>
<td>14 (22)</td>
<td>A – 44,608 (115,487)</td>
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<td></td>
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<td>6.5</td>
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<td>44.7</td>
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<td>1,412</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td>Salton Zone</td>
<td>34 (55)</td>
<td>A – 12,464 (32,269)</td>
</tr>
<tr>
<td>San Andreas Fault³</td>
<td></td>
<td>7.0</td>
</tr>
<tr>
<td>- Coachella Valley Segment</td>
<td>33 (53)</td>
<td>L – 27 (69)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.0</td>
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<td>69.5</td>
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<td></td>
<td></td>
<td>695</td>
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<tr>
<td>- San Bernardino Segment</td>
<td>40 (65)</td>
<td>L – 48 (125)</td>
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<tr>
<td></td>
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<td>8.0</td>
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<td>0.8</td>
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<td></td>
<td>795</td>
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<td></td>
<td></td>
<td>0.11</td>
</tr>
</tbody>
</table>

Notes:  
1L – length and A – area.  
²Maximum Credible Earthquake (MC) is the “maximum earthquake that appears capable of occurring under the presently known tectonic framework” as defined by the California Geologic Survey. The MCE represents a seismic event more severe than the Maximum Probable Earthquake. The MCE is presented in this table as a means of indicating the relative differences in fault source characteristics.  
³Using mean attenuation relationship of Sadigh as reported by Joyner and Boore (1988).  
⁴Site is within S.E. transverse Range. Minimum site to source distance assumed to be five kilometers.  
⁵Minimum magnitude equal to 6.5 for Coachella Valley Segment. Magnitude 8.0 maximum event assumes simultaneous rupture of Coachella Valley, San Bernardino, and Eastern Mojave Segments.  
Source: EMEC, 1994
4.2.2.11 Regional Seismicity

The California Geological Survey 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 (CGS, 2001). Figure 4-10, Volume 1 is a plot of this earthquake activity in the project region. The data shown in Figure 4-10, Volume 1 are only considered complete for the past 75 years, since establishment in 1932 of the Southern California Seismic Network jointly administered by the United States Geological Survey and California Institute of Technology. Prior to 1932, only events large enough and close enough to be felt in populated areas are known. Locations of these events are inferred, based upon either observations of surface rupture or report of observed shaking intensity.

Figure 4-10, Volume 1 shows the site 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. Upon review of recorded seismicity in the region, and using the attenuation relationship developed by Sadigh as reported by Joyner and Bore (1988), GeoSyntec (1992) [in EMEC, 1994) estimated that the strongest ground motion at the site from historical events was about 0.15 g, using mean attenuation rates, and 0.27 g using mean plus one standard deviation.

Based on the distances to recognized regional seismic sources and a “random earthquake” of Magnitude 6.75 located 3 miles (5 km) from the Eagle Mountain site, deterministic calculations of potential ground motion at the site were performed (EMEC, 1994; GeoSyntec, 1996). The calculations, which used the attenuation relationship developed by Sadigh (Joyner and Bore, 1988), estimated a highest horizontal peak ground acceleration of 0.48 g from a Magnitude 7.5 event on the Blue Cut fault (EMEC, 1994; GeoSyntec, 1996). More recent probabilistic studies on seismicity in the area (Frankel, et al, 2002) estimate that the site has a 2 percent probability of exceeding peak ground accelerations of between 0.3 and 0.4g in the next 50 years.

4.2.2.12 Local Faulting

Field reconnaissance and review of remote sensing data (GeoSyntec, 1992) by EMEC (1994) identified four ancient fault traces that trend across the site or are within 2000 feet (600 m) of site boundaries. These faults were investigated by Proctor (1993) and Shlemon (1993) to evaluate their activity or potential activity. The investigations included review of available geologic reports of the area, aerial photographs, high altitude infra-red imagery, gravimetric surveys, field mapping, trench excavating and logging, evaluation of local micro-seismicity, and soil-stratigraphic age dating.

The four ancient faults trend northwest across the site (EMEC, 1994), a direction consistent with a pattern of regional faulting believed to have existed in Miocene time (approximately 5 to 22 million years before present (ybp)). In at least one location, a dike of volcanic rock considered
to be of Miocene age is not offset by these faults indicating that they may date to pre-Miocene time (EMEC, 1994). Traces of three of the ancient faults are exposed, and the East Pit provides exposure of some portion of the faults to depths of more than 500 feet (150 m). In some areas, however, tailings piles covered or obliterated the fault traces. Therefore, EMEC (1994) excavated and logged two trenches through the overburden, and reviewed stereoscopic air photos of the mining operations taken from 1944 to 1956. These studies enabled further evaluation of the relationship of these faults to site stratigraphy.

Exposures in the mine pit and trenches at the fault locations indicated unbroken alluvium, providing evidence that there had been no displacement along the ancient faults at the site during Holocene time (EMEC, 1994). The 1994 studies included evaluation of stereoscope air photos taken of the site during mining operations, which indicated no identifiable displacement of alluvium estimated to be at least 40,000 years old. Furthermore, evaluation of aerial photos taken prior to the start of mining operations, and field reconnaissance within the East Pit and the general site area, indicated that no displacement has occurred along faults at the site in the past 100,000 years (EMEC, 1994).

Based upon geologic similarities, all four ancient faults were concluded to be of similar geologic age. Hence, it was concluded that significant displacement has not occurred since Miocene time (approximately 5 to 22 million ybp) and these faults are considered inactive (EMEC, 1994). Further details of the investigations for on-site faults, including information from the Proctor (1993) and Shlemon (1993) studies, are contained in GeoSyntec (1996). Their summary report on faulting and seismicity (GeoSyntec, 1996) supports the conclusion that these faults are pre-Holocene in age.

4.2.2.13 Reservoir Seepage

Bedrock exposed in both the lower and upper reservoir areas is moderately to highly fractured (EMEC, 1994). Existing surface drainage in the Eagle Mountain mine is directed into the East Pit, where it ponds and evaporates or seeps into the ground. In addition to fractured bedrock, the east wall of the East Pit is made up of alluvial deposits. Studies conducted by Kaiser and MRC (1991) [in EMEC, 1994] indicated that the horizontal permeability of these deposits is relatively high (EMEC, 1994). Given the relatively high permeability of the rock that underlies the Central Pit, and the rock and soil units that underlie the East Pit, seepage from the reservoirs during operation of the power project is likely. Seepage will not pose a hazard to any reservoir structures, but would require additional make-up water to replace the amount lost (EMEC, 1994).

4.2.2.14 Ground Subsidence

Ground subsidence should not be a potential project hazard (EMEC, 1994). Poorly consolidated aquifers or petroleum reservoirs that could subside as a result of fluid withdrawals are not present in the project area. Abandoned or active mines in rock units susceptible to subsidence are not known to be present in the project area. Soil deposits that could be susceptible to hydro-compaction subsidence are also not present in the project area (EMEC, 1994).
4.2.2.15  Active and Inactive Mines

The proposed project would utilize two of the three main mining pits at the inactive Eagle Mountain Mine site: the East Pit and the Central Pit. The western-most of the three pits, the Black Eagle Pit, is outside the proposed central project area and would not be affected by construction and operation of the pumped storage hydroelectric facility, access roads, or transmission line.

Two mine adits are located adjacent to the central project area. There are no current plans to use or otherwise disturb these features in conjunction with the proposed construction. The adits appeared to be stable at the time of previous evaluations (EMEC, 1994), although natural minor collapses are possible in the future.

4.2.2.16  Soil Erosion

Construction of the reservoirs, tunnels, and power plant facilities will occur in mined areas and underground and pose no potential for soil erosion. Soil erosion would be increased during the construction of the project in areas where construction activity causes the removal of site vegetation such as well sites and water pipeline routes. Increased erosion would take place within both the upper and lower reservoirs.

4.2.2.17  Landslides and Mass Movement

Previous site observations (EMEC, 1994) indicate that all slopes surrounding the proposed upper and lower reservoirs are human-made mine benches. Kaiser and MRC (1991) [in EMEC, 1994] noted that "approximately 50 to 70 percent of the benches constructed in the bedrock of the East Pit have failed or are unstable." Pit walls and benches on both the north and south sides of the pit have experienced instability (EMEC, 1994). In one area, slope failures are noted as having removed three consecutive benches creating a continuous slope with a height of approximately 180 feet (EMEC, 1994). Such failures are typically attributed to wedge failures of fractured bedrock. Elsewhere, individual benches may be absent for horizontal distances of as much as 200 feet, either due to blasting practices and/or ore removal (EMEC, 1994).

DuBois (1958) [in EMEC, 1994] evaluated observed and potential behavior of rock slopes in the existing and planned mine pits. Based upon examination of the mineral assemblage and structural orientation of each of the major rock units, he concluded that the schistose meta-arkose unit is the least favorable for pit slopes. Shearing associated with metamorphism and the presence of sericite and clay bands parallel to shear planes has weakened the rock mass within this unit. This weakness is augmented by development of secondary iron oxide minerals. Thus, the unit tends to experience stability problems when pit walls are steeper than 1:1 (horizontal to vertical) inclinations (EMEC, 1994).

The 1994 evaluation (EMEC, 1994) indicated that the existing walls of the East Pit consist of mining benches that are approximately 40 feet high and 40 feet wide. The cuts between benches
are typically slightly less than vertical, resulting in an overall slope of approximately 1.3:1 (EMEC, 1994).

In the central pit (upper reservoir), the 1994 study indicated that mine benches were present except along the south side. The average height was estimated between 200 and 300 feet. Bench geometry was described as similar to the east pit, with 40-foot-high cut near-vertical slopes separated by 40-foot-wide benches (EMEC, 1994).

Bedrock jointing in the vicinity of the site is described as well-developed and extensively interconnected (EMEC, 1994). The primary system trends northwest-southeast, paralleling the trend of the major faults within the project area (EMEC, 1994). A secondary joint set is approximately perpendicular to the first and trends northeast-southwest. Locally, there are additional joints with north-south and east-west trends. Both major sets are steeply dipping. A third set of joints is shallow-dipping with varying strikes (EMEC, 1994).

According to the 1994 site studies (EMEC, 1994), the potential for a deep-seated slope failure was extensively investigated by Kaiser and MRC (1991). The analyses investigated both static conditions and seismic (earthquake) conditions using assumed peak horizontal ground acceleration of 0.22g. The analyses were performed using 2-D and 3-D limit equilibrium and kinematic methods that account for the shear strength and orientation of rock discontinuities. Results of the stability analyses found that the existing pit slopes have factors of safety in excess of 1.5 for static conditions, and 1.1 for seismic conditions (EMEC, 1994).

The 1994 evaluation (EMEC, 1994) concluded that no mass soil or rock movements could occur that would affect off-site facilities. The only potential mass soil or rock movements that could occur would be a slope failure within the upper or lower reservoir (EMEC, 1994). Impacts associated with any such failure would be limited primarily to the immediate failure area, although a slope failure impacting the water surface within a pit could cause wave action, potentially undermining the stability of other slopes around the water’s edge.

### 4.2.3 Potential Impacts

#### 4.2.3.1 Mineral Resources

During the life of the project, additional extraction of iron ore from the East and Central pits would be precluded, but could be mined again if the mineral resource was determined to have greater value than hydroelectricity. Future extraction of ore from these pits was considered unlikely in the 1990s (EMEC, 1994) because of low demand and high start-up costs.

#### 4.2.3.2 Earthquakes and Faults

There would be no impacts caused by construction or operation of the power facility on seismic activity in the area. There would be no potential for reservoir-induced seismicity since there are no active faults on or near the site (EMEC, 1994).
4.2.3.3 Reservoir Seepage

The potential for leakage of water from the reservoirs would not pose a hazard to reservoir operations, but would require additional make-up water to replace that lost to infiltration. Potential measures to reduce seepage into the underlying rock mass include placement of a layer of low-permeability soils on the reservoir basin and localized grouting. With such measures in place, EMEC (1998) estimated seepage losses of about 600 acre-feet per year.

4.2.3.4 Ground Subsidence

Because of the density of the natural soil and rock formations at the site and the engineering characteristics of the proposed construction, ground subsidence is not considered to be a potential hazard associated with this project (EMEC, 1994).

4.2.3.5 Active and Inactive Mines

During the life of the project, the East and Central Pits would be inundated with water, therefore precluding extraction of iron ore from these areas. EMEC (1994) concluded that economic conditions involving ore pricing and mining start-up costs made future extraction of ore from these pits unlikely.

4.2.3.6 Soil Erosion

There will be some increases in soil erosion resulting from construction of this project. These impacts will be related to development of the upper and lower reservoirs, access roads, power line towers, water supply corridor, and surface facilities.

4.2.3.7 Landslides and Mass Movements

There are areas within the Central and East pits that have potentially unstable slopes because mining has exposed adversely oriented fracture sets on the pit walls. Consequently, slope raveling and localized, surficial slope failures and/or rock falls should be expected in these slopes.

4.2.4 Existing or Proposed Protection, Mitigation, or Enhancement Activities

4.2.4.1 Mineral Resources

The loss of any economically recoverable mineral resources within the East and Central pits cannot be mitigated during the life of the project (EMEC, 1994). However, those mineral resources would remain on site and could be mined in the future if it was determined that the value of the minerals exceeded the value of the hydroelectric power.

4.2.4.2 Earthquakes and Faults

Site-specific investigations in 1994 (EMEC, 1994) do not locate any active faults in the site area. Therefore, the risk of surface rupture at the site caused by faulting is considered very low.
project facilities will be designed to resist the anticipated ground shaking related to earthquake activity in the area.

4.2.4.3 Reservoir Seepage
Mitigation of seepage from the bottom of both the lower and upper reservoirs will be accomplished by placement of a blanket of fine tailings materials as needed across the base and lower slopes of the reservoirs. The eastern end of the lower reservoir (East Pit) will be blanketed to a minimum depth of 3 feet to minimize seepage into the alluvial materials that are presently exposed in the pit wall. A blanket of tailings will be placed in other portions of the reservoirs where detailed inspection indicates significant seepage is likely to occur. The interior of the mine pit has not been mapped to identify other likely areas of concentrated seepage. Therefore, the exact methods of seepage control are not known at this time. Localized grouting and shotcrete placement are the most likely methods. Once access to the pit can be obtained, geologic mapping will be performed and seepage control methods will be defined with greater certainty.

4.2.4.4 Ground Subsidence
Ground subsidence is not considered to be a potential hazard associated with this project (EMEC, 1994).

4.2.4.5 Active and Inactive Mines
The loss of access to the inactive East and Central pits of the Eagle Mountain mine cannot be mitigated during the life of the project (EMEC, 1994).

4.2.4.6 Soil Erosion
The problem of soil erosion would be minimized to the extent possible by limiting surface disturbance to only those areas necessary for construction. Where natural topsoil occurs, it would be salvaged and stockpiled prior to construction, and the piles would be stabilized with temporary vegetation or covered. Following construction, all areas of disturbed natural topsoil not occupied by permanent project facilities would be graded, re-top soiled, and seeded to reduce erosion potential. Additional soil stabilization best management practices (BMPs) will be undertaken as appropriate.

4.2.4.7 Landslides and Mass Movements
During construction, areas within the pits that exhibit unstable slopes because of adverse fracture sets exposed in the pit walls would be scaled of loose rock and unstable blocks. Material scaled from the side slopes will be removed and disposed of outside the pit, or pushed downslope and buried in the bottom of the pit. Rock slopes within the East and Central Pits that lie below an elevation of 5 feet above the maximum water level will be scaled of loose and unstable rock during construction. Existing cut slopes that lie above these elevations will not be modified unless there is evidence of potential failure areas that could impact project facilities.
Slope raveling and localized, surficial slope failures and/or rockfalls will likely continue to occur, but will not have significant impacts on reservoir operations. Any such failures are expected to be no greater than a few tens of cubic yards in size (EMEC, 1994). Foreseeable damage that could be caused by such a failure would be to the reservoir lining or to the inlet/outlet structures. Lining damage would be repaired by placing new lining, while damage to the inlet/outlet structure could be mitigated by shaping the surrounding area to deflect materials away from the structure. The potential for such failures to occur will be minimized by rock scaling and by the buttressing of the lowermost slopes of each reservoir by mine tailings removed from potentially unstable areas above the reservoir water surface (EMEC, 1994).

The 1994 studies concluded that no mass soil or rock movements related to site construction could occur that would affect off-site facilities. The potential mass soil or rock movements that could occur would be a slope failure within the upper or lower reservoir. Impacts associated with any such failure would be limited to the immediate failure area (EMEC, 1994).

4.3 Water Resources – Water Supply

4.3.1 Description of Environment

The project site is located in the Chuckwalla watershed in Riverside and Imperial Counties. The site is located in the Eagle Mountains on a bedrock ridge along the northwestern margins of the watershed. The central portions of the watershed contain the Palen and Chuckwalla Valleys, with thick accumulations of alluvial sediments that comprise the Chuckwalla Valley groundwater basin (DWR, 2003). Most domestic and agricultural areas are located in the western portions of the basin near Desert Center, about three miles south of the project site. This area has been historically referred to as the Upper Chuckwalla Valley. In the central part of the Chuckwalla Valley (part of the Upper Chuckwalla Valley) are two large agricultural areas of palms and dates, and in the Lower Chuckwalla Valley is the Chuckwalla Valley State Prison.

There are five groundwater basins surrounding the Chuckwalla Valley groundwater basin. North of the Upper Chuckwalla Valley watershed is the Pinto Valley groundwater basin and north of the Palen Valley is the Cadiz Valley groundwater basin. To the west is the Orocopia Valley groundwater basin, which contains Hayfield Valley. About 45 miles east of the project site are the Palo Verde Mesa and Palo Verde Valley groundwater basins. Figure 4-11 shows the locations of the groundwater basins.

Although the Cadiz Valley groundwater basin is adjacent to the Chuckwalla groundwater basin, mountains along the edge of the basin provide complete enclosure around the Cadiz valley so both surface flows and groundwater flows are internal or confined to the Cadiz Valley groundwater basin (B&V, 1998). Surface water and groundwater flows are from the edges of the basin toward Cadiz Lake (DWR, update 2003 and B&V, 1998).

The western portion of the Orocopia Valley groundwater basin drains eastward into the Hayfield (dry) Lake and into the Upper Chuckwalla groundwater basin. The Hayfield Valley is about 17
miles long. An artificial groundwater recharge site was constructed in the Hayfield Lake area of the basin. Metropolitan Water District of Southern California (MWD) stored about 88,000 acre-feet of water in the basin in the late 1990s as part of a conjunctive use program.

The Chuckwalla Valley groundwater basin receives both surface and groundwater inflow from the Pinto Valley groundwater basin. The water enters into the Chuckwalla Valley groundwater basin through a gap in the bedrock just north of the project site (B&V, 1998). Joshua Tree National Park (JOTR) overlies the Pinto Valley groundwater basin. The JOTR also surrounds the project and extends into the bedrock areas of the Chuckwalla watershed.

The Palo Verde Mesa and adjacent Palo Verde Valley groundwater basins are located east of the Chuckwalla Valley groundwater basin. A bedrock gap allows groundwater from the Chuckwalla Valley groundwater basin to flow into the Palo Mesa Valley. Because there is no groundwater divide, the groundwater continues into the Palo Verde Valley groundwater basin. The eastern edge of the Palo Verde Valley groundwater basin is the Colorado River.

4.3.1.1 Springs and Wells

Springs are present in the Eagle Mountains south of the Pinto Basin. Figure 4-12 shows the location of the springs.

The first high-capacity well was drilled in the Chuckwalla Valley groundwater basin in 1958 (Mann, 1984). There are more than 60 wells in the Chuckwalla Valley groundwater basin (CH2M Hill, 1996). Figure 4-12 shows the locations of some of these wells. Based on State Water Resources Control Board (SWRCB) recordation data, only seven wells pump in excess of 25 acre-feet per year (Mann, 1986). Since 1986, additional pumping has begun, associated with agriculture in the central portion of the Chuckwalla Valley (part of the Upper Chuckwalla Valley) and in the Lower Chuckwalla Valley at the Chuckwalla Valley State Prison.

Wells in the Chuckwalla Valley groundwater basin range up to 2,000 feet in depth (B&V, 1998) and have pumping capacities up to 3,900 gallons per minute (gpm) (DWR, 2003). The average pumping rate is about 1,800 gpm. Groundwater wells in the Upper Chuckwalla groundwater basin range up to 900 feet deep. Two wells in this portion of the valley near the project site can produce 2,300 gpm (Greystone, 1994).

The National Park Service (NPS) owns one well in the Pinto groundwater basin (Pinto Well No. 2). The SWRCB has no records that the NPS has water rights or water uses within the Pinto Basin (NPS, 1994). Kaiser Steel owns two additional wells in the southeastern portion of the Pinto Basin.

4.3.1.2 Water Bearing Formations

Water bearing units include quaternary alluvium, the Pinto Formation, and the Bouse Formation. The maximum thickness of these deposits is about 1,200 feet in the central portions of the basin

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and up to 2,000 feet in the eastern portions of the basin (B&V, 1998), although DWR only considers there to be 1,200 feet of sediments (DWR, 2003).

The alluvium consists of fine to coarse sand interbedded with gravel, silt, and clay. The alluvium likely comprises the most important aquifer in the area (DWR, 1963).

The Pinto Formation consists of coarse fanglomerate, clay, and some interbedded basalts. The fanglomerates would likely yield water freely to wells but the basalts would not (DWR, 1963).

Along the fringes of the Chuckwalla Valley are the Bouse Formation and an older fanglomerate. The older fanglomerate is composed of coarse alluvial sediments and fanglomerate deposits. These semi-consolidated sediments yield several hundred gpm to wells (Wilson and Owen-Joyce, 1994).

4.3.1.3 Hydraulic Characteristics

In describing the hydraulic characteristics of sediments and aquifers, several terms are used to quantify the ability to store and transmit water. The hydraulic conductivity is the ability of the sediments to transmit water. Transmissivity, a term applied to aquifers, is the hydraulic conductivity multiplied by the thickness of the sediments capable of storing water. All sediments have some void space between the particles; this void space is reported as porosity. Water in the void spaces cannot be entirely removed. The storage coefficient is the percentage of water that can be removed from the pores by gravity drainage and is applied when describing unconfined aquifers. Storativity is similar to the storage coefficient, but is the percentage of water that can be released from the pores by a decrease in pressure. Storativity is used when referring to semi-confined or confined aquifers.

Limited information is available on the hydraulic characteristics of the sediments in the Chuckwalla basin. California Department of Water Resources (DWR) estimated the average specific yield (specific yield is approximately equal to the storage coefficient for unconfined aquifers) to be 10 percent for the upper 220 feet of saturated sediments (DWR, 1979).

Two aquifer tests were performed in the northern portion of the Chuckwalla Valley groundwater basin to assess the aquifer’s hydraulic characteristics. Wells 5S/16E-7M2 and 4S/16E-30D1, which are about 600 to 1900 feet deep, were pumped while the drawdown effects were measured in nearby observation wells. The results show that the aquifer near 4S/16E-30D1 is highly permeable, with a transmissivity of 225,000 to 310,000 and a storativity of 0.05 to 0.32, which indicates the aquifer is unconfined (Greystone, 1994). Testing at well 5S/16E-7M2 was inconclusive as the storativity ranged between 0.5 and 0.7, which is not within a reasonable range. The locations of these wells are shown on Figure 4-12.

4.3.1.4 Groundwater Levels

Groundwater levels are measured by the United States Geologic Survey in 12 wells within the basin. DWR also reports groundwater levels for several other wells; however, there are only a
few scattered measurements. A partial trend in groundwater levels can be developed by combining records from several wells.

Groundwater levels in the Upper Chuckwalla valley near the project site are represented by wells 5S/16E-7P1, 5S/16E-7P2, and 4S/16E-32M1, have measurements with similar trends, and cover about a 50-year period. Figure 4-12 shows the locations of these wells. Figure 4-13 shows the water level measurements. Groundwater levels between 1950 and 1981 were relatively stable. Between 1981 and about 1986 the water levels declined by as much a 110 feet. The effects of the pumping were not as extreme at well 5S/15E-12N1, which is located about 1.5 miles to the west of 5S/16E-7P1. Groundwater levels between 1986 and 2002 have recovered by about 70 feet before any artificial recharge by MWD. The recovery is due in part to a large decrease in agricultural pumping and potentially increased subsurface inflows (steeper gradients) from the Pinto, Orocopia (Hayfield Valley), and Cadiz Valley groundwater basins (Hanson, 1992). However, the Cadiz Valley groundwater basin is now not considered to be a recharge source to the Chuckwalla Valley groundwater basin (B&V, 1998). Assuming the groundwater level trend continues, groundwater levels may fully recover between 2007 and 2011.

Groundwater levels in the eastern portion of the Chuckwalla valley near the outflow to the Palo Verde Mesa groundwater basin are conflicting. Well 7S/20E-18H1 shows a similar trend as the wells in the Upper Chuckwalla basin while well 7S/20E-28C1 shows the groundwater levels were recovering during the overdraft period. The conflicting results suggest the water levels may be affected by local use (7S/20E-18H1) and that the groundwater levels were actually rising and were not affected by pumping in the Upper Chuckwalla groundwater basin. Figure 4-12 shows the locations of these wells. Figure 4-14 shows water level measurements in comparison to the Upper Chuckwalla groundwater basin water levels.

Groundwater levels in the Palo Verde Mesa groundwater basin are flat lying (7S/21E-15A1) and show little to no effects of pumping within the Upper Chuckwalla groundwater basin. Figure 4-12 shows the location of this well. Figure 4-14 shows water level measurements in comparison to the Upper Chuckwalla groundwater basin water levels.

Groundwater levels in the Pinto Valley groundwater basin remained stable up until about 1962. Thereafter, groundwater levels in the basin began a slow decline until about 1982 when groundwater levels recovered, potentially due to the higher precipitation received that year, even though groundwater levels in the Chuckwalla Valley groundwater basin were declining. A recent 2007 measurement shows that levels have continued to recover and are currently similar to levels experienced in 1966. Because the groundwater levels have different trends it suggests pumping in the Chuckwalla Valley groundwater basin does not have a significant effect on groundwater levels in the Pinto Valley groundwater basin. Figure 4-15 shows the groundwater levels in both the Pinto and Chuckwalla Valley groundwater basin.
4.3.1.5 Groundwater Flow Direction

Groundwater contours developed from 1974 groundwater level measurements for the Chuckwalla basin show groundwater movement from the north and west toward the gap between the Mule and the McCoy Mountains at the southeastern end of the Chuckwalla Valley groundwater basin (DWR, 1979) and into the Palo Verde Mesa groundwater basin. Figure 4-16 shows the groundwater contours and flow directions.

4.3.1.6 Groundwater Storage

The total storage capacity of the Chuckwalla Valley groundwater basin was estimated to be about 9,100,000 acre-feet. Storage of useable (recoverable) groundwater is estimated at about 900,000 acre-feet, assuming that the upper 100 feet of the aquifer are recoverable (DWR, 1975). DWR has since revised its estimate to 15 million acre-feet (DWR, 1979).

The groundwater storage estimate for just the northwestern portion of the Upper Chuckwalla Valley, near the project site is about one million acre-feet. This is a very conservative estimate because only 100 feet of saturated sediments were considered in the calculations and there are several hundred feet of saturated sediments remaining (Mann, 1986).

4.3.1.7 Groundwater Quality

The total dissolved solids (TDS) content across the basin ranges from 274 to 12,300 mg/L (DWR, 1979). The best water quality is found in the western portion of the basin, where TDS concentrations range from 275 to 730 mg/L (DWR, 1979). Table 4-2 lists water quality results in the Upper Chuckwalla Valley near the project’s proposed pumping wells. The table also provides water quality in Palen Valley, the next valley east of the Upper Chuckwalla Valley.

The water in the Upper Chuckwalla Valley has concentrations of nitrate, boron, fluoride, arsenic, and TDS that are higher than recommended levels for drinking water use (DWR, 1975). The water from well 5S/16E-7M2 has a TDS of 577 mg/L (Greystone, 1994). High concentrations of boron impair groundwater for irrigation use (DWR, 1975). TDS concentrations appear to have increased by about 160 mg/L between 1961 and 1994.

Groundwater quality to the east in Palen Valley is of poorer quality. TDS concentrations range from about 500 up to 4,200 mg/L.

Miscellaneous water quality results are reported by the Department of Public Health and co-operators for 10 wells in the Chuckwalla groundwater basin. Although the results from only one well were available, radiological, nitrate, pesticides, and volatile and synthetic organic chemicals have been below the maximum contaminant level for drinking water (DWR, 2003).
Table 4-2 Upper Chuckwalla and Palen Valley Groundwater Quality

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<th>WELL NAME</th>
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<th>TDS (mg/L)</th>
<th>Ca (mg/L)</th>
<th>Mg (mg/L)</th>
<th>Na (mg/L)</th>
<th>K (mg/L)</th>
<th>CO3 (mg/L)</th>
<th>HCO3 (mg/L)</th>
<th>SO4 (mg/L)</th>
<th>Cl (mg/L)</th>
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<th>As (ug/L)</th>
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<th>F (mg/L)</th>
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<td>55</td>
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<td>0.3</td>
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**Upper Chuckwalla Valley**

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<th>Na (mg/L)</th>
<th>K (mg/L)</th>
<th>CO3 (mg/L)</th>
<th>HCO3 (mg/L)</th>
<th>SO4 (mg/L)</th>
<th>Cl (mg/L)</th>
<th>NO3 as N (mg/L)</th>
<th>As (ug/L)</th>
<th>B (mg/L)</th>
<th>F (mg/L)</th>
<th>CaCO3 (mg/L)</th>
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</table>

**Palen Valley**

Notes:

1. California Title 22 Drinking Water Maximum Contaminant Level (MCL)
2. Recommended MCL
3. Iron exceeds MCL
The water quality effects of runoff and groundwater inflow through fractures from the Eagle Mountain mine on the Chuckwalla Valley groundwater basin aquifers is unknown (B&V, 1998).

4.3.1.8 Groundwater Pumping

The amount of groundwater pumped from the Chuckwalla Valley groundwater basin could be estimated from recordation data filed with the SWRCB or by the acres and types of crops grown multiplied by the evapotranspiration rates of the plants. Since the recorded pumping over the years has been erratic and may be incomplete, estimates using agricultural land usage were made (Mann, 1986).

The estimates were made by using water duties (evapotranspiration plus applied water losses) for crops and planted acreages measured using aerial photographs and field confirmation. Estimates were made for 1986 (Mann, 1986), 1992 (Hanson, 1992), and 1996 and 2005 (GEI/B-E). Figures 4-17 through 4-20 show the crops grown in the upper Chuckwalla Valley in these years. Table 4-3 summarizes the acreages and estimated volume of groundwater pumped. The highest pumping occurred in 1986, at about 20,778 acre-feet per year, mostly for jojoba and asparagus. Most of the jojoba and asparagus fields have since been abandoned and agricultural water usage has significantly decreased. Only about 25 percent of land continues to be farmed. More recent endeavors in palm farming have slightly increased groundwater use in the area from 5,587 acre-feet per year in 1992 to 6,707 acre-feet per year in 2005.

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 740 acre-feet per year at the Lake Tamarisk development (Mann, 1986). Southern California Gas Company uses well 5S/16E-7P1 and -7P2 to supply about 5 acre-feet per year to its power plant. Further east in the basin is the Chuckwalla Valley State Prison. The prison uses about 500 acre-feet per year based on 2002-2003 estimates of 3700 inmates, 900 staff, and 100 gallons per day per person.

Groundwater production can affect groundwater levels. Figure 4-13 shows the plot of the groundwater levels versus estimates of groundwater pumping for agricultural, domestic, and industrial use. The figure shows that the decline of the water levels in the Upper Chuckwalla Valley between 1981 through 1985 is due to groundwater pumping locally exceeding the perennial yield of the basin.
Table 4-3 Chuckwalla Valley Agricultural Water Use Summary

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</table>

4.3.1.9 Recharge Sources

The groundwater basin is recharged by percolation of runoff from the surrounding mountains and from precipitation to the valley floor (DWR, 1979). Average annual precipitation in the basin ranges up to 4 inches (DWR, update 2003). There are few measurements to quantify the amount of recharge from rain. It has been suggested that 5 to 10 percent of the rain falling on the tributary desert mountain watersheds contributes to the groundwater basin (LC&A, 1981). The average recharge to the aquifer was estimated to be about 5,540 to 5,600 acre-feet per year based on an assumed 10 percent infiltration rate (BLM and County of Riverside, 1992 and GeoSyntec, 1992).

The Upper Chuckwalla Valley is also recharged by subsurface inflow from the north by the Pinto Valley groundwater basin. Subsurface inflow from the Pinto Valley groundwater basin occurs as outflow through an alluvium-filled gap at the east end of the Pinto Valley (Kunkle, 1963). The perennial yield of the Pinto Basin is estimated as 2,500 acre-feet per year. If not intercepted by wells, this water would become subsurface inflow to the Chuckwalla Valley groundwater basin (Mann, 1986).

Subsurface inflow from the Hayfield Valley is estimated to be 1,700 acre-feet per year (LC&A, 1981). Since there has been no pumping, this is considered to be all recharge to the Chuckwalla Valley groundwater basin.
Although not separated by groundwater basin, subsequent estimates of recharge from up-gradient groundwater basins (i.e., Pinto and Orocopia) are about 6,700 acre-feet per year (CH2M Hill, 1996).

There may be some inflow from the Cadiz Valley but no studies have been made to determine the amount (Mann, 1986). Subsequent authors, because of its similar size and elevation to the Pinto Valley groundwater basin, have estimated inflow from Cadiz to the Chuckwalla Valley groundwater basin may be about the same as from Pinto Valley, or 2,500 acre-feet per year (CH2M Hill, 1996). More recent studies have indicated there is no groundwater outflow from Cadiz Valley (B&V, 1998).

4.3.1.10 Outflow
Outflow is limited to the subsurface, as no surface waters leave the basin. Underflow from the Chuckwalla groundwater basin discharges to the Palo Verde Mesa groundwater basin at an estimated rate of 400 acre-feet per year (Metzger et al, 1973).

4.3.1.11 Perennial Yield
The perennial yield of the Chuckwalla Valley groundwater basin is probably not less than about 10,000 acre-feet per year and not more than about 20,000 acre-feet per year (Hanson, 1992). The perennial estimate was refined to 12,200 acre-feet per year by CH2M Hill (1996) after Greystone’s (1994) estimate of 16,634 acre-feet per year.

4.3.2 Potential Impacts to Water Supply
4.3.2.1 Proposed Project Water Supply
The proposed project will require about 9,450 acre-feet of water for the two-year start-up period and 2,300 acre-feet per year of water for replenishment water. Water could be conserved if the mine pits were lined.

The proposed project is conceived to rely on groundwater for its water supply, similar to previous assessments. Three 600- to 900-foot-deep wells were proposed to be used. The locations are shown on Figures 4-12 and 4-21. Testing of two of the wells showed the aquifer could produce 2,300 gpm (Greystone, 1994).

This analysis assumes the land and the wells previously identified could be purchased or leased for use by the project.

4.3.2.2 Previous Assessment of Impacts
A groundwater model was developed to assess the potential impacts due to project pumping (Greystone, 1994). The model was not available for review or use. It used an annual recharge to the groundwater basin of 16,634 acre-feet per year, higher than the current estimated groundwater recharge. It predicted that groundwater levels would be affected by pumping.
After the initial two years of startup pumping, groundwater levels would decline by 5 to 45 feet in the basin, with the largest drawdown near the project pumping wells. The analysis forecasted the long-term effects of the pumping and indicated that after a 50-year period groundwater levels would be 2 to 10 feet lower than the initial groundwater levels. It is reasonable to accept continued pumping will create a localized pumping depression, but having a residual of 2 to 10 feet in the basin after 50 years is not reasonable especially when the water balance summary shows recharge would exceed the water demand by 9,300 acre-feet per year (Greystone, 1994, Table 7) and would occur for 48 years. This equals about 460,000 acre-feet of water that would raise groundwater levels. The results of the modeling at best should be considered a very conservative estimate of the effects of the project pumping. Alternative methods validated against physical evidence were used to evaluate the pumping effects on the water supply.

4.3.2.3 Perennial Yield

The Chuckwalla Valley groundwater basin has an estimated perennial yield (inflow to the basin) of about 12,200 acre-feet per year (CH2M Hill, 1996). When pumping exceeds the annual discharge, groundwater levels will decline and outflow from the basin may decrease. Also, inflow from adjacent groundwater basins may increase, which could lead to a decrease in water levels in those basins.

A groundwater balance was developed to show the potential effects of the startup and long-term groundwater pumping effects. Table 4-4 shows the balance, assuming 9,450 acre-feet per year will be required for two years for reservoir fill at startup and 2,300 acre-feet per year thereafter. It assumes continued agricultural and domestic water use similar to 2005 as listed on Table 4-3.

Pumping will exceed recharge for the first two years, which will cause groundwater levels to decline. Thereafter, the inflow will be in excess of outflows by about 844 acre-feet per year and groundwater levels will rise. The deficit created by the initial fill of the reservoirs will be returned to balance within about 17 years. If an alternative source of supply other than local groundwater were used for the initial filling, the basin would remain within its perennial yield with an excess of 844 acre-feet per year.
<table>
<thead>
<tr>
<th>Year</th>
<th>Eagle Mountain Pumped Storage Project</th>
<th>Agricultural Pumping</th>
<th>Aquaculture Pumping</th>
<th>Sum of other Pumping</th>
<th>Subsurface Outflow</th>
<th>Subtotal Outflow</th>
<th>Average Inflow</th>
<th>Inflow minus Outflow</th>
<th>Cumulative Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9,450</td>
<td>6,707</td>
<td>639</td>
<td>1,307</td>
<td>400</td>
<td>18,503</td>
<td>12,200</td>
<td>-6,303</td>
<td>-6,303</td>
</tr>
<tr>
<td>2</td>
<td>9,450</td>
<td>6,707</td>
<td>639</td>
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<td>400</td>
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<td>12,200</td>
<td>-6,303</td>
<td>-12,606</td>
</tr>
<tr>
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<td>6,707</td>
<td>639</td>
<td>1,307</td>
<td>400</td>
<td>11,353</td>
<td>12,200</td>
<td>-847</td>
<td>-11,760</td>
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<tr>
<td>4</td>
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<td>639</td>
<td>1,307</td>
<td>400</td>
<td>11,353</td>
<td>12,200</td>
<td>847</td>
<td>-10,913</td>
</tr>
<tr>
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<td>11,353</td>
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<td>-10,066</td>
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<tr>
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<td>-4,986</td>
</tr>
<tr>
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<td>-4,139</td>
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<td>639</td>
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<td>1,307</td>
<td>400</td>
<td>11,353</td>
<td>12,200</td>
<td>847</td>
<td>-752</td>
</tr>
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<td>639</td>
<td>1,307</td>
<td>400</td>
<td>11,353</td>
<td>12,200</td>
<td>847</td>
<td>95</td>
</tr>
<tr>
<td>18</td>
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<td>6,707</td>
<td>639</td>
<td>1,307</td>
<td>400</td>
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<td>942</td>
</tr>
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<td>400</td>
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<td>12,200</td>
<td>847</td>
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<td>400</td>
<td>11,353</td>
<td>12,200</td>
<td>847</td>
<td>2,635</td>
</tr>
</tbody>
</table>

Notes:

1. Initial startup may be as high a 9,450 A-F/Yr. If seepage losses are curtailed, it could be as low as 7,500 A-F/Yr.
2. Value based on 2005 agricultural usage estimates (Table WS-2).
3. Pumping required to account for evaporation from open water bodies associated with fish ponds or tanks. Based on 2005 aerial photos.
4. Includes Desert Center domestic, Lake Tamarisk, So Cal Gas, and Coachella Valley State Prison.
5. From CH2M Hill 1996.
4.3.2.4 Regional Groundwater Level Effects

During the first two years of operation, assuming all project water demands were supplied by groundwater, about 12,600 acre-feet will have been removed from storage. There are about 9,100,000 acre-feet in storage in Chuckwalla Valley groundwater basin. Assuming an average thickness of the saturated sediments of about 1,200 feet, there are about 7,600 acre-feet per foot of saturated aquifer. Table 4-5 shows these estimates. Overdrafting the groundwater basin by about 12,600 acre-feet will lower groundwater levels regionally by about 1.7 feet at the end of the second year of operation.

Outflow to the Palo Verde Mesa groundwater basin has been estimated to be about 400 acre-feet per year. Outflow is typically estimated by multiplying the hydraulic conductivity times the groundwater gradient times the area (saturated thickness of the sediments). The values used to estimate the outflow could not be located. Assuming a hydraulic conductivity of 10 feet per day and the groundwater gradient from Figure 4-16, 1974 pre-intensive agricultural pumping, of 0.005 feet per foot (ft/ft), the area can be estimated. Table 4-5 shows the calculations. Reducing the area by 1.7 feet (potential change in basin groundwater levels) shows the outflow for those two years would be 377 acre-feet per year, a less than significant reduction. This estimate is validated based on water levels during the overdraft period of the 1980s as shown on Figure 4-14.
Table 4-5  Palo Verde Mesa Outflow Estimates – Two-Year Effect

<table>
<thead>
<tr>
<th>Estimate of change in groundwater Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater in storage</td>
</tr>
<tr>
<td>Basin surface area</td>
</tr>
<tr>
<td>Conservative Depth</td>
</tr>
<tr>
<td>Storage per Foot of Aquifer</td>
</tr>
<tr>
<td>Estimated 2-Year Overdraft</td>
</tr>
<tr>
<td>Regional Decline in Water Levels</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimated Outflow 1974</th>
<th>Estimated Outflow with Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradient</td>
<td></td>
</tr>
<tr>
<td>dl</td>
<td>4,977 feet</td>
</tr>
<tr>
<td>dh</td>
<td>25 feet</td>
</tr>
<tr>
<td>gradient</td>
<td>0.005 ft/ft</td>
</tr>
<tr>
<td>Hydraulic Conductivity</td>
<td>10 ft/day</td>
</tr>
<tr>
<td>Outflow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>400 AFY</td>
</tr>
<tr>
<td></td>
<td>17,424,000 cuft/yr</td>
</tr>
<tr>
<td></td>
<td>47,737 cuft/day</td>
</tr>
<tr>
<td>Back Solved Area</td>
<td></td>
</tr>
<tr>
<td>width</td>
<td>31,680 feet</td>
</tr>
<tr>
<td>depth</td>
<td>30.0 feet</td>
</tr>
<tr>
<td>area</td>
<td>950,410 sq ft</td>
</tr>
</tbody>
</table>

Notes:

1. Groundwater contours from DWR, 1964
2. Basin storage estimates from DWR, 2002

4.3.2.5  Local Groundwater Level Effects

The effects of pumping on the Upper Chuckwalla Valley groundwater basin have been observed to be as much as 110 feet by 1986 when the basin was pumped at a rate of almost 22,000 AFY, which exceeded the estimated perennial yield of 12,200 acre-feet per year. This level of pumping started in 1981 and continued through 1986 as shown by groundwater levels on Figure 4-13. The estimated cumulative overdraft was about 39,000 acre-feet by 1986 as shown on Table 4-6.
Table 4-6  Estimated Overdraft in A-F/Yr for 1981 to 1986
Chuckwalla Valley Groundwater Basin

<table>
<thead>
<tr>
<th>Year</th>
<th>Eagle Mountain Mine ¹</th>
<th>Agricultural Pumping ¹</th>
<th>Aquaculture Pumping ²</th>
<th>Sum of other Pumping ³</th>
<th>Subsurface Outflow ⁴</th>
<th>Subtotal Outflow</th>
<th>Average Inflow ⁴</th>
<th>Inflow minus Outflow</th>
<th>Cumulative Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>3,006</td>
<td>11,331</td>
<td>302</td>
<td>920</td>
<td>400</td>
<td>15,959</td>
<td>12,200</td>
<td>-3,759</td>
<td>-3,759</td>
</tr>
<tr>
<td>1982</td>
<td>1,200</td>
<td>13,220</td>
<td>302</td>
<td>920</td>
<td>400</td>
<td>16,042</td>
<td>12,200</td>
<td>-3,842</td>
<td>-7,601</td>
</tr>
<tr>
<td>1983</td>
<td>47</td>
<td>15,108</td>
<td>302</td>
<td>920</td>
<td>400</td>
<td>16,777</td>
<td>12,200</td>
<td>-4,577</td>
<td>-12,178</td>
</tr>
<tr>
<td>1984</td>
<td>790</td>
<td>16,997</td>
<td>302</td>
<td>920</td>
<td>400</td>
<td>19,409</td>
<td>12,200</td>
<td>-7,209</td>
<td>-19,387</td>
</tr>
<tr>
<td>1985</td>
<td>484</td>
<td>18,885</td>
<td>302</td>
<td>920</td>
<td>400</td>
<td>20,991</td>
<td>12,200</td>
<td>-8,791</td>
<td>-28,178</td>
</tr>
<tr>
<td>1986</td>
<td>450</td>
<td>20,774</td>
<td>302</td>
<td>920</td>
<td>400</td>
<td>22,846</td>
<td>12,200</td>
<td>-10,646</td>
<td>-38,824</td>
</tr>
</tbody>
</table>

Notes:

¹ From Greystone 1994.
² Pumping required to account for evaporation from open water bodies associated with fish ponds or tanks. Based on 1996 aerial photos.
³ Includes domestic, Lake Tamarisk, and So Cal Gas.
⁴ From CH2M Hill 1996.
The effects of pumping during the startup period will result in a temporary cumulative overdraft of about 12,000 acre-feet. The potential effects of pumping by the project during the first two year startup periods can be assessed using the known effects of pumping that caused the overdraft in the Upper Chuckwalla Valley between 1981 and 1986. Table 4-6 shows 12,000 acre-feet of cumulative overdraft was potentially reached by 1983. Figure 4-13 shows groundwater levels in 1983 had declined by about 47 feet near well 5S/16E-7P1. Therefore, the project startup pumping will likely result in about 47 feet of local drawdown near the pumping wells.

Using a polynomial expression of the Thesis equation the drawdown was projected for the wells shown on Figure 4-21. We used a transmissivity of 250,000 gallons per day per foot with a storage coefficient of 0.15 and assumed the wells would pump at 2,300 gpm for 2 years. The drawdown created by each well would be about 21 feet. Because the proposed pumping wells are spaced about a mile or more from each other, three separate cones of depression will be created. Within 500 feet of the pumping wells, the drawdown will be less than 10 feet and at one mile away from the well the water level drawdown will only be about 3 feet. Figure 4-24 shows the pumping effects.

Inflow from the Pinto Valley groundwater basin could be affected by locally lowering water levels in the Chuckwalla Valley groundwater basin. Groundwater levels in the Pinto Valley, Figure 4-16, showed there was little to no effect caused by pumping during the overdraft period between 1981 and 1986.

Assuming there was an effect on the Pinto Valley groundwater levels caused by the project pumping, calculations were made to estimate changes in the inflow using similar methods that were used to estimate the outflow from the Chuckwalla Valley groundwater basin. Historic groundwater contours are not available for the Pinto Valley. Groundwater contour maps were generated from the groundwater flow model and showed the groundwater gradient near the inflow from the Pinto Valley groundwater basin in 1979 was 0.003 ft/ft. Figure 4-22 shows these contours. The groundwater contours were developed after 2 years of project pumping and showed the gradient was steeper, about 0.005 ft/ft. Figure 4-23 shows these projected contours. Inflow from the Pinto Valley groundwater basin has been estimated to be about 2,250 acre-feet per year. Changing the groundwater gradient would increase the outflow to about 3,780 acre-feet per year for a period of two years. Thereafter, the groundwater gradient would flatten and within 17 years would return to its pre-project level. The effect of increasing the outflow from the Pinto Valley groundwater basin is estimated by comparing the increased flow to the total groundwater in storage. The change in water levels in the Pinto Valley would be about 1.3 feet after two years of startup pumping as estimated from Table 4-7.
Table 4-7  Pinto Basin Outflow Estimates – Two-Year Effect

<table>
<thead>
<tr>
<th>Estimate of change in groundwater Levels</th>
<th>Groundwater in storage 2</th>
<th>Basin surface area</th>
<th>Conservative Depth</th>
<th>Storage per Foot of Aquifer</th>
<th>Estimated 2-Year Outflow Increase</th>
<th>Regional Decline in Water Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>230,000 AF</td>
<td>183,000 acres</td>
<td>100 feet</td>
<td>2,300 AF/foot</td>
<td>3,062 AF</td>
<td>1.33 feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimated Outflow 1979</th>
<th>Estimated Outflow with Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradient</td>
<td></td>
</tr>
<tr>
<td>dl</td>
<td>3,245 feet</td>
</tr>
<tr>
<td>dh</td>
<td>10 feet</td>
</tr>
<tr>
<td>gradient 1</td>
<td>0.003 ft/ft</td>
</tr>
</tbody>
</table>

| Hydraulic Conductivity | 110 ft/day | 110 ft/day |

| Inflow Area            | 2,640 feet | 2,640 feet |
| width                  | 300 feet   | 300 feet   |
| depth                  | 792,000 sq ft | 792,000 sq ft |
| area                   |            |            |

| Outflow                | 268,475 cuft/day | 451,165 cuft/day |
| 97,993,220 cuft/yr     | 164,675,298 cuft/yr |
| 2,250 AFY              | 3,780 AFY        |

Notes:

1. Groundwater contours from Greystone, 1994 model results
2. Basin storage estimates from DWR, 2002

The effect of project pumping on springs in the Eagle Mountains is not expected to be significant. It appears, based on limited available water resource information, unlikely that these springs are hydrologically connected to the Pinto or Chuckwalla Valley basin aquifers since they are located in the mountains above the Pinto and Chuckwalla basins. Rather, they appear to be fed by local groundwater systems that would be unaffected by withdrawals from the proposed project (NPS, 1994).

4.3.2.6  Groundwater Flow Direct Affects

The groundwater flow is generally from the west and north and flows towards the south and east. As shown on Figure 4-22 startup pumping by the project will only locally change the local groundwater contours. Long-term pumping effects as shown on Figure 4-23, generated from the groundwater flow model after 50 years of operations, also shows the groundwater levels and flow directions will not be significantly changed as a result of the project. The model is predicting a residual of two feet of drawdown, which does not make sense as there will be 460,000 acre-feet of excess recharge available.
4.3.2.7 Groundwater Quality Affects

Limited groundwater quality analyses have been performed in the valley and are available for review. Samples were collected in 1960 at various locations throughout the valley. Samples were also collected in 1994 during pilot testing of groundwater wells for use by the project. These wells are the same or near the previously sampled wells so a comparison of historic to present water quality can be made. Table 4-2 contains these analyses.

The water quality analyses show conflicting patterns. Wells 4S/16E-32M and -30D1 show there has been very little change even though the groundwater basin experienced overdraft during 1981 through 1991. However, wells 5S/16E-7P1 and -7M2 show their TDS has increased by about 160 mg/L. The increase appears to be related to irrigation return water as the nitrate concentrations increased by about 2 mg/L over the same time, potentially due to the use of fertilizers.

Although the project will cause temporary overdraft, the overdraft will be far less than historic periods when little to no change in water quality occurred. Therefore, projected pumping is not expected to affect the water quality in the groundwater basin.

The effects of runoff from the Eagle Mountain mine on the Chuckwalla Valley groundwater basin aquifers and its water quality are unknown (B&V, 1998).

4.3.2.8 Subsidence Potential

The potential of drawdown associated with pumping of the wells causing subsidence is typically associated with the lowering of confined aquifer groundwater levels below historic low levels. The aquifers are unconfined and there has been no reported evidence of subsidence in the area. The maximum drawdown created by the project will be after the second year of pumping for startup of the project. The project’s pumping is only anticipating creating temporary overdraft and lower groundwater level to a maximum of 21 feet after pumping for two years. Thereafter, the pumping will be reduced to within the basin’s perennial yield and groundwater levels will begin to rise. Because pumping will not exceed historic groundwater level lows (about 110 feet), the potential for inelastic subsidence due to groundwater pumping is low and is not considered to be significant.

4.3.2.9 Cumulative Projected Effects to Water Supply

There are several projects that are in planning and permitting stages within the Chuckwalla Valley groundwater basin. They include a potential landfill, solar generating facilities, and the existing groundwater banking program by MWD in the Hayfield Valley.

Several solar electric generating facilities are in planning stages but no information has been released regarding their potential water demand. We understand they will be photovoltaic cells, which will have minimal water needs. The effects cannot be assessed at this time.
The proposed landfill wants to use the Eagle Mine site to dispose of solid wastes. The landfill would potentially need about 1,200 acre-feet per year exacerbating the overdraft effects from the initial filling, and for make-up water, would change the water balance from a positive to being in continuous overdraft.

MWD has placed about 88,000 acre-feet in Hayfield valley as part of a conjunctive use program. At some point MWD will want to extract the water, which should have a net overall effect on the water balance of zero. Due to the minimal geologic information, number and location of extraction wells, and the extraction duration (one or multiple years), it is unknown whether drawdown associated with pumping of MWD wells would extend to the Desert Center area and affect water levels; therefore, the cumulative effect could not be assessed.

### 4.3.3 Existing or Proposed Protection, Mitigation, or Enhancement Activities

Mitigation measures under consideration for the project include the following:

1) Obtain an alternative water source for the initial startup water.

2) Purchase land and two wells, spaced at least one mile from each other, to provide replenishment water.

3) Obtain permission to use well 3S/15E-4J1, a monitoring well within the Pinto Valley groundwater basin near the outflow to the Chuckwalla Valley groundwater basin, to measure water levels and confirm that the project pumping effects have no significant effect. Locate an existing well within the central portion of the Pinto valley to confirm the effects.

4) Construct or use an existing groundwater monitoring well, directly east of the mine, in the sediments within the valley to assess the influence of the mine on water quality.

5) Prepare and implement a groundwater level and water quality program to confirm and maintain impacts at less than significant levels.

### 4.4 Water Resources – Water Quality

#### 4.4.1 Description of Environment

#### 4.4.1.1 Groundwater

The TDS content across the basin ranges from 274 to 12,300 mg/L (DWR, 1979). The best water quality is found in the western portion of the basin, where TDS concentrations range from 275 to 730 mg/L (DWR, 1979). In the northwest portions of the valley, arsenic concentrations have ranged from 9 to 25 mg/L (Greystone 1994). Table 4-2 lists water quality results in the Upper Chuckwalla valley near the project’s proposed pumping wells and in the Palen Valley, east of the Upper Chuckwalla Valley.
The water quality in the Upper Chuckwalla valley has concentrations of nitrate, boron, fluoride, arsenic and TDS that are higher than recommended levels for drinking water use (DWR, 1975). The water from well 5S/16E-7M2 has a TDS of 577 mg/L (Greystone, 1994). High concentrations of boron impair groundwater for irrigation use (DWR, 1975). TDS concentrations appear to have increased by about 160 mg/L between 1961 and 1994.

Groundwater quality to the east in Palen Valley is of poorer quality. TDS concentrations range from about 800 up to 4,200 mg/L.

Miscellaneous water quality results are reported by the Department of Public Health and co-operators for 10 wells in the Chuckwalla groundwater basin. Although the results from only one well were available, radiological, nitrate, pesticides, and volatile and synthetic organic chemicals have been below the maximum contaminant level for drinking water (DWR, 2003).

The water quality effects of runoff and groundwater inflow through fractures from the Eagle Mountain mine on the Chuckwalla Valley groundwater basin aquifers is unknown (B&V, 1998).

The proposed project would be located in eastern Riverside County, within the Colorado River Basin - Region 7 of the California Water Quality Control Board. Potential beneficial uses that may be applied to surface water or groundwater resources within this Region are listed in Table 4-8.
<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUN</td>
<td>Municipal and domestic supply: Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.</td>
</tr>
<tr>
<td>AGR</td>
<td>Agriculture supply: Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.</td>
</tr>
<tr>
<td>AQUA</td>
<td>Aquaculture: Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.</td>
</tr>
<tr>
<td>IND</td>
<td>Industrial service supply: 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 repressurization.</td>
</tr>
<tr>
<td>GWR</td>
<td>Ground water recharge: Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting salt water intrusion into fresh water aquifers.</td>
</tr>
<tr>
<td>REC I</td>
<td>Water contact recreation: Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, and use of natural hot springs.</td>
</tr>
<tr>
<td>REC II</td>
<td>Non-contact water recreation: Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.</td>
</tr>
<tr>
<td>WARM</td>
<td>Warm freshwater habitat: Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.</td>
</tr>
<tr>
<td>COLD</td>
<td>Cold freshwater habitats: Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.</td>
</tr>
<tr>
<td>WILD</td>
<td>Wildlife habitat: Uses of water that support terrestrial ecosystems including, but not limited to, the preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.</td>
</tr>
<tr>
<td>POW</td>
<td>Hydropower generation: Uses of water for hydropower generation.</td>
</tr>
<tr>
<td>PFRSH</td>
<td>Freshwater Replenishment: Uses of water for natural or artificial maintenance of surface water quantity or quality.</td>
</tr>
<tr>
<td>RARE</td>
<td>Preservation of rare, threatened or endangered species: Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.</td>
</tr>
</tbody>
</table>
No permanent surface water presently exists on the proposed site; therefore, beneficial uses specific to surface waters, including standards for the protection of aquatic life, recreation, aquaculture, do not presently apply. Small pools of surface water may accumulate within the existing pits in response to heavy precipitation events; however, the region is very arid, averaging 3 to 4 inches annually (RWQCB, 2007a). This would indicate that water at the site is currently ephemeral in nature and would not be expected to persist for an extended period of time.

A few intermittent springs exist in the area of the northwest Chuckwalla Valley (Figure 4-12). None of the springs are documented as permanent, year round springs, (SCS, 1990). Available information on the springs is limited, at best, and dated (Table 4-9). None of these springs are identified by Region 7 as having site-specific use classifications; therefore, the default use classifications are assigned to miscellaneous unnamed tributaries (e.g., GWR, REC I, RED II, WARM, WILD, and RARE).

<table>
<thead>
<tr>
<th>Name</th>
<th>Locations</th>
<th>Elevation (ft)</th>
<th>Dry/Flowing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eagle Tank</td>
<td>3S/13E-23</td>
<td>2040</td>
<td></td>
</tr>
<tr>
<td>Buzzard</td>
<td>4S/14E-16</td>
<td>2010</td>
<td>Dry (March/88)</td>
</tr>
<tr>
<td>Unnamed</td>
<td>4S/14E-16</td>
<td>2400</td>
<td></td>
</tr>
<tr>
<td>Hayfield Summit</td>
<td>5S/14E-19</td>
<td>1900</td>
<td></td>
</tr>
<tr>
<td>Long Tank</td>
<td>6S/15E-2</td>
<td>1190</td>
<td>Flowing (June/61)</td>
</tr>
</tbody>
</table>

Waters of the State presently located at the proposed site include only groundwater resources. The primary groundwater resource in the Eagle Mountain area is the water table aquifer of the Chuckwalla Valley basin. Beneficial uses that apply to the groundwater in the Chuckwalla hydrologic unit include municipal and domestic supply, industrial service supply, and agriculture supply. By definition, all surface and groundwater is considered suitable or potentially suitable for municipal or domestic water supply, unless one or more of the following conditions applies (California Regional Water Quality Control Board (CRWQCB), 2005):

- TDS exceeds 3,000 mg/L.
- Contamination exists either by natural processes or by human activity that cannot reasonably be treated.
- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.
- The aquifer is regulated as a geothermal energy producing source.
Historic groundwater quality TDS concentrations only occasionally exceed the 3,000 mg/L (Figure 4-25, Volume 1) and none of the other exceptions would apply to the aquifer of the Chuckwalla Valley basin, reinforcing that the current municipal or domestic water supply classifications are generally appropriate. Therefore, the federally approved Region 7 water quality standards (Table 4-10) for groundwater would apply to the project waters, but only if substantial leakage to groundwater is expected, and the expected leakage to groundwater is still to be determined.

### Table 4-10: California Regional Water Quality Control Board, Region 7 (CRWQCB, 2007a) and EPA numeric standards for inorganic chemical constituents that apply to waters designated for domestic or municipal supply use.

<table>
<thead>
<tr>
<th>Inorganic Chemical Constituent</th>
<th>CA Region 7 MCL (mg/L)</th>
<th>EPA MCL (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Barium</td>
<td>1.0</td>
<td>2</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.01</td>
<td>0.005</td>
</tr>
<tr>
<td>Chromium (total)</td>
<td>0.05</td>
<td>0.1</td>
</tr>
<tr>
<td>Lead</td>
<td>0.05</td>
<td>0.015</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td>Nitrate as N</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Selenium</td>
<td>0.01</td>
<td>0.05</td>
</tr>
<tr>
<td>Silver</td>
<td>0.05</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Historic water chemistry data for the Chuckwalla aquifer are variable and suggest treatment would be necessary prior to human consumption depending on the depth and location of the well (Figures 4-25 – 4-27).

#### 4.4.1.2 Surface Water Resources

No surface water presently exists on site and therefore the presentation of existing water quality data for streams, lakes, or reservoirs is not applicable to this project.

The proposed pumped storage hydroelectric project will create a surface water resource through the construction of two reservoirs. These reservoirs are strictly intended for use in hydropower production, which would carry industrial (IND) and power (POW) beneficial use designations. The proposed source water for the project is groundwater. Project plans include fencing alternatives to prevent recreation and wildlife access to the site. In addition, given the operation of the proposed project, which requires large displacement of surface water in both water bodies, we would not anticipate these reservoirs would support a viable aquatic life use.
4.4.2 Potential Impacts to Water Quality

4.4.2.1 Groundwater Quality Effects

Limited groundwater quality analyses have been performed in the valley and are available for review. Samples were collected in 1960 at various locations throughout the valley. Samples were also collected in 1994 during pilot testing of groundwater wells for use by the project. These wells are the same or near the previously sampled wells so a comparison of historic to present water quality can be made. Table 4-11 contains these analyses.

The water quality analyses show conflicting patterns. Wells 4S/16E-32M and -30D1 show there has been very little change even though the groundwater basin experienced overdraft during 1981 through 1991. However, wells 5S/16E-7P1 and -7M2 show their TDS has increased by about 160 mg/L. The increase appears to be related to irrigation return water as the nitrate concentrations increased by about 2 mg/L over the same time, potentially due to the use of fertilizers.

Although the project will cause temporary overdraft for a period of two years and the overdraft will be far less than historic periods, there is a low potential that project pumping could induce westward migration of poorer quality water from Palen Valley.

Seepage from the reservoirs is estimated to be 600 acre-feet per year. This seepage water will enter the groundwater. Water quality of the water in the reservoirs will change over time due to evaporation, resulting in increasing levels of TDS. In order to maintain TDS at a level consistent with existing groundwater quality, a water treatment plant using RO is proposed.

In order to plan the water treatment facility, water quality data from the northern Chuckwalla wells were used to for assumptions about the source water quality. While the total replacement water need is estimated to be 2,360 acre-feet per year evaporation and seepage, only the evaporation component (1,760 acre-feet per year) enters into the estimation of water treatment requirements. The RO treatment would remove water from the upper reservoir at a rate of 3 MGD and remove sufficient TDS to maintain the in-reservoir TDS at the same average concentration of the source water, approximately 450 PPM, based on available data for the Chuckwalla wells. Approximately 4 million lbs of salts would be removed from the reservoir each year.

Typically, the RO and other desalination methods produce a brine solution that concentrates the salts. In coastal projects, these are often mixed with industrial water and discharged back into the ocean. In an inland installation, the brine can be stored in lagoons where solar radiation further concentrates the brine. In some cases, brine can be used for other commercial purposes. Recent advancements in technology address membrane fouling, temperature, pH, and contaminants.
RO desalination plants can require up to 25 percent less land area than competing desalination platforms, making them easier to site. The proposed Eagle Mountain project would develop environmentally safe storage lagoons to prevent off-site transport of the salts to either surface or groundwater environments.

The lagoons will be sized to accommodate 100 years of accumulated storage of brine and salts. Brines can sometimes be commercially harvested and that potential may be evaluated during later phase of project development. However, license application drawings and designs will assume no commercial ventures are active. Another potential to be explored as the Project progresses, is integration of desalinization with proposed nearby solar power projects.

4.4.2.2 Surface Water Quality Affects

Degradation of waters could occur through two processes. First, degradation would occur due to the evaporation of project waters, resulting in increased concentrations of salts. A reverse osmosis treatment plant is proposed to address this issue, as previously described.

Second, the contact of project waters with pit material could result in elevated metals concentrations. In 1993, five samples were collected from the ore body material and were analyzed for standard soil analyses and water soluble leachate from saturate paste extracts. During this sampling, an effort was made to obtain a variety of rock types representative of the geologic formations present in the pits. Analytical tests followed procedures from the USDA Handbook 60 (USDA 1954), where leachate is produced by adding distilled water to the homogenized core samples that pass through a 2 mm sieve. Initial water quality of the distilled water was not reported with the lab reports.

We compared the results from these leachate analyses (Table 4-10) to standards that would apply to the MCLs in Table 4-11. Based on this comparison, leachate concentrations are generally within the range of historic groundwater quality concentrations. Potential seepage from the reservoirs has a low potential to exceed the MCLs for cadmium and mercury (Table 4-11). The potential for arsenic, barium, chromium, lead, selenium, and silver to exceed the MCLs is uncertain since detection limits for these analytes were higher than the MCL. For nitrate, one sample exceeded the 10 mg/L MCL, suggesting that potential seepage from the reservoirs may contain nitrate concentrations greater than the domestic MCL. Results for pH ranged from 6.5 to 9.8. The primary concern would be the presence of sulfur containing ores that could result in acid mine seepage to groundwater resources.
Table 4-11: Results of 1993 geochemical analyses. Bolded values exceed domestic or municipal supply MCLs.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Sample 1</th>
<th>Sample 2</th>
<th>Sample 3</th>
<th>Sample 4</th>
<th>Sample 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid Base Potential (CaCO3)</td>
<td>Tons/1000T</td>
<td>2</td>
<td>40</td>
<td>3</td>
<td>372</td>
<td>56</td>
</tr>
<tr>
<td>Sulfur, total</td>
<td>percent</td>
<td>0.06</td>
<td>&lt;0.01</td>
<td>0.03</td>
<td>&lt;0.01</td>
<td>0.09</td>
</tr>
<tr>
<td>Neutralization Potential</td>
<td>percent as CaCO3</td>
<td>0.4</td>
<td>4</td>
<td>0.4</td>
<td>37.2</td>
<td>5.9</td>
</tr>
<tr>
<td>Sulfur, organic</td>
<td>percent</td>
<td>0.04</td>
<td>&lt;0.01</td>
<td>0.03</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Sulfur, pyritic</td>
<td>percent</td>
<td>0.02</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Sulfur, sulfate</td>
<td>percent</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>0.09</td>
</tr>
<tr>
<td>Nitrate as N, soluble</td>
<td>mg/kg</td>
<td>3.5</td>
<td>11.7</td>
<td>3.4</td>
<td>7.3</td>
<td>2</td>
</tr>
<tr>
<td>Calcium, soluble</td>
<td>meq/L</td>
<td>5.94</td>
<td>2.5</td>
<td>9.08</td>
<td>0.7</td>
<td>26.8</td>
</tr>
<tr>
<td>Magnesium, soluble</td>
<td>meq/L</td>
<td>2.47</td>
<td>1.81</td>
<td>3.13</td>
<td>3.62</td>
<td>3.37</td>
</tr>
<tr>
<td>Sodium, soluble</td>
<td>meq/L</td>
<td>0.7</td>
<td>2.7</td>
<td>1</td>
<td>0.74</td>
<td>0.96</td>
</tr>
<tr>
<td>pH, Saturated paste</td>
<td>units</td>
<td>6.8</td>
<td>8.5</td>
<td>6.5</td>
<td>9.6</td>
<td>8.5</td>
</tr>
<tr>
<td>Sodium Absorption Ratio</td>
<td></td>
<td>0.3</td>
<td>1.8</td>
<td>0.4</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>Conductivity, Saturated Paste</td>
<td>mmhos/cm</td>
<td>0.86</td>
<td>0.82</td>
<td>1.22</td>
<td>0.51</td>
<td>2.25</td>
</tr>
<tr>
<td>Sulfate, soluble</td>
<td>mg/kg</td>
<td>128</td>
<td>36</td>
<td>67</td>
<td>19</td>
<td>1597</td>
</tr>
<tr>
<td>Aluminum, extractable</td>
<td>mg/kg</td>
<td>0.3</td>
<td>0.9</td>
<td>&lt;0.3</td>
<td>&lt;0.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Arsenic, extractable</td>
<td>mg/L</td>
<td>&lt;0.5</td>
<td>&lt;0.5</td>
<td>&lt;0.5</td>
<td>&lt;0.5</td>
<td>&lt;0.5</td>
</tr>
<tr>
<td>Boron, extractable</td>
<td>mg/L</td>
<td>0.2</td>
<td>0.2</td>
<td>&lt;1.0</td>
<td>&lt;1.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Cadmium, extractable</td>
<td>mg/L</td>
<td>&lt;0.03</td>
<td>&lt;0.03</td>
<td>&lt;0.03</td>
<td>&lt;0.03</td>
<td>&lt;0.03</td>
</tr>
<tr>
<td>Copper, extractable</td>
<td>mg/L</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Iron, extractable</td>
<td>mg/L</td>
<td>7</td>
<td>0.3</td>
<td>&lt;1.0</td>
<td>&lt;1.0</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Lead, extractable</td>
<td>mg/L</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Manganese, extractable</td>
<td>mg/L</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Mercury, extractable</td>
<td>mg/L</td>
<td>&lt;0.0002</td>
<td>&lt;0.0002</td>
<td>&lt;0.0002</td>
<td>&lt;0.0002</td>
<td>&lt;0.0002</td>
</tr>
<tr>
<td>Molybdenum, extractable</td>
<td>mg/L</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Selenium, extractable</td>
<td>mg/L</td>
<td>&lt;0.5</td>
<td>&lt;0.5</td>
<td>&lt;0.5</td>
<td>&lt;0.5</td>
<td>&lt;0.5</td>
</tr>
<tr>
<td>Zinc, extractable</td>
<td>mg/L</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
<td>0.08</td>
<td>0.21</td>
<td>0.12</td>
</tr>
<tr>
<td>Sand (2.0 - 0.062 mm)</td>
<td>percent</td>
<td>98</td>
<td>96</td>
<td>98</td>
<td>93</td>
<td>99</td>
</tr>
<tr>
<td>Silt (0.062 - 0.002 mm)</td>
<td>percent</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Clay (&lt; 0.02mm)</td>
<td>percent</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
4.4.3  *Existing or Proposed Protection, Mitigation, or Enhancement Activities*

The construction of a RO facility has been proposed to help manage project waters at acceptable levels of salinity. Designs for the RO water treatment facility will be refined during project development. The RO facility will conserve water, improve environmental protection, and maintain appropriate water quality standards.

4.5  *Fish and Aquatic Resources*

4.5.1  *Description of Environment*

The project site lies within the Colorado River drainage, which includes much of the Colorado, Mojave, and Great Basin deserts. In the Colorado River, the dominant native fishes are large minnows (such as squawfish and bonytail chub) and suckers (such as flannelmouth and razorback suckers) (Moyle 1993). California’s native fish have been divided into native fish provinces based on aquatic isolation over geologic time. The proposed project site lies within the Colorado Province (McGinnis 1984). This province encompasses the southeastern corner of California, also referred to as the Colorado Desert. Damming and introduction of exotic species (game species) to this drainage, however, have resulted in extinctions and local extirpations of native species. Remaining native fishes in the Colorado Province include a few species of chub, suckers, and pupfish. No fish are known to occur in the ephemeral springs in the area.

Other ephemeral surface water sources in the central project site and vicinity are Eagle Creek (a wash just south of the central project site), other smaller washes, and temporary pools at the bottom of mine pits that form from runoff. All of these water sources are temporary and do not support fish.

The Colorado River Aqueduct runs adjacent to the central project site. South of the central project site is a forebay (part of the aqueduct system) at MWD’s Eagle Mountain Pumping Plant. Fish species present in the aqueduct system are the same as those found in Lake Havasu (Giusti 1993). Most are 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 contain game fish, it is closed to the public for fishing.

No fish-related recreational opportunities exist in or near the project area. There are no plans to introduce fish into the reservoirs. There is the potential for fish to become deposited within the proposed reservoirs accidentally through introduction of fish or fish eggs to the proposed reservoirs by birds. However, should fish be introduced into the reservoirs, it is unlikely that they would survive.

Both reservoirs would be drawn down on a daily cycle. The upper reservoir will fluctuate between El. 2,340 feet and El. 2,476 feet. At minimum pool, the surface area will be 50 acres,
with 2,300 acre-feet of dead storage. The lower reservoir will fluctuate between El. 910 and El. 1092 feet. At minimum pool, the lower reservoir will have a surface area of 53 acres and will contain 4,200 acre-feet of dead storage. Fish inhabiting the reservoirs would be subjected to over 100 feet of vertical fluctuation on a daily or weekly basis. Therefore, fish entrainment rates would be high and fish habitat quality low.

Survival of entrained fish would also be low. From the upper reservoir, entrained fish would pass through an I/O structure to a 4,400 feet-long low-head pressure tunnel, then to a 1,300 feet-deep vertical shaft connecting the upper tunnel to the lower (“high head”) tunnel. The “high head” pressure tunnel will extend 1,500 feet to a penstock manifold, and four penstocks will extend approximately 700 feet to the turbine inlet valves at the powerhouse. At the powerhouse, fish would pass through the reversible, vertical-shaft, pump-turbine units. From the powerhouse, the four individual tailrace tunnels will extend approximately 300 feet to a tailrace manifold, and the main tailrace tunnel will extend 6,800 feet from the manifold to the lower reservoir I/O structure.

Mechanical injuries (such as strike, shear, cavitation, or pinching at gaps) can result in direct fish mortality rates of 5 to 15 percent, depending on turbine type. With repeated turbine passage, the same fish population can be expected to approach zero survival as the frequency of entrainment increases. Further subjection to high and low hydrostatic pressure cycles will also reduce fish survival, especially if fish are subjected to high pressures for longer periods, followed by abrupt transition to lower ambient pressures (as occurs when fish pass through turbine runners).

In total, the reservoirs will be unsuitable fish habitat.

4.5.1.1 Macroinvertebrates

Water in the reservoirs will be colonized by aquatic macroinvertebrates. Insect groups that are quite prevalent in the southern California deserts are orthopterans, true bugs, beetles, butterflies, moths, wasps, and other hymenoptera. These groups contain species that are aquatic and could potentially colonize the reservoirs. Aquatic habitats in the California desert sometimes support crustaceans such as fairy and tadpole shrimp. Brine shrimp may occur in areas with permanent, saline waters. It is not possible to predict the ultimate species composition of the reservoirs, but there will only be those species that can tolerate large fluctuation in water level and high temperatures.

4.5.2 Potential Impacts

No fish are currently present at the project site. Fish populations are not expected to become established in the reservoirs; therefore, there will be no impact to fisheries.

4.5.3 Existing or Proposed Protection, Mitigation, or Enhancement Activities

The local resource agencies have expressed an interest in minimizing the recreational activity in the project area. In addition, there is concern that if fish became established in the reservoirs,
they would provide a food source for non-native birds. This is considered to be undesirable for the native desert species found in the project area. Therefore, no fish stocking of the reservoirs is proposed and no recreational fishing opportunities will be provided.

4.6 Wildlife and Botanical Resources

4.6.1 Data or Studies Summaries

4.6.1.1 Laws, Regulations, and Relevant Management Plans

4.6.1.1.1 Federal Laws and Regulations

Endangered Species Act of 1973, As Amended (FESA). Title 16, United States Code, Section 1531 et seq. and Title 50, Code of Federal Regulations, part 17.1 et seq., designate and provide for the protection of listed threatened and endangered species and critical habitat for those species. Section 9 of FESA prohibits the take of federally listed species. “Take” includes not only direct mortality but other actions that may result in adverse impacts, such as loss of habitat. Sections 7 and 10 of the federal ESA permit “incidental take” of a listed species via a federal or private action, respectively, through formal consultation with the United States Fish and Wildlife Service (USFWS). The administering agency for terrestrial and avian species is the USFWS.

Migratory Bird Treaty Act. Title 16, United States Code, Sections 703-712, prohibit the killing, possessing, or trading in migratory birds, part or product, except in accordance with regulations prescribed by the Secretary of the Interior. The administering agency is the USFWS.

National Environmental Policy Act (NEPA). This act requires the analysis of the environmental effects of any major federal action. The administering agency is a federal agency.

Federal Clean Water Act. Pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344), an Individual or Nationwide Permit is required when a proposed project will cause the obstruction or alteration of “Waters of the United States” (WUS). Rivers, irrigation canals, and drainages, are classified as WUS, defined as interstate or intrastate permanent or ephemeral waters, and their tributaries, that are linked to interstate commerce. Section 404 of the 1977 Clean Water Act (as amended) prohibits the discharge of dredged or fill material into WUS without a permit. The United States Army Corps of Engineers (Corps) has final jurisdiction over waters of the United States; the Natural Resources Conservation Service (NRCS) has the lead in determining wetlands in agricultural situations. Under Section 401 of the Clean Water Act (33 U.S.C. 1341), any application for a federal license to conduct an activity which may result in any discharge into navigable waters must obtain certification of compliance with application state water quality standards. This certification program is administered by the California State Water Resources Control Board.
4.6.1.2 **State Laws and Regulations**

**California Endangered Species Act of 1984 (CESA).** California Department of Fish and Game (CDFG) Code Sections 2050 *et seq.* protect California’s rare, threatened, and endangered species. The administrating agency is CDFG.

**Fully Protected Species.** CDFG Code Sections 3511 and 5050 prohibit the taking or possession of birds and reptiles designated as “fully protected.” The administrating agency is CDFG.

**Protection of Listed Wildlife Species.** Title 14, CDFG Code Sections 670.2 and 670.5 designate animals of California as threatened or endangered. The administrating agency is CDFG.

**CDFG Code Section 3503.** This code section prohibits the taking, possession, or needless destruction of the nest or eggs of any bird. Section 3503.5 specifically protects birds of prey by making it unlawful to take, possess, or destroy any birds of prey or their nests or eggs. The administrating agency is CDFG.

**CDFG Code Section 3513.** This code section makes it unlawful to take or possess any migratory bird designated in the Migratory Bird Treaty Act. The administrating agency is CDFG.

**Native Plant Protection Act of 1977.** CDFG Code Sections 1900 *et seq.* designate rare, threatened, and endangered plants. The administrating agency is CDFG.

**CDFG Code Section 1602.** This code section provides for protection of channels and streams through a “streambed alteration” permit, wherein CDFG proposes conditions whereby a project applicant can minimize adverse effects to those channels. While arboreal drainages and other channels with defined beds and banks are neither rare nor unique in the Project vicinity, they provide essential cover and forage utilized by most desert vertebrates. As such, they are important desert habitat. The administrating agency is CDFG.

**California Environmental Quality Act (CEQA).** CEQA requires review of any project that is undertaken, funded, or permitted by a State or local governmental agency. A state agency (e.g., CDFG) is the administrating agency. The lead agency has the discretion to consider any non-listed species a *de facto* listed species by the statement that “a species not included in any listing in subsection (c) shall nevertheless be considered to be rare or endangered if the species can be shown to meet the criteria in subsection (b)” (CEQA Guidelines §15380, Subsection d). If significant project effects were identified, the lead agency would have the option of requiring mitigation for effects through changes in the project or deciding that overriding considerations make mitigation infeasible (CEQA Sec. 21002).

**California Desert Native Plants Act (California Food and Agriculture Code §§ 80001-80006).** The California Desert Native Plants Act (CDNPA) allows the harvest of certain species of non-listed, native plants under permits issued by the County Agricultural Commissioner or...
Sheriff. The purpose of the CDNPA is to prevent the unlawful harvesting of native desert trees and cacti, either for wood, landscaping, or other purposes. Where feasible and practicable, individual plants can be salvaged and used for the Project revegetation program or salvaged by an approved nursery, landscaper, or other group to indirectly reduce unlawful harvesting elsewhere. Species subject to permitting include palo verde, ironwood, mesquite, catclaw acacia, smoke tree, ocotillo, and cacti species.

4.6.1.1.3 Relevant Management Plans

Proposed Northern and Eastern Colorado Desert Coordinated Management (NECO) Plan. In 1976, Congress designated the 25-million-acre California Desert Conservation Area (CDCA). BLM developed a management plan for the CDCA in 1980, but conditions relative to species status, conservation programs, wilderness and national park designations, and other land uses have changed since the original plan was developed. The U.S. Bureau of Land Management (BLM) has completed a series of regional plan amendments, among them NECO Plan (BLM and CDFG 2002), which encompasses 5.5 million acres in the southeastern California Desert and the entire Project footprint.

The NECO Plan identified the following issues that underlie the plan’s conservation and management program:

- Adopt standards and guidelines for public land health
- Recover two threatened species: the desert tortoise and Coachella Valley milkvetch
- Conserve approximately 60 special-status animals and plants and natural communities
- Resolve management issues of wild horses and burros along the Colorado River
- Designate recreational /routes of travel
- Resolve issues of the land ownership pattern
- Resolve issues of resource access and regulatory burden
- Incorporate changes created by the 1994 California Desert Plant Act.

In addition to a number of specific objectives and actions to meet the goals of the above issues, the NECO Plan provides for conservation and management of several special-status species, in large part through a system of broad management areas: Desert Wildlife Management Areas (DWMAs) for desert tortoises, and Wildlife Habitat Management Areas (WHMAs) for other special-status species and natural communities (Figures 4-28). In both types of management areas, habitat improvements are prescribed to enhance the species of concern; DWMAs feature a one percent surface disturbance limit as well.
Desert Tortoise Recovery Plan. In June 1994, the final Desert Tortoise (Mojave Population) Recovery Plan was released (USFWS, 1994a). The 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 DWMAs act as reserves in which recovery actions are implemented (Figure 4-29). The recovery plan works in concert with Critical Habitat (Figure 4-29), designated for the tortoise in 1994 (USFWS 1994b) by prescribing management actions to aid recovery, with Critical Habitat providing legal protection.

Joshua Tree National Park General Management Plan (1995). The purpose of this plan is to define the general preservation and management goals and strategies for JOTR.

4.6.2 Description of Environment

The Project 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, approximately 2.8 to 5.4 inches per year (Turner and Brown, 1982). This is a warmer, wetter desert than the Mojave Desert and while substantial rainfall may occur in the winter months, there is a strong summer component, with warm, monsoonal rains emanating from the Gulf of Mexico. Winter temperatures average approximately 54°F (Turner and Brown, 1982). Ambient, summer temperatures are extreme, commonly reaching 110+°F for long periods and averaging approximately 90°F. This period of extremely warm weather is also lengthy, extending from mid-spring through the fall. As a consequence of these climatic conditions, the vegetation is highly drought-adapted, but contains subtropical elements. Where the summer rainfall is more reliable (extreme southeastern California), the arboreal community, largely consisting of microphyllous trees, is a primary component of the flora. But in general, species richness and density are relatively low due to the low rainfall and high temperatures, whether compared to more mesic environments or simply other regions of the Sonoran Desert.

The hydropower project is located at the edge of the Eagle Mountains, but gently sloping to undulating bajadas and valleys dominate the remainder of the Project landscape. The presence of coarse particles in the substrate varies and is largely dependent on the proximity of the Project to mountains and attendant hydrologic forces. Hence, boulders and cobbles are common in the upper bajadas and toeslopes, with smaller particles downslope. Desert pavement is intermittently present in the immediate area of the hydropower project. Soils generally range from soft sand to coarse-sandy loams, with aeolian patches of loose sand and intermittent incipient dunes from west of Wiley Well Road to Midpoint Substation. Elevations range from approximately 400 to 2000 feet.

Drainage patterns reflect the local topography. Along the broad bajadas traversed by the Project’s linear facilities, drainage is primarily characterized both by scattered, well-defined washes and networks of numerous narrow runnels. The former 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 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, albeit in a stunted form. These small channels often fail to either flow or provide through-flow to larger drainages. Sheet flow is evident across those bajadas where overland flows result from a combination of heavy precipitation and local topography; the substrates there tend to be more gravelly than non-sheeting habitats due to the hydrologic transport of materials. Throughout the Project area, percolation into the plain or nearby playa occurs where slopes are negligible.

Four basic native plant communities (after Holland 1986) are intersected by the Project: Sonoran Creosote Bush Scrub (California Native Plant Society [CNPS] Element Code 33100), Desert Dry Wash Woodland (CNPS Element Code 62200), and Stabilized and Partially Stabilized Dunes (CNPS Element Code 22200). The hydropower project is largely heavily disturbed by prior mining activities, but is bordered by Sonoran Creosote Bush Scrub (County of Riverside and BLM 1996). From the hydropower project east, the plant community is characterized by variations of Sonoran Creosote Bush Scrub. This community is dominated by two species: creosote bush (Larrea tridentata) and burro bush (Ambrosia dumosa). However, common elements variously include brittlebush (Encelia farinosa), white rhatany (Krameria grayi), chollas (Cylindropuntia echinocarpa, C. ramosissima, and occasionally C. bigelovii), one to several species of indigo bush (Psorothamnus schottii, P. arborescens var. simplicifolius, and P. emoryi), and ocotillo (Fouquieria splendens). Throughout Chuckwalla Valley and in bajadas to the east, the Project also intersects broad plains of contiguous to intermittent, arboreal washes (Desert Dry Wash Woodland). Where the drainages are well defined, the wash banks and islands are densely vegetated with aphyllous or microphyllous trees, primarily ironwood (Olneya tesota) and blue palo verde (Cercidium floridum), with occasional to common honey mesquite (Prosopis glandulosa), smoke tree (Psorothamnus spinosus) and catclaw (Acacia greggii). Where the drainages are contiguous, with sheet flow occurring across broad, bajadal floodplains, the tree species typically found in arboreal drainages are, instead, aspect-dominant elements of the landscape and appear to be homogeneous across the landscape. Other common wash associates - cheesebush (Ambrosia [=Hymenoclea] salsola), galleta grass (Pleuraphis rigida), desert lavendar (Hyptis emoryi), desert peach (Prunus fasciculatum), chuparosa (Justicia californica), and jojoba (Simmondsia chinensis) grow in both the arboreal drainages as well as the less distinct runnels.

Vegetation in the Stabilized and Partially Stabilized Dunes from Midpoint Substation west to about three miles west of Wiley Well Road is dominated by creosote bush, galleta grass, and white bursage; Emory dalea (Psorothamnus emoryi) is occasional to common. Representative understory species include dune primrose (Oenothera deltoides), sand verbena (Abronia villosa), forget-me-not (Cryptantha angustifolia), Spanish needle (Palafoxia arida), and plantago (Plantago ovata); croton (Croton californica) is periodically common. Associated sinks are
dominated by blue palo verde (*Cercidium floridum*), with understories of dense galleta grass, and Fendler globe mallow (*Sphaeralcea angustifolia*).

There are several highly disturbed habitats along the Project route. In Chuckwalla Valley, the Project intersects several abandoned jojoba farms and a few active agricultural parcels (jojoba and asparagus farms). The transmission line also crosses Interstate 10 and travels along Chuckwalla Road for approximately eight miles. (See the Recreation and Land Use Sections for a detailed description of land uses in the Project vicinity.)

Common wildlife species in this region are adapted to arid conditions and/or are migratory. In the habitats intersecting the Project, taxa include ungulates, small and midsized mammals, birds, reptiles, and invertebrates. Common species include black-tailed hare (*Lepus californicus*), desert kit fox (*Vulpes macrotis*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), antelope ground squirrel (*Ammospermophilus leucurus*), Merriam’s kangaroo rat (*Dipodomys merriami*), desert woodrat (*Neotoma lepida*), black-throated sparrow (*Amphispiza bilenata*), California horned lark (*Eremophila alpestris acta*), ash-throated flycatcher (*Myiarchus cinerascens*), mourning dove (*Zenaida macroura*), cactus wren (*Campylorhynchus brunneicapillus*), lesser nighthawk (*Chordeiles acutipennis*), red-tailed hawk (*Buteo jamaicensis*), and turkey vulture (*Cathartes aura*). Common species specifically associated with drainages include desert mule deer (*Odocoileus hemionus*), verdin (*Auriparus flaviceps*), black-tailed gnatcatcher (*Polioptila melanura*), and phainopepla (*Phainopepla nitens*). Side-blotched lizard (*Uta stansburiana*), desert iguana (*Dipsosaurus dorsalis*), zebra tailed lizard (*Callisaurus draconoides*), western whiptail (*Cnemidophorus tigris*), desert horned lizard (*Phrynosoma platyrhinos*), gopher snake (*Pituophis melanoleucus*), and coachwhip (*Masticophis flagellum*) are commonly occurring reptiles. Amphibians are comparatively uncommon in the Project area due to lack of permanent water and unreliable ephemeral water. However, a few species are known from the area and may breed in ephemeral water sources as they become available during summer or winter rains. The most common species are red-spotted toad (*Bufo punctatus*) and Pacific treefrog (*Pseudacris regilla*). Commonly occurring invertebrate taxa include spiders (Class: Arachnidae), beetles (Order: Coleoptera), true bugs (Order: Hemiptera), and wasps and ants (Order: Hymenoptera).

The draft EIS/EIR for the Eagle Mountain Landfill (County of Riverside and BLM 1996) also identified several common species that inhabit the disturbed Kaiser Eagle Mountain Mine and surrounding mine shafts as a result of that disturbance. These include common raven (*Corvus corax*), house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), European starling (*Sturnus vulgaris*) and several bat species that use the mine structures, but are generally intolerant of human activity (Townsend’s big-eared bat [*Plecotus townsendii*], pallid bat [*Antrozous pallidus*], western pipistrelle (*Pipistrellus hesperus*), and Brazilian free-tail bat [*Tadarida brasiliensis*]).
4.6.2.1 **Desert Dry Wash Woodland**

The arboreal washes that are common in the landscape traversed by the Project are considered biologically significant habitat features to which biodiversity in the Colorado Desert is strongly linked (see review in National Research Council 1995). These assemblages provide critical breeding, refuge, and foraging habitat for a variety of birds, amphibians, and invertebrates and many local species concentrate their activities in these lush drainages. Because of its value to wildlife and natural processes, Desert Dry Wash Woodland is considered sensitive by the California Resources Agency (BLM and CDFG 2002).

Desert Dry Wash Woodland is located on the Project intermittently throughout Chuckwalla Valley to Midpoint Substation.

4.6.2.2 **Sand Dunes**

Dunes are uncommon habitats in the desert. A rich plant and animal community occupies this habitat and there are several associated species that are largely or entirely found in the loose sand of the dunes proper or in the surrounding sandy habitat (e.g., dune primrose \[*Oenothera deltoides*\], desert lily \[*Hesperocallis undulata*\], Coachella Valley milkvetch \[*Astragalus lentiginosus* var. *coachellae*\], croton \[*Croton californica*\], sand verbena \[*Abronia villosa*\], and Mojave fringe-toed lizard \[*Uma scoparia*\]). This habitat primarily occurs in valleys or lower bajadas with slopes under approximately one percent. Drainage is largely by percolation with occasional arboreal washes and sinks.

On the Project, low, sparsely to moderately vegetated dunes and hummocks are present from Midpoint Substation west to about three miles west of Wiley Well Road (Chuckwalla Valley Dune Thicket Area of Critical Environmental Concern).

4.6.3 **Other Biological Issues**

4.6.3.1 **Biological Soil Crusts**

Biological crusts, also variously known as crytobiotic, cryptogamic, microbiotic, and micryphytic crusts, form in the upper layers of soils. These soil crusts include a community of microscopic bacteria, fungi, algae, and other microorganisms that function mechanically, chemically, and biologically to stabilize soils against erosion; provide nutrients and water for plant growth; and modify ambient temperatures (West 1990, Belnap et al. 2001). Their function in arid systems has only relatively recently been addressed, especially as it relates to crust disturbance (Rowlands 1980, Belnap et al. 1998, Evans and Belnap 1999). Crusts are highly susceptible to crushing, especially when dry, which can occur via a number of mechanisms, including grazing, vehicular traffic, surface grading, and hiking. Not only do crushed crusts lose their function, but crushed crusts release a flush of nutrients that support the growth of exotic annual species (e.g. *Bromus* spp., *Schismus arabicus*) (Pendleton et al. 2004).
4.6.3.2 Invasive Species

Several species of exotic plants have been introduced to the southwestern deserts. Tamarisk (Tamarix spp.), a medium-sized tree, was introduced to the United States as an ornamental and windbreak. Brought to the United States in the early 1800s (Allen 2002), old hedges of tamarisk are still common along farms and railroads in many areas of the desert. It has especially invaded riparian areas, including springs, rivers, and canals, outcompeting native vegetation for available resources.

Highly successful annual exotics in the desert include three grasses - red brome (Bromus madritensis rubens), cheatgrass (B. tectorum), and split grass (Schismus spp) – and two dicots – Tournefort’s mustard (Brassica tournefortii) and filaree (Erodium cicutarium). Most were established in the desert in the mid-twentieth century primarily via grazing and agriculture (Allen 2002), but also by road-building and other anthropogenic activities that disturb soil surfaces and/or use equipment capable of transporting exotic seed from sources elsewhere. Brooks (2007) also cited nitrogen deposition from vehicle exhaust as potentially promoting plant invasions.

Exotic species use available resources, thereby competing with native plant species and altering species composition and evenness. This, in turn, alters the availability of resources (e.g., cover, forage) to wildlife, which may alter species diversity in the affected wildlife community. Lack of native vegetation may also be implicated in the inability of species that are periodically stressed by drought – a normal and relatively frequent phenomenon in the desert - to withstand that stress. Furthermore, exotic annuals are responsible for promoting wildfires in the desert (Brown and Minnich 1986, Brooks 1998 in Allen 2002).

4.6.4 Potential Impacts

4.6.4.1 General Impacts to Biological Resources

Project issues and impacts to biological resources are analyzed in two phases, construction phase and operation and maintenance phase.

The potential project impacts discussed below are analyzed prior to the implementation of mitigation and compensation measures. Incorporation of mitigation measures as part of the project can permit those measures to be included in the analysis of Project impacts, thereby reducing the Project impacts.

4.6.4.2 Construction

Construction activities associated with the Project include (1) renovation of the Eagle Mountain Mine to accommodate the reservoirs and generating facilities, (2) construction of the transmission line, and (3) construction of the water pipeline.
Equipment required for construction would include bulldozers, backhoes, graders, air compressors, man lifts, generators, drill rigs, truck-mounted augers, flatbed trucks, boom trucks, rigging and mechanic trucks, small wheeled cranes, concrete trucks, water trucks, crew trucks and other heavy equipment. Soil and construction materials may be temporarily stored or stockpiled.

Construction associated with the hydropower project would include construction of shafts, tunnels, the powerhouse, administration/storage area, and any necessary recontouring of the pits. For the most part, the hydropower project construction would take place in a highly disturbed, heavily mined area. However, there may be some areas that have biological resources, either because they were not disturbed during mining, or, more likely, because they have regenerated naturally.

Construction of the transmission line would include:

- Preparation of staging/laydown areas;
- Access road and spur road construction/improvement;
- Clearing and grading of pole sites;
- Foundation preparation and installation of poles;
- Wire stringing and conductor installation;
- Temporary parking of vehicles outside the construction zone on sites that support sensitive resources (sites not designated as construction material yards); and
- Cleanup and site reclamation.

Construction of the water pipeline collection system would include activities similar to those of the transmission line, although the surface disturbance would probably be greater to accommodate both pipeline installation and the access road.

Depending on the schedule of construction (timing and length of the construction period) and the presence of special biological resources, direct impacts from construction could include loss of individuals and habitat. Special habitat resources, such as specific burrowing sites, may be lost during project construction. For species with relatively limited mobility; i.e., those that are underground during most of the day or year, or those that have a life stage in the soil or on plants (e.g., insects, nesting birds) - individual losses are more likely than for more mobile species. Some birds may be temporarily disturbed by construction activities and abandon the area, although others will become easily habituated to human activity (e.g., loggerhead shrike).

Population impacts to those species that may be affected by habitat loss on the linear facilities are generally expected to be minor due to the small footprint of habitat physically disturbed.
relative to the surrounding available habitat. Animals displaced due to the project would be able
to return to the area once construction activities have ceased.

Loss of native habitat for the sole purpose of construction (as opposed to maintenance) is
temporary, but should be considered semi-permanent for the Colorado Desert. Natural regrowth
is constrained by limited and unpredictable precipitation and can require several decades to
approach pre-disturbance conditions. During this time, the habitat is unavailable for use by
native wildlife. As such, all surface disturbances during construction that results in the removal
or displacement of vegetation and soil should be considered semi-permanent.

In addition to the semi-permanent loss of habitat, wildlife may experience temporary disruption
of normal movements to achieve feeding, breeding, sheltering, and dispersal. This could occur if
mitigation associated with construction of any Project component includes erecting temporary
exclusion fencing.

Indirect impacts could include dust deposition on neighboring vegetation. This is expected to be
temporary, however, and thus have no lasting impacts.

4.6.4.3 Operation and Maintenance

The primary direct impacts to species from operation of the Project could include the loss of
individuals that move onto the site and the loss of use of special biological resources (e.g.,
springs or seeps) due to the proximity and operation of the facility. Based on the existing high
level of disturbance on the hydropower project site and minimal expected habitat loss due to the
linear facilities, it is anticipated that there will be negligible loss of resources to most species.
However, all resources on the Project are currently unknown.

The presence of another transmission line could result in the losses of birds through collisions or
electrocution, even if a transmission line of equal stature is already present in the adjacent right-
of-way. Depending on the current existence of roads, new recreational access may also be
provided by the water pipeline right-of-way. This may result in further habitat degradation and
species loss if egress into formerly inaccessible areas results. Finally, maintenance of tower pads
and spur roads on the transmission line would perpetuate the vegetation loss of tower pads and
roads and, potentially, increase erosion.

Wildlife outside of areas of Project-associated surface disturbance and Project operation may
also experience indirect, adverse effects. Such effects could include:

- Loss of dispersal areas and connectivity to other areas;
- Altered home ranges and social structure;
- Increased depredation by predators attracted to the site; and
- Altered plant species composition due to the introduction of exotic vegetation.
It is unlikely that the water pipeline or transmission line will restrict animal movement. However, the current use of the Eagle Mountain Mine by bighorn sheep and other species is unknown. It is conceivable that the normal movements of some species to achieve feeding, breeding, sheltering, and dispersal or migration may be indirectly affected by the Project. This could affect both individuals and populations.

Faunal community structure may be altered if predators are attracted to the landfill due to available water or lights. Plant community structure and resulting fauna may also be altered if non-native species introduced during construction and/or maintenance activities increase in both abundance and distribution.

4.6.5 Existing or Proposed Protection, Mitigation, or Enhancement Activities

4.6.5.1 General Mitigation Measures

General recommendations for wildlife and habitat are discussed below.

Avoidance and Minimization of Habitat Degradation. In general, disruption of ecological processes and biological resources should be avoided, where possible, or minimized. Habitat degradation should be limited to essential areas only and, where practical, previously disturbed areas should be used for driving, parking, and storing equipment. A plan can be developed to ensure that vegetation removal and damage to soil surfaces is minimized through pre-construction surveys, delineation, and staking/flagging of avoidance areas. Where avoidance is infeasible, the plants may be salvaged and planted in an adjacent, undisturbed site. Plant salvaging is described in a Project Restoration Plan.

Pre-Construction Surveys. Pre-construction surveys of the potential disturbance areas, including access roads, tower pad sites, pulling sites, equipment storage sites, and all use areas that are not fenced by wildlife exclusion fencing, would be conducted to ensure that special-status species are avoided or mitigated. Areas fenced by wildlife exclusion fencing would be searched for special species following fencing, and special-status would be removed according to permits for the Project.

Construction- and Operations-Related Environmental Protection. Prior to the start of construction, activities and contingencies related to construction, operation, and environmental protection must be delineated in a comprehensive mitigation and monitoring plan. Issues addressed should include, but not be limited to, designated working areas and equipment storage, stream protection, equipment maintenance and cleaning, fueling and accidental fuel spills, removal of all debris, hazardous waste, and other construction-related materials, and worker education. The worker education program for Project personnel should include measures for desert tortoises and all special-status species, as well as general working procedures (e.g., minimization of habitat degradation, garbage control, vehicular speed limits, and working with biological monitors).
**Designation of a Project Biologist.** A Project biologist should be assigned to ensure successful monitoring of construction activities, implementation of the worker education program, and successful implementation of all other mitigation measures. The Project biologist would be approved by the agencies and would be responsible for reporting to the agencies.

**Weed Control.** A weed control program would be developed prior to construction that identifies (1) existing weed populations on the Project and in the surrounding area, (2) methods to quantify weed invasion, (3) methods for minimization of weed introduction, and (4) methods and a schedule for weed eradication, should populations invade the Project.

**Restoration Program.** A detailed revegetation program should be developed prior to surface disturbance that will ensure realistic and adequate restoration of semi-permanently disturbed sites. The program would include:

- Quantitative identification of the baseline annual, herbaceous perennial, and woody perennial plant community;
- Soil salvage and preparation;
- Plant salvage during construction;
- Soil testing and appropriate amendments and/or inoculation of mycorrhizal fungi to develop a healthy soil micro-community;
- Seeding and/or planting of seedlings of colonizing species and mycorrhizal net builders;
- Test plots;
- Plant protection;
- Erosion and weed control;
- Irrigation alternatives, as necessary; and
- A realistic set of success measures.

**Reporting.** During construction, the Project biologist would provide progress reports at regular intervals to the BLM and other relevant agencies to describe the Project progress, mitigation measures implemented, mitigation successes or difficulties, and recommendations. Any harassment or mortality take of listed species, with suggestions for mitigation improvement, would be documented.

**Adaptive Management.** When data show that alterations in techniques, mitigation measures, or permits are required to adequately protect wildlife and habitats, then these should be analyzed with the relevant agencies and changes implemented.
4.7 Wetlands, Riparian, and Littoral Habitat

4.7.1 Description of Environment

4.7.1.1 Wetlands and Waters
No natural wetlands occur in the Project vicinity. Drainages in this part of Riverside and Imperial County are generally limited to high-energy runoff via washes that are usually dry. As water from these runoffs quickly percolates into the surrounding soil, the establishment of wetland vegetation is precluded. The additional soil moisture during these brief periods is enough to allow the growth of aphyllous or microphyllous trees (see above), but the lack of residual soil moisture and less importantly, the scouring action from the high-energy, intermittent flow, prohibits the growth of most species of plants.

It is unclear without further investigation, but there may be standing water associated with water treatment facilities for the Eagle Mountain townsite.

There are no perennial streams in the Project vicinity.

4.7.1.1.1 Seeps and Springs
Seeps and springs are unique and rare resources found primarily along the perimeter of mountain ranges. Most are quite small, only a few feet in diameter, and may have surface water or merely saturated soil. Associated vegetation often includes wetland obligates. Six seeps, springs, or water catchments were identified by the NECO Plan in the vicinity of the project (Figure 4-30). Four of these, Buzzard Spring, Dengler Tank, Eagle Tank, and Cactus Spring, are outside the Project boundary by at least two miles (County of Riverside and BLM 1996). The NECO Plan identified two other springs (unnamed), however, one of which might be adjacent to the Project but no further information is available.

4.7.2 Potential Impacts
Since there are no wetlands in the Project vicinity, there will be no impact to wetlands.

The effect of pumping on springs in the Eagle Mountains is not expected to be significant. Based on limited available information, it appears unlikely that these springs are hydrologically connected to the Pinto or Chuckwalla Valley basin aquifers since they are located in the mountains above the Pinto and Chuckwalla basins. Rather, they appear to be fed by local groundwater systems that would be unaffected by withdrawals from the proposed project (NPS, 1994). Since flow from the springs is unlikely to be affected by the project, the vegetation supported by these springs is also unlikely to be affected by the project.
4.7.3 Existing or Proposed Protection, Mitigation, or Enhancement Activities

The NECO plan calls for wetland systems associated with subsurface, running, and standing water to function properly and have the ability to recover from major disturbances and to maintain hydrologic conditions.

4.8 Rare, Threatened, and Endangered Species

4.8.1 Data or Studies Summaries

Biological surveys have been conducted for several projects in the Project area in the recent past. For the transmission line, these include:


4.8.2 Description of Environment

Several species known to occur on or in the vicinity of the 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 federally or state-listed as Threatened or Endangered and receive specific protection as defined in federal or state endangered species acts (FESA and CESA, respectively). Candidate species for listing, species designated as “Species of Concern” or “Sensitive” by state or federal agencies, and plant species from Lists 1A, 1B, and 2 of the CNPS (2007) *Electronic Inventory of Rare and Endangered Vascular Plants of California* are protected under the California Environmental Quality Act (CEQA) by the statement that “a species not included in any listing in subsection (c) shall nevertheless be considered to be rare or endangered if the species can be shown to meet the criteria in subsection (b)” (CEQA Guidelines §15380, Subsection d). These species and listed 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 NECO as species for which surveys must be completed where a project intersects the species ranges, as mapped in NECO. Therefore, these plants are also included in the list of special-status species for the Project. In
addition, two species 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.

Table 4-12 identifies the special-status, game, and protected species that may occur within the Project vicinity and have potential to be affected by Project activities. This list is based on (1) records of the California Natural Diversity Data Base (CNDDB) for special-status species that are known to occur in the project survey area; (2) records from the CNPS for special-status plants; (3) results from relevant surveys (e.g., Karl 2002, 2005, and 2003 and 2007 field notes, Environmental Planning Group [EPG] 2004, Blythe Energy LLC 2004, Tetra Tech EC, Inc. 2005) and reviews (County of Riverside and BLM 1996); (4) the NECO Plan (BLM and CDFG 2002); and (5) known habitats in the area (i.e., experience of the author). A summary of the habitat and range of each special-status species is also discussed below.
Table 4-12
Eagle Mountain Pumped Storage Project
Potential for Special-Status Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Status²</th>
<th>Habitat</th>
<th>Likelihood of Occurrence on the Project Site</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abrams’s Spurge (Chamaesyce abramsiana)</td>
<td>—</td>
<td>Sandy sites in Mojavean and Sonoran Desert scrubs in eastern California; 0-3000 ft</td>
<td>Possible, north of I-10 and east of Graham Pass Rd</td>
</tr>
<tr>
<td>Arizona Spurge (Chamaesyce arizonica)</td>
<td>—</td>
<td>Sandy flats in Sonoran Desert scrub, below ~1000 ft</td>
<td>Possible, north of I-10 and east of Graham Pass Rd</td>
</tr>
<tr>
<td>Ayenia (Ayenia compacta)</td>
<td>—</td>
<td>Sand and gravelly washes and canyons in desert scrubs, 450-3600 ft</td>
<td>Possible primarily around the hydropower project</td>
</tr>
<tr>
<td>California Ditaxis (Ditaxis serrata var. californica)</td>
<td>—</td>
<td>Sonoran Creosote Bush Scrub from 100 to 3000 ft</td>
<td>Possible in Chuckwalla Valley</td>
</tr>
<tr>
<td>Coachella Valley Milkvetch (Astragalus lentiginosus coachellae)</td>
<td>—</td>
<td>Loose to soft sandy soils, often in disturbed sites; 100 to 2200 ft</td>
<td>Unlikely that habitat exists on the Project site</td>
</tr>
<tr>
<td>Cove’s Cassia (Senna covesii)</td>
<td>—</td>
<td>Dry washes and slopes in Sonoran Desert Scrub, 1000 to 3500 ft</td>
<td>Possible on entire project</td>
</tr>
<tr>
<td>Crucifixion Thorn (Castela emoryi)</td>
<td>—</td>
<td>Movavean and Sonoran Desert scrubs; typically associated with drainages</td>
<td>Possible; observed at the mine; NECO records for the species are scattered throughout the plan area</td>
</tr>
<tr>
<td>Desert Sand-parsley (Ammoselinum giganteum)</td>
<td>—</td>
<td>Sonoran Desert Scrub; known from one site, near Hayfield Dry Lake, at 1200 ft</td>
<td>Highly unlikely</td>
</tr>
<tr>
<td>Desert Unicorn Plant (Proboscidea althaefolia)</td>
<td>—</td>
<td>Sandy areas in Sonoran Desert scrub throughout southeastern California, below 3300 ft.</td>
<td>Possible throughout the Project area</td>
</tr>
<tr>
<td>Flat-seeded Spurge (Chamaesyce platysperma)</td>
<td>—</td>
<td>Sandy flats and dunes in Sonoran Desert scrub; below 350 ft</td>
<td>Possible north of I-10 and east of Graham Pass Rd</td>
</tr>
<tr>
<td>Foxtail Cactus (Coryphantha alversonii)</td>
<td>—</td>
<td>Primarily rocky substrates between 250 and 4000 ft. Creosote Bush Scrub</td>
<td>Likely on the bajada south of the hydropower project; possible but unlikely along the transmission route due to previous survey results</td>
</tr>
<tr>
<td>Glandular Ditaxis (Ditaxis claryana)</td>
<td>—</td>
<td>Sandy flats in Mohavean and Sonoran Creosote Bush scrubs in Imperial, San Bernardino, and Riverside counties; below 1500 ft</td>
<td>Possible in the Chuckwalla Valley</td>
</tr>
<tr>
<td>Species</td>
<td>Status</td>
<td>Habitat</td>
<td>Likelihood of Occurrence on the Project Site</td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
<td>---------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Harwood’s Milkvetch (Astragalus insularis var. harwoodii)</td>
<td>2</td>
<td>Dunes and windblown sands below 1200 ft., east and south of Desert Center</td>
<td>Known from sandy sites from Midpoint west to Graham Pass Rd</td>
</tr>
<tr>
<td>Jackass Clover (Wislizenia refracta var. refracta)</td>
<td>2</td>
<td>Sandy washes, roadsides, flats; 1900 to 2700 ft</td>
<td>Unlikely due to lack of onsite habitat</td>
</tr>
<tr>
<td>Las Animas Colubrina (Colubrina californica)</td>
<td>2</td>
<td>Sonoran Desert Creosote Bush Scrub, &lt;3300 ft</td>
<td>Possible along the entire Project, especially near the hydropower project</td>
</tr>
<tr>
<td>Mesquite Neststraw (Stylocline sonorenensis)</td>
<td>1A</td>
<td>Open sandy drainages; known from one site near Hayfield Spring; presumed extinct in California</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Orocopia Sage (Salvia greatae)</td>
<td>— BLM Sensitive 1B</td>
<td>Mohavean and Sonoran Desert scrubs; gravelly/rocky bajadas, mostly near washes; below 3000 ft</td>
<td>Possible near the hydropower project</td>
</tr>
<tr>
<td>Spearleaf (Matelea parvifolia)</td>
<td>2</td>
<td>Rocky ledges and slopes, 1000 to 6000 ft, in Mojave and Sonoran Desert scrubs</td>
<td>Only potential habitat is near hydropower project</td>
</tr>
<tr>
<td>Slender Woolly-heads (Nemacaulis denudate var. gracilis)</td>
<td>2</td>
<td>Dunes in coastal and Sonoran Desert scrubs, primarily in the Coachella Valley; below 1500 ft</td>
<td>Possible in incipient dunes from west of Wiley Well Rd. to Midpoint</td>
</tr>
<tr>
<td>Spiny Abrojo (Condalia globosa var. pubescens)</td>
<td>4</td>
<td>Sonoran Creosote Bush Scrub; 500 to 3300 ft</td>
<td>Possible on the upper bajada of the Chuckwalla Mts. and around the hydropower project</td>
</tr>
<tr>
<td>Invertebrates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheeseweed Owlfly (Oliarces clara)</td>
<td>—</td>
<td>Creosote bush scrub in rocky areas</td>
<td>Possible, especially near the hydropower project</td>
</tr>
<tr>
<td>Amphibians</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couch’s Spadefoot (Scaphiopus couchii)</td>
<td>— BLM Sensitive SC</td>
<td>Various arid communities in extreme southeastern California and east, south</td>
<td>Possible</td>
</tr>
<tr>
<td>Reptiles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chuckwalla (Sauromalus ater)</td>
<td>—</td>
<td>Rock outcrops</td>
<td>Likely in all rocky areas near the hydropower project and along the transmission line</td>
</tr>
<tr>
<td>Desert Rosy Boa (Charina trivirgata gracia)</td>
<td>— BLM Sensitive</td>
<td>Rocky uplands and canyons; often near stream courses</td>
<td>Possible, especially near hydropower project</td>
</tr>
</tbody>
</table>
## Species Status

<table>
<thead>
<tr>
<th>Species</th>
<th>Status²</th>
<th>Habitat</th>
<th>Likelihood of Occurrence on the Project Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mojave Fringe-toed Lizard (Uma scoparia)</td>
<td>BLM Sensitive SC</td>
<td>Restricted to aeolian sandy habitats in the Mojave and northern Sonoran deserts</td>
<td>Known from aeolian areas west of and around Midpoint Substation</td>
</tr>
<tr>
<td>Desert Tortoise (Gopherus agassizii)</td>
<td>T T</td>
<td>Most desert habitats below approximately 5000 ft in elevation</td>
<td>Known from the project area west of approximately the Chuckwalla Valley Dune Thicket ACEC</td>
</tr>
</tbody>
</table>

### Birds

<table>
<thead>
<tr>
<th>Species</th>
<th>Status²</th>
<th>Habitat</th>
<th>Likelihood of Occurrence on the Project Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Peregrine Falcon (Falco perigrinus anatum)</td>
<td>Delisted BCC</td>
<td>Dry, open country, including arid woodlands; nests in cliffs</td>
<td>Possible forager onsite, may nest in adjacent mts.</td>
</tr>
<tr>
<td>Bendire’s Thrasher (Toxostoma bendirei)</td>
<td>BCC BLM Sensitive SC</td>
<td>Arid to semi-arid brushy habitats, usually with yuccas, cholla, and trees</td>
<td>Possible</td>
</tr>
<tr>
<td>Black-tailed Gnatcatcher (Polioptila melanura)</td>
<td>— — — —</td>
<td>Desert washes</td>
<td>Likely</td>
</tr>
<tr>
<td>Burrowing Owl (Athene cunicularia)</td>
<td>BCC BLM Sensitive SC</td>
<td>Open, arid habitats</td>
<td>Likely</td>
</tr>
<tr>
<td>California Horned Lark (Eremophila alpestris actia)</td>
<td>— SC —</td>
<td>Open desert habitats</td>
<td>Likely</td>
</tr>
<tr>
<td>Cooper’s Hawk (Accipiter cooperii)</td>
<td>SC</td>
<td>Woodlands and forests, possibly desert oases</td>
<td>Possible near the hydropower project and lushly vegetated arboreal washes</td>
</tr>
<tr>
<td>Crissal Thrasher (Toxostoma crissale)</td>
<td>BCC SC</td>
<td>Dense mesquite and willows along desert streams and washes</td>
<td>Highly unlikely due to probable lack of habitat</td>
</tr>
<tr>
<td>Ferruginous Hawk (Buteo regalis)</td>
<td>— BLM Sensitive SC</td>
<td>Arid, open country</td>
<td>Possible winter resident only</td>
</tr>
<tr>
<td>Gila Woodpecker (Melanerpes uropygialis)</td>
<td>BCC E</td>
<td>Desert woodland habitats</td>
<td>Possible if habitat is present</td>
</tr>
<tr>
<td>Golden Eagle (Aquila chrysaetos)</td>
<td>BCC BLM Sensitive SC</td>
<td>Open country; nests in large trees in open areas or cliffs</td>
<td>Possible forager on site, may nest in adjacent mts.</td>
</tr>
<tr>
<td>Le Conte’s Thrasher (Toxostoma lecontei)</td>
<td>BCC BLM Sensitive SC</td>
<td>Mohavean and Sonoran Desert Scrub</td>
<td>Likely</td>
</tr>
<tr>
<td>Loggerhead Shrike (Lanius ludovicianus)</td>
<td>BCC SC</td>
<td>Arid habitats with perches</td>
<td>Likely</td>
</tr>
<tr>
<td>Merlin</td>
<td>— SC</td>
<td>Open country; nests in trees,</td>
<td>Possible as winter</td>
</tr>
<tr>
<td>Species</td>
<td>Status</td>
<td>Habitat</td>
<td>Likelihood of Occurrence on the Project Site</td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
<td>---------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>(Falco columbarius)</td>
<td>BCC BLM Sensitive</td>
<td>Audubon Watchlist USBC Watchlist</td>
<td>cliffs, and on ground only</td>
</tr>
<tr>
<td>Mountain Plover (Charadrius montanus)</td>
<td>BCC</td>
<td>SC</td>
<td>Audubon Watchlist USBC Watchlist</td>
</tr>
<tr>
<td>Northern Harrier (Circus cyaneus)</td>
<td>—</td>
<td>SC</td>
<td>—</td>
</tr>
<tr>
<td>Prairie Falcon (Falco mexicanus)</td>
<td>BCC</td>
<td>SC</td>
<td>—</td>
</tr>
<tr>
<td>Short-eared Owl (Asio flammeus)</td>
<td>—</td>
<td>SC</td>
<td>Audubon Watchlist USBC Watchlist</td>
</tr>
<tr>
<td>Sonoran Yellow Warbler (Dendroica petechia sonorana)</td>
<td>BCC</td>
<td>SC</td>
<td>—</td>
</tr>
<tr>
<td>Vermilion Flycatcher (Pyrocephalus rubinus)</td>
<td>—</td>
<td>SC</td>
<td>—</td>
</tr>
<tr>
<td>Yellow-breasted Chat (Icteria virens)</td>
<td>—</td>
<td>SC</td>
<td>—</td>
</tr>
</tbody>
</table>

**Mammals**

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>Habitat</th>
<th>Likelihood of Occurrence on the Project Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Badger (Taxidea taxus)</td>
<td>—</td>
<td>SC</td>
<td>Many habitats</td>
</tr>
<tr>
<td>Arizona Myotis (Myotis occultus)</td>
<td>—</td>
<td>SC</td>
<td>WBWG:M</td>
</tr>
<tr>
<td>Big Free-tailed Bat (Nyctinomops macrotis)</td>
<td>—</td>
<td>SC</td>
<td>WBWG:MH</td>
</tr>
<tr>
<td>Burro Deer (Odocoileus hemionus eremicus)</td>
<td>—</td>
<td>Game Species</td>
<td>—</td>
</tr>
<tr>
<td>California Leaf-nosed Bat (Macrotus californicus)</td>
<td>BLM Sensitive</td>
<td>SC</td>
<td>WBWG:H</td>
</tr>
<tr>
<td>Colorado Valley Woodrat (Neotoma albigna venusta)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Nelson’s Bighorn Sheep (Ovis canadensis nelsoni)</td>
<td>BLM Sensitive</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Pallid Bat</td>
<td>—</td>
<td>SC</td>
<td>WBWG:H</td>
</tr>
<tr>
<td>Species</td>
<td>Status²</td>
<td>Habitat</td>
<td>Likelihood of Occurrence on the Project Site</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>---------</td>
<td>-------------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>(Antrozous pallidus)</td>
<td>BLM Sensitive</td>
<td>Variety of arid areas in pinyon-juniper woodland, desert scrubs, palm oases, drainages; always near rocky areas</td>
<td>near the hydropower project</td>
</tr>
<tr>
<td>Pocketed Free-tailed Bat (Nyctinomops femorosaccus)</td>
<td>— SC</td>
<td>Caves, mines and buildings in lower desert scrub habitats; also near the Colorado River</td>
<td>Possible near the hydropower project</td>
</tr>
<tr>
<td>Southwestern Cave Myotis (Myotis velifer brevis)</td>
<td>SC BLM Sensitive</td>
<td>Arid scrub and grasslands, to coniferous forests, roosts in cliffs, forages along streams and in woodlands, fields</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Townsend’s Big-eared Bat (Corynorhinus townsendii)</td>
<td>— BLM Sensitive</td>
<td>Broad habitat associations. Roosts in caves and manmade structures; feeds in trees</td>
<td>Possible, primarily near the hydropower project</td>
</tr>
<tr>
<td>Western Mastiff Bat (Eumops perotis californicus)</td>
<td>— BLM Sensitive</td>
<td>Cliffs, trees, tunnels, buildings in desert scrub</td>
<td>Possible, especially near hydropower project</td>
</tr>
<tr>
<td>Yuma Puma (Puma concolor browni)</td>
<td>— SC</td>
<td>Colorado River bottomlands</td>
<td>Possible</td>
</tr>
</tbody>
</table>

1/ See text for method of determination of those species potentially in project area.
2/ Source: California Department of Fish and Game Wildlife and Habitat Data Analysis Branch, http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals (2007)

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 the USFWS, but have no official status [formerly C2 species])
- Federal BCC USFWS Bird of Conservation Concern
- State SC CDFG Species of Special Concern (species that appear to be vulnerable to extinction)
- State Protected Species that cannot be taken without a permit from the CDFG
- Fully Protected Species that cannot be taken without authorization from the Fish and Game Commission
- 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 USFWS candidate species

3/ 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.)

USBC = United States Bird Conservation List
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
4.8.2.1 Listed Species

Coachella Valley Milkvetch (*USFWS: Endangered; BLM: Sensitive; CDFG: None; CNPS: List 1B*). This species is found from the Coachella Valley, east to approximately Desert Center (NECO 2002, CNPS 2007). The strongly inflated, two-celled, speckled pods of this silky haired milkvetch easily distinguish it from other milkvetches. It is an herbaceous perennial whose above-ground portions die back during drought periods. While it is restricted to loose-sandy, including aeolian, soils, the substrate over the soil may be slightly gravelly. Microhabitat sites are often associated with disturbance, consistent with many legumes, and in a 1987 survey of the Southern California Edison (SCE) Palo-Verde Devers II Transmission Line, individuals were commonly found in road berms (Karl and Uptain 1985). It has been found throughout the Coachella Valley (Karl and Uptain 1985, NECO 2002, CNPS 2007), but many of these populations are threatened by OHV recreational use and may no longer exist. It was also recently found in the aeolian areas of Chuckwalla Valley, along SR 177 (Figure 4-31; BLM and CDFG 2002, CNPS 2007).

Coachella Valley milkvetch is unlikely to be found on the Project due to lack of habitat. If dunes exist in the vicinity of the Project pipeline and transmission line in Chuckwalla Valley of which ECE is currently unaware, then it may be present. However, it was not seen on several previous surveys of the transmission line corridor (BLM and IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

Desert Tortoise (*USFWS: Threatened; CDFG: Threatened; Protected*). The desert tortoise is one of five species of North American tortoises, four of which belong to the genus *Gopherus*: *G. agassizii* (desert tortoise), *G. berlandieri* (Texas tortoise), *G. flavomarginatus* (bolson tortoise), and *G. polyphemus* (gopher tortoise). A fifth species, *Xerobates lepidocephalus* (scaley-headed tortoise) is known from southern Baja California, Mexico, and may be a relict descendant of the desert tortoise (Ottley et al., 1989). Only the desert tortoise inhabits the southwest 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 and northern Sinaloa, Mexico (Ernst et al., 1994; Germano et al., 1994).

The desert tortoise occupies arid habitats below approximately 4,000 ft in elevation (Karl 1983, Weinstein 1989). Common vegetation associations in the Mojave Desert include creosote bush scrub, saltbush scrub, Joshua tree woodland, and Mojave yucca communities. In the Colorado and Sonoran deserts of southern California and Arizona, desert tortoises occupy somewhat lusher desert habitats, with increased bunch grasses, cacti, and trees; thornscrub is occupied in the Sinaloan Desert. Because of the burrowing nature of tortoises, soil type is an important habitat component (Karl 1983, Weinstein et al., 1986). 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. In portions of Nevada and elsewhere, where a near-surface durapan limits digging, tortoises often occupy caverns in the exposed caliche of wash banks. 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 slopes are inhabited; only playas and steep, talus-covered slopes are avoided.

The USFWS emergency-listed the desert tortoise as endangered on August 4, 1989 (USFWS 1989). The Mojave population - the species in California, Nevada, Utah, and parts of Arizona north of the Colorado River - was listed in the final rule on April 2, 1990 as threatened (USFWS 1990). The Sonoran population, the species in the remainder of Arizona, is not listed and does not have protected status under the ESA. On June 22, 1989, the California Fish and Game Commission listed the species as threatened under the California Endangered Species Act (CESA) (State of California Fish and Game Commission 1989). On February 8, 1994, the USFWS designated critical habitat for the Mojave population of the desert tortoise (USFWS 1994b), encompassing approximately 6,446,200 acres (2,608,741 ha). One critical habitat unit (CHU), the Chuckwalla CHU, intersects the project area.

Desert tortoises have been observed on all previous surveys in the Project area (County of Riverside and BLM 1996, Karl 2002, BLM and IID 2003, EPG 2004, TetraTech EC, Inc. 2005). Habitat for this species exists on the Project from approximately four miles west of Wiley Well Road (Karl 2002) west to the hydropower project (County of Riverside and BLM 1996). (While not on the Project site proper, areas outside the Project that could be affected by Project construction and/or operation also patchily occur east of Wiley Well Road.) Generally, sign counts were relatively low on the alignment coinciding with the Project transmission line (Karl 2002 and 2004, BLM and IID 2003, TetraTech, Inc., 2005).

The Chuckwalla DWMA intersects the Project from Wiley Well Rd, approximately five miles west of Midpoint Substation, to approximately 12.5 miles west (Figure 4-29). Designated critical habitat overlaps the project area from approximately 1.3 miles east of Wiley Well Rd. for approximately 20 miles to the west (Figure 4-29).

**American Peregrine Falcon (USFWS: Delisted, Bird of Conservation Concern; CDFG: Endangered, Fully Protected).** This is a falcon of open country, cliffs, and occasionally cities. It breeds from Alaska south to Baja California, wintering in Baja California, the Gulf of California, and extreme southern California. The nest is a scrape on a high cliff ledge and, as such, this species may forage on the Project, but nest offsite.

No peregrine falcons have been observed on previous surveys in the Project area. The Project only offers foraging habitat for this species, although nesting could occur in the mountains adjacent to much of the Project, especially the hydropower project.

**Gila Woodpecker (USFWS: Bird of Conservation Concern; CDFG: Endangered).** The Gila woodpecker inhabits desert scrub and washes, saguaros, river groves, and woodlands, including residential shade trees. Its range extends from the Imperial Valley to the southern tip of Nevada, southern and central Arizona, extreme southwestern New Mexico, all of Baja California, and much of western and central Mexico.
Although not observed on previous surveys in the Project area, Gila woodpecker could occur in the far eastern portion of the Project.

4.8.2.2 Non-Listed Special-Status Species

4.8.2.2.1 Plants

**Abram’s Spurge** (*USFWS: None; CDFG: None; CNPS: List 2*). This prostrate annual (Family: Euphorbiaceae) is found on sandy flats in the Mohave and Sonoran Desert, at elevations below approximately 650 feet (Hickman 1993). Possible locations on the Project would be the sandy soils in various parts of the Coachella Valley (primarily north of Desert Center) and east of approximately Graham Pass Road. This species was not seen on several previous surveys of the transmission line corridor (BLM and IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

**Arizona Spurge** (*USFWS: None; CDFG: None; CNPS: List 2*). This prostrate to erect perennial (Family: Euphorbiaceae) is found on sandy flats of the Sonoran Desert, below approximately 1,000 feet (Hickman 1993). While CNPS locations are restricted to the western portion of the desert (CNPS 2002), the species’ range extends to Texas (Hickman 1993). As such, possible populations could grow along sander portions of the Project route, especially north of Desert Center and east of approximately Graham Pass Road. This species was not seen on several previous surveys of the transmission line corridor (BLM and IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

**Ayenia** (*USFWS: None; CDFG: None; CNPS: List 2*). This perennial herb (Family: Sterculiaceae) is known from rocky canyons in Mohavean and Sonoran desert scrubs, below 1,600 feet (Hickman 1993). The range includes Riverside, San Bernardino, and San Diego counties, Arizona, Sonora (Mexico), and Baja California (CNPS 2007). There are several records in the vicinity of the Project (CNPS 2007). Potential locations along the Project would be the upper bajada and in the area around the hydropower project. This species was not seen on several previous surveys of the transmission line corridor (BLM and IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

**California Ditaxis** (*USFWS: None; CDFG: None; CNPS: List 3*). This herbaceous perennial (Family: Euphorbiaceae) is found in sandy loam soils, especially associated with the edges and low islands of runnels and washes (Karl, field notes). It has been recorded from southern San Bernardino County through much of Riverside County, to Arizona, and into Sonora, Mexico (CNPS 2007). California ditaxis was found to be relatively common in Shavers Valley, south of the Project, in 1985 (Karl and Uptain 1985). Recorded elevations are approximately 2,000 to 3,000 feet (CNPS 2007). On the Project, this species might be present throughout, but especially west of the eastern extent of the Chuckwalla Mountains (Figure 4-31). It was not sought on recent surveys along the transmission line because the species is a CNPS List 3 plant and not considered special-status for most projects. NECO has included this species as a special-status species.
**Cove’s Cassia** *(USFWS: None; CDFG: None; CNPS: List 2).* This subshrub (Family: Fabaceae) occupies sandy microsites (washes and slopes) in Sonoran Desert scrub habitats. It ranges from the Sonoran Desert Scrub ecosystem in southeastern California (San Bernardino, Riverside, and Imperial counties) to Arizona, Baja California, and Sonora, Mexico. The elevational range is approximately 1,000 to 3,500 feet (CNPS 2007). NECO records for this species are for the Chuckwalla Mountains and northeast in the Whipple Mountains (Figure 4-32), but CNPS (2007) has records for Chuckwalla Valley as well as other sites. Based on the geographic range, habitat associations, and previous surveys on this line, Cove’s cassia could occur in Chuckwalla Valley. However, it was not seen on several previous surveys of the transmission line corridor (BLM and IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

**Crucifixion Thorn** *(USFWS: None; CDFG: None; CNPS: List 2).* This much-branched, thorny shrub (Family: Simaroubaceae) is found on gravelly slopes in Mojave and Sonoran desert scrub vegetation, typically in association with drainages (Hickman 1993). The species range is the southern Mojave and Sonoran deserts, from California east and south to Arizona and Sonora, Mexico.

One individual was found on the bajada south of the hydropower project in the Eagle Mountain Landfill studies (County of Riverside and BLM 1996). NECO records this species at 13 scattered locations throughout the plan area. In 2002, this species was observed south of the Little Chuckwalla Mountains (BLM and IID 2003). It has not been observed on previous surveys of the transmission line corridor (BLM and IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

**Desert Unicorn Plant** *(USFWS: None; BLM: None; CDFG: None; CNPS: List 4).* This herbaceous perennial to subshrub (Family: Martyniaceae) is found throughout southern California deserts, east to Texas and south to Baja California and Sonora, Mexico (Baldwin et al. 2002, CNPS 2007). It is associated with the warmer, wetter Sonoran desert scrub and subtropical thornscrubs below approximately 3,300 feet. Associated soils are generally considered to be sandy (Baldwin et al. 2002, CNPS 2007, Karl, field notes). The entire Project area is possible habitat for this species (Figure 4-32, NECO 2002; CNPS 2007).

**Desert Sand Parsley** *(USFWS: None; CDFG: None; CNPS: List 2).* Desert sand parsley (Family: Apiaceae) is an annual herb that is known only from one location, at Hayfield Dry Lake (CNPS 2007). The macrohabitat is Sonoran Desert scrub, at El.1,300 feet. The microhabitat is undescribed, with the exception that Hickman (1993) describes the occupied soils as heavy soil under shrubs. Since so little is known about this species, it has the potential, albeit unlikely, to occur along most of the Project.

**Flat-seeded Spurge** *(USFWS: None; BLM: Sensitive; CDFG: None; CNPS: List 1B).* This prostrate annual (Family: Euphorbiaceae) is found on sandy flats and dunes in the Sonoran Desert, at elevations below approximately 350 feet (CNPS 2007). The range extends from the western boundaries of the Colorado Desert in California to western Arizona and northern Sonora,
Mexico. It is known from only five sites in California, one of which (San Bernardino County) needs verification (CNPS 2007). Possible locations on the Project would be the sandy soils in various parts of the Coachella Valley (primarily north of Desert Center) and east of approximately Graham Pass Road. This species was not seen on several previous surveys of the transmission line corridor (BLM and IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

**Foxtail Cactus** *(USFWS: None; CDFG: None; CNPS: List 4)*. This cactus typically grows in clumps of several, cylindroid, unbranched stems 4 to 6 inches long and covered in white, dark-tipped spines, 1/2 to 5/8 inches long (Benson 1969). It occupies sandy to rocky soils in creosote bush scrub habitats in southeastern California, between 250 and 4,000 feet in elevation (Hickman 1993). Over 280 foxtail cacti were observed on the hydropower project and bajada to the south in the Eagle Mountain Landfill studies (County of Riverside and BLM 1996). NECO (2002) identifies much of the NECO planning area as the range of this species (Figure 4-33) and many plants were found during previous surveys west of the Project transmission line route, just north of the Chuckwalla Mountains, and on the bajada south of the hydropower project (BLM and IID 2003, Karl 2002). None was found along the Project transmission line route.

**Glandular Ditaxis** *(USFWS: None; CDFG: None; CNPS: List 2)*. This herbaceous perennial (Family: Euphorbiaceae) is found from the Coachella Valley to Arizona and Sonora, Mexico at elevations below approximately 1,500 feet (Hickman 1993, CNPS 2007). Occupied habitats include sandy soils in Mojave and Sonoran creosote bush scrubs. This species is similar to other species of Ditaxis, but is thinly strigose and the leaf blades and sepals subtending female flowers are glandular-serrulate (Munz and Keck 1968, Hickman 1993). Aerial portions of the plant die back during dry periods; as such, it often is not evident during drought. Locations near the Project include Chuckwalla Valley, south of Interstate 10 (Figure 4-31; NECO 2002, CNPS 2007), so glandular ditaxis is possible on most of the Project site, with the exception of the upper bajadas near the hydropower project.

**Harwood’s Milk-vetch** *(USFWS: None; CDFG: None; CNPS: List 2)*. This annual herb (Family: Fabaceae) grows in dunes and windblown sand in Mojave and Sonoran creosote bush scrubs, at El. 300 to 1200 feet (Munz and Keck 1968, Hickman 1993). Common associates include *Chaenactis fremontii, Schismus arabicus, Plantago ovata, Abronia villosa, Oenothera deltoides, Cryptantha angustifolia*, and *Lotus strigosus*.

The geographic range includes northwestern Mexico, northeastern Baja California, southeastern Arizona, and southeastern California (Hickman 1993, Felger 2000). In California, reported locations are eastern Riverside, Imperial, and San Diego Counties (CNPS 2007). (See also Figure 4-33 for the range in the NECO Planning Area.) On previous surveys in the Project, Harwood’s milkvetch was observed from east of Midpoint Substation west to approximately Graham Pass Road (EPG 2004; Karl 2005).
Jackass Clover (*USFWS*: None; *CDFG*: None; *CNPS*: List 2). This annual herb in the caper family (Capparaceae) is an uncommon species of dunes, sandy washes, roadsides, and alkaline flats in Sonoran and Mojave Desert scrubs (Baldwin et al. 2002, CNPS 2007). The range is southern California to Texas (Baldwin et al. 2002). Elevations are reported as 1,980 to 2,650 feet (Baldwin et al. 2002, CNPS 2007). The combination of habitat type and elevation generally makes the presence of this species on the Project site unlikely, as there are probably no aeolian habitats or playas near the hydropower project where elevations are near 2,000 feet. There is a record of the species in Chuckwalla Valley east of SR 177, however (CNPS 2007). NECO cites a different species of jackass clover, *W. refracta* var. *palmeri* for the dunes around Palen Dry Lake, north of the Project transmission line (Figure 4-31).

Las Animas Colubrina (*USFWS*: None; *CDFG*: None; *CNPS*: List 2). This medium-tall shrub (Family: Rhamnaceae) grows in Sonoran Desert Creosote Bush Scrub below 3,000 feet (Hickman 1993, CNPS 2007). It is known from Riverside County south and east to Arizona and Mexico. Near the ROW, this species is known from Chuckwalla Valley area and Chuckwalla Bench (Figure 4-34). As such, the entire ROW, especially the upper bajadas near the hydropower project, should be considered habitat. However, it was not observed on previous surveys of the transmission line corridor (BLM and IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

Mesquite Nest Straw (*USFWS*: None; *CDFG*: None; *CNPS*: List 1A). This annual herb (Family: Asteraceae) is known in California from a single 1930 collection at Hayfield Dry Lake. Its range also extends to southeastern Arizona and northeastern Sonora, Mexico (CNPS 2007). Known occupied habitat is open, sandy drainages below 1,200 feet (Hickman 1933). The lack of distinctly identified habitat and range precludes identification of specific portions of the route where the species may be growing. As such, the entire Project should be considered potential habitat. This species was not observed on previous surveys of the transmission line corridor (BLM and IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004)

Orocopia Sage (*USFWS*: None; *BLM*: Sensitive *CDFG*: None; *CNPS*: List 1B). This species (Family: Lamiaceae) is known from Riverside and Imperial counties near the Chocolate and Orocopia mountains. The elevational range is approximately 100 to 2,800 feet (Hickman 1993, CNPS 2007). Habitat is varied Sonoran Desert scrubs, although known sites are gravelly to rocky alluvial fans and canyons.

This species is currently known only from the Orocopia Mountains (Figure 4-32) and was observed during the Eagle Mountain Landfill studies along the Eagle Mountain Railroad, on the bajada south of the landfill site (County of Riverside and BLM 1996). It is possible, then, that it would be found on the Project linear facilities north of Desert Center. It was not observed on previous surveys of the transmission line corridor (BLM [IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).
Slender Woolly-heads (USFWS: None; CDFG: None; CNPS: List 2). This annual herb (Family: Polygonaceae) grows in dune habitats in southern California, Arizona, and northwest Mexico (CNPS 2007). Although the California observations for this species are all substantially west and south of the Project (CNPS 2007), the geographic range and habitat associations of slender woolly-heads suggest that it may be found in the incipient dunes west of Wiley Well road to Midpoint Substation. It was not observed on previous surveys of the transmission line corridor (BLM [IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

Spearleaf (USFWS: None; CDFG: None; CNPS: List 2). Spearleaf (Family: Asclepiadaceae) is an herbaceous perennial occupying rocky desert scrub habitats from San Bernardino County south to Baja California and east to Texas (CNPS 2007). Known elevations are approximately 1,400 to 3,600 feet (Baldwin et al. 2002, CNPS 2007). Based on its habitat associations and geographic range, it is possible, albeit unlikely, on the upper bajada and ravines near the hydropower project (Figure 4-34). It was not observed on previous surveys of the transmission line corridor (BLM [IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

Spiny Abrojo (USFWS: None; CDFG: None; CNPS: List 4). This uncommon shrub (Family: Rhamnaceae) is found in Sonoran Creosote Bush Scrub (Munz and Keck 1968, Baldwin et al. 2002) in Riverside and Imperial Counties, Arizona, and northern Mexico, at elevations of approximately 500 to 3,300 feet (CNPS 2007). NECO reported that this species is most commonly associated with canyons and gravelly soils; 47 records were from Chuckwalla Bench and the Chocolate Mountains (Figure 4-33). Based on habitat requirements and range, this species is possible on the Project in the vicinity of the hydropower project and on the upper bajada adjacent to the Chuckwalla Mountains, although it was not observed on previous surveys of the transmission line corridor (BLM [IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004).

4.8.2.2.2 Invertebrates

Cheeseweed Owlfly (USFWS: None; CDFG: None). This species occupies creosote bush scrub in rocky areas (Borror and White 1970) and is often found near streams (CNDDB 2001). O. clara has a larval stage that probably exceeds one year (AGFD 2003), and an adult stage of roughly three to four days (Faulkner 1990b; AGFD 2003). The short-lived emergence of the adult in April or May appears to coincide with years of high winter precipitation (BOR no date). O. clara resides in scattered locations throughout the deserts of southeastern California, western Arizona, and southern Nevada [Faulkner 1990a and b; Wiesenborn 1998; Arizona Game and Fish Department (AGFD) 2003; Lower Colorado River Multi-Species Conservation Program (LCRMSCP) 2004]. It has been collected in Imperial, Riverside, and San Bernardino Counties, California; Yuma, La Paz, and Mohave Counties, Arizona; and Clark County, Nevada (Wiesenborn 1998; LCRMSCP 2004). The species is known from relatively few, perhaps less than 15, scattered populations (Faulkner 1990a; Wiesenborn 1998; AGFD 2003); however, it
undoubtedly has a more extensive distribution than is now known (Faulkner 1990b). Given the limited knowledge about its distribution, this species could be present on the entire Project.

4.8.2.2.3 Amphibians

Couch’s Spadefoot (USFWS: None; CDFG: Species of Special Concern). This species is found from extreme southeastern California, to southwestern Oklahoma, and south across Texas into central Mexico and Baja California. Habitat includes shortgrass plains, mesquite savanna, creosote bush desert, thornforest, tropical deciduous forest, and other areas of low rainfall (Stebbins 2003). These individuals remain in subterranean burrows for most of the year, emerging to breed in temporary pools after or during periods of rainfall, both winter rains and summer monsoons. Thus, breeding may occur from April or May to September. Breeding can also occur in slow streams, reservoirs, or ditches (Jennings and Hayes 1994).

This species has the potential to occur along the transmission line (Figure 4-35).

4.8.2.2.4 Reptiles

Chuckwalla (USFWS: Species of Concern; CDFG: None). The range of this lizard includes Utah and Nevada south to the west coast of Sonora and most of the east coast of the Baja Peninsula in Mexico (Stebbins 2003). (See Figure 4-35 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.) Chuckwallas are relatively common in areas of rock outcroppings and large boulders and are often seen basking on rocks in the sun.

Chuckwalla were detected during surveys for the Eagle Mountain Landfill (County of Riverside and BLM 1996) and chuckwalla scat were observed in most rock outcrops in the Project vicinity on previous surveys of the transmission line (BLM and IID 2003, Karl 2002, 2005, and 2003 and 2007 field notes, EPG 2004, Blythe Energy 2004). Notably, more scat was observed in 2005 surveys than in earlier years, probably as a result of several years of average or better forage conditions, following an approximately 15-year drought cycle (Karl 2004b).

Desert Rosy Boa (USFWS: Species of Concern; CDFG: None). Desert rosy boa inhabits primarily rocky sites in the southern Mojave and the Sonoran deserts of California and Arizona (Stebbins 2003). While permanent water is not a requirement, this species can often be found near permanent or ephemeral streams. It is primarily a nocturnal species. On the Project, the most likely locations for desert rosy boa are near the hydropower project (Figure 4-35).

Mojave Fringe-toed Lizard (USFWS: None; BLM: Sensitive; CDFG: Species of Special Concern). This species can be found in the deserts of Inyo, San Bernardino, Los Angeles, and Riverside Counties in California (Palermo no date) at elevations from 300 to 3,000 feet (Stebbins 2003). It inhabits Arizona in Yuma County south of Parker (Stebbins 2003). (See Figure 4-36 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.) This species is restricted to loose, windblown sand from dunes, flats, riverbanks, and washes, where vegetation, especially woody perennials, is often scant.
In the Project area, Mojave fringe-toed lizards have been observed from the Midpoint Substation west to approximately Graham Pass Road (EPG 2004, Blythe Energy 2004, Karl 2005, and 2007 field notes).

### 4.8.2.2.5 Birds

**Bendire’s Thrasher (USFWS: Bird of Conservation Concern; BLM: Sensitive; CDFG: Species of Special Concern; Audubon: Watchlist).** The breeding range of Bendire’s thrasher extends from Guaymas, Sonora, Mexico to Utah, New Mexico, and Inyo County, California. Although migratory, this species may be a year-round resident in the southern portions of its range (Sinaloa, Mexico) (England and Laudenslayer 1993). Occupied habitat includes fairly open areas with substantial vertical structure, such as washes and woodlands with scattered shrubs and trees (CNDDB 2001, National Geographic Society 2002). Rarely is dense vegetation used (England and Laudenslayer 1993). NECO cites desert succulent scrub (e.g., *Yucca* spp. and columnar cacti) and microphyll woodland with palo verde trees as occupied habitats in southeastern California.

There is a substantial amount of open desert dry wash woodland on the Project’s transmission line and Bendire’s thrasher may be present (Figure 4-38).

**Black-tailed Gnatcatcher (USFWS: None; CDFG: None; Audubon: Watchlist).** The black-tailed gnatcatcher is a year-round resident in north-central and northwest Mexico, including Baja California, as well as southern California north to Inyo County and east to southwest Texas. It is normally found in arid lowland and montane scrub habitats, but is more typical of desert habitats, commonly among mesquite or creosote scrub, and particularly along washes or ravines (Terres 1980, American Ornithologists’ Union [A.O.U.] 1998; National Geographic Society 2002).

Black-tailed gnatcatcher is a common inhabitant of the arboreal washes of the region and is likely to be found on the entire Project site in appropriate habitat.

**Burrowing Owl (USFWS: Bird of Conservation Concern; BLM: Sensitive; CDFG: Species of Special Concern).** This is an owl of open grasslands, prairies, deserts, and farms. It is also common on golf courses, road cuts, and ruderal sites in arid habitats and is highly subsidized in the broad agricultural valleys (e.g., Palo Verde Valley, Imperial Valley). It breeds from southern Canada south through much of the United States west of the Mississippi and Mexico, typically wintering in warmer areas. Nesting occurs primarily in burrows built by other species, including ground squirrels, kit fox, badger, and desert tortoise.

Burrowing owl could be found throughout the Project site (Figure 4-38).

**California Horned Lark (USFWS: None; CDFG: Species of Special Concern).** This species is a common inhabitant of open habitats, including desert scrub, short-grass prairies, desert playas, and agricultural fields in stubble or cultivation (AOU 1998; Terres 1980). It is a resident over
much of the United States, breeding throughout North America (National Geographic Society 2002).

Habitat for this species exists on the entire Project.

**Cooper’s Hawk** *(USFWS: None; CDFG: Species of Special Concern)*. Cooper’s hawk is a broadly distributed species, having a year-round residency through most of the continental United States and north-central Mexico, extending its breeding range into southern Canada and its non-breeding range to Central America (Rosenfield and Bielefeldt 2006). It may breed at desert oases and has historically nested along the lower Colorado River, although habitat loss along the Colorado appears to have reduced the breeding population (Garrett and Dunn 1981). Occupied habitats include deciduous, mixed and evergreen forests and deciduous riparian habitat (see review in Rosenfield and Bielefeldt 2006).

This species was not observed during previous surveys in the Project area, although it may be found near the hydropower project or in the more densely vegetated arboreal washes.

**Crissal Thrasher** *(USFWS: Bird of Conservation Concern; BLM: Sensitive; CDFG: Species of Special Concern)*. The crissal thrasher is a resident of the southwestern United States at lower elevations from southern California north to southern Inyo County, southern Nevada, and extreme southwest Utah, and south into central Sonora and Chihuahua, Mexico. It is also found locally in the Mexican Plateau as far as central Mexico (A.O.U. 1998). This species is fairly common in the Colorado River Valley, but has been in decline for decades in the Imperial, Coachella, and Borrego Valleys (Dobkin and Granholm [no date]). (See Figure 4-37 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.) The crissal thrasher is quite secretive by habit and may be found in riparian thickets and among dense vegetation, often mesquite or saltbush, in arid lowland and montane scrub (A.O.U. 1998; Ehrlich et al. 1988; National Geographic Society 2002).

Crissal thrasher is unlikely to be found on the Project due to the probable lack of habitat.

**Ferruginous Hawk** *(USFWS: Bird of Conservation Concern; BLM: Sensitive; CDFG: Species of Special Concern; Audubon: California Watchlist)*. This species is a winter resident in California and the southwest, into Mexico. It forages over open habitat, preying on rodents, rabbits, and other small prey.

This species has not been observed on other surveys in the Project area, although the entire Project constitutes winter foraging habitat for this species (Figure 4-38).

**Golden Eagle** *(USFWS: Bird of Conservation Concern; BLM: Sensitive; CDFG: Species of Special Concern, Fully Protected)*. This species is a resident of foothill, mountainous, and open country, foraging over deserts, farmland, and prairies for small mammals, snakes, and birds. It is a year-round resident throughout most of western North America. Nesting occurs in cliffs and large trees.
The entire Project constitutes foraging habitat for this species (Figure 4-38). While no nesting habitat occur onsite, the mountains adjacent to much of the Project, especially near the hydropower project, may provide nesting sites.

**LeConte’s Thrasher** (*USFWS: Bird of Conservation Concern; BLM: Sensitive; CDFG: Species of Special Concern; Audubon and USBC: Watchlist*). LeConte’s thrasher is sparsely and locally distributed in southern California, western Arizona, southern Nevada, and extreme southwestern Utah (Schram 1998, NatureServe 2003). It is generally restricted to the lowest, hottest, and most barren desert plains, particularly in saltbush and creosote bush habitats (Terres 1980). Le Conte’s thrasher prefers dense chollas for nesting but will also nest in palo verde, mesquite, ocotillo, and sagebrush (Terres 1980).

In previous surveys in the Project area, one to several LeConte’s thrashers were observed during most of the surveys (County of Riverside and BLM 1996, Karl 2002, BLM and IID 2003, EPG 2004, TetraTech EC, Inc. 2005). Habitat for this species exists on the entire Project (Figure 4-37), although the most likely segments are dominated by blue palo verde and/or Mojave Yucca.

**Loggerhead Shrike** (*USFWS: Bird of Conservation Concern; CDFG: Species of Special Concern*). Loggerhead shrike is widely distributed across the United States (National Geographic Society 2002) and is a fairly common resident of the southwestern deserts (Schram 1998). It occupies many habitats, including both native habitats and agricultural parcels. In California it may be found in desert, piñon-juniper woodland, savannah, grassland, ranches, and agricultural land (Small 1977).

In previous surveys in the Project area, several individuals of loggerhead shrike were observed during each of the surveys (County of Riverside and BLM 1996, Karl 2002, BLM and IID 2003, EPG 2004, TetraTech EC, Inc. 2005). Habitat for this species exists in the entire Project vicinity.

**Merlin** (*USFWS: None; CDFG: Species of Special Concern*). This species is a winter resident in California and the extreme-southern United States into Mexico. It inhabits a variety of habitats, nesting in wooded sites in trees, cliffs, or on the ground. The entire Project site constitutes winter foraging habitat for this species.

**Mountain Plover** (*USFWS: Bird of Conservation Concern; BLM: Sensitive; CDFG: Species of Special Concern; Audubon and USBC: Watchlist*). The geographic range of the mountain plover includes the plains of the west-central United States (breeding range) and the lower valleys and plains of central and southern California, Arizona, southern Texas, northern Mexico, and Baja California Norte (wintering range) (Knopf 2006).

This species is associated with open, flat areas with low sparse vegetation, especially short-grass prairies or sparse habitats with patches of bare ground. Most birds winter in California on alkaline flats, cultivated fields, burned or heavily grazed grasslands, or post-harvest alfalfa fields (Rosenberg *et al.* 1991, Knopf 2006). The largest wintering population is in Imperial Valley,
and the species has been described as an “uncommon transient and irregular winter resident” of the lower Colorado River basin (http://www.lcrmscp.org 1999). (See Figure 4-38 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.)

This species is unlikely to occur on the Project, although it is known from Palen Dry Lake (BLM and CDFG 2002).

**Northern Harrier (USFWS: None; CDFG: Species of Special Concern).** This is a hawk of open habitats, with the habit of flying close to the ground. It is relatively uncommon in the desert and, in the area of the Project, is primarily a winter resident.

This species has a low likelihood of occurrence on the Project, although one individual was observed in surveys for the Eagle Mountain Landfill and Recycling Center (County of Riverside and BLM 1996).

**Prairie Falcon (USFWS: Bird of Conservation Concern; CDFG: Species of Special Concern).** This species is a year-round resident of the western United States. (See Figure 4-38 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.) It inhabits open country, including deserts and prairies, occasionally hunting in woodlands. Nesting occurs in cliffs.

One prairie falcon was observed during area surveys (Karl 2002), although the entire Project constitutes winter foraging habitat for this species. The mountains adjacent to much of the Project may provide nesting sites.

**Short-eared Owl (USFWS: None; CDFG: Species of Special Concern).** This species is an uncommon winter resident of the southern United States into Mexico. It inhabits a variety of open-country habitats, including marshes, agricultural fields, deserts, and prairies. Short-eared owl also frequents areas intermixed with brush and woodland, provided there is ample open grassland to hunt (Glinsky 1998). It both hunts over these habitats, chiefly at dawn and dusk, and roosts there during the day.

While not observed during previous surveys in the Project area, this species may be a winter resident on the entire Project.

**Sonoran Yellow Warbler (USFWS: Bird of Conservation Concern; CDFG: Species of Special Concern).** This species frequents willows, poplars, and other streamside trees and shrubs, town shade trees, open woodlands, orchards, and moist thickets. The range for the species includes all of North America, south through Central America, and the West Indies to northern South America. The subspecies *sonorana* is confined to the Colorado River Valley from Nevada to Mexico, and possibly the Imperial Valley.

Habitat for this species on the Project is very marginal. One individual was observed at the Eagle Mountain townsite reservoir during 1990 surveys (County of Riverside and BLM 1996).
Vermilion Flycatcher (*USFWS*: None; *CDFG*: Species of Special Concern). Vermilion flycatcher occupies wooded or shrubby sites near water. Commonly associated trees are mesquite, willows, and cottonwoods. The species is mainly a resident from southern California to the southwestern tip of Utah, western and southern Texas, and south throughout Baja California, Mexico, Honduras, western South America, and the Galapagos Islands. (See Figure 4-38 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.)

Habitat for this species, on the Project, is probably lacking. Hence the species is unlikely to occur on the Project.

Yellow-breasted Chat (*USFWS*: None; *CDFG*: Species of Special Concern). The breeding range for the species includes most of the United States, slightly extending into Canada and Mexico. Nesting habitat is composed of dense, nearly impenetrable thickets in riparian or foothill situations (Ryser 1985).

On the Project, the species may be transient, but habitat is generally lacking. One individual was observed at the Eagle Mountain townsite reservoir during 1990 surveys (County of Riverside and BLM 1996). Another was observed on the surveys for the Desert Southwest Transmission Line Project (BLM and IID 2003).

4.8.2.2.6 Mammals

American Badger (*USFWS*: None; *CDFG*: Species of Special Concern). American badgers are found on the flats and alluvial fans next to desert mountains (Hoffmeister 1986). They occupy a wide variety of habitats in California, but open, uncultivated land appears to be a requirement (CDFG 1986b).

Habitat is available for American badgers throughout the Project. Badger signs were observed during 1989-90 and 1995 surveys for the Eagle Mountain Landfill and Recycling Center (County of Riverside and BLM 1996).

Arizona Myotis (*USFWS*: None; *CDFG*: Species of Special Concern; *Western Bat Working Group (WBWG)*: Medium Priority). *Myotis occultus* historically occurred in extreme Southeastern California and Sonora, Mexico, to western Chihuahua, Mexico, and northward in Arizona and western New Mexico (Barbour and Davis 1969). In California, this species occurred only along the Colorado River lowlands and in the adjacent desert mountain ranges (CDFG 1997, BLM and CDFG 2002). It has not been observed in California since 1969 and is likely extirpated from the state (although it is common elsewhere).

NECO (BLM and CDFG 2002) identifies the range of this species in California as overlapping the eastern portion of the Project, near Midpoint Substation (Figure 4-40).

Big Free-tailed Bat (*USFWS*: None; *CDFG*: Species of Special Concern; *WBWG*: Medium to High Priority). This species is distributed from extreme southern California east to far western
Texas and south nearly to northeastern Argentina (Milner et al. 1990, Constantine 1998). There are also some isolated occurrences along the coast of California to San Francisco (Constantine 1998), British Columbia, Kansas, and Iowa (Milner et al. 1990). *N. macrotis* is primarily an inhabitant of rugged, rocky country and has been found in rock crevices of cliffs and under boulders and rock ledges (Barbour and Davis 1969, Jameson and Peters 1988); it will also roost in buildings and occasionally in trees (Milner et al. 1990). Documented plant associations have included riparian woodland, desert scrub, desert dry wash woodland, evergreen forest, and mixed tropical deciduous and thorn scrubs (Hoffmeister 1986, see review in Milner et al. 1990). Jameson and Peters (1988) reported that it was an uncommon resident in pinyon-juniper regions of the arid parts of California. Elevations in the United States are generally below 1,800 meters (6,000 feet) (Milner et al. 1990).

On the Project site, this species will most likely be found near the Eagle and Chuckwalla mountains.

**Burro Deer** *(USFWS: None; CDFG: None, Game Species)*. Burro deer are the desert subspecies of mule deer, occupying dense microphyll woodland habitat throughout the Colorado Desert where there are adequate water sources (Figure 4-42). While not a special-status species, it is a managed game species.

This species has been observed on other surveys in the Project area (EPG 2004) and is likely to be found throughout the Project in arboreal drainages. Many of the more well-developed drainages occur near the Chuckwalla and Eagle mountains, but there are also moderately dense microphyll drainages east of the Chuckwalla Mountains.

**California Leaf-nosed Bat** *(USFWS: None; CDFG: Species of Special Concern; WBWG: High Priority)*. California leaf-nosed bat occurs from southern Nevada, southern California, and Western Arizona southward through Baja California Sur and Sonora, Mexico (Barbour and Davis 1969). In California, it occupies the low-lying desert areas. It formerly inhabited the coastal basins of southern California, but populations have disappeared there due to loss of foraging habitat (CDFG 1983). (Also see Figure 4-41 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.) Occupied habitats include manmade structures (deserted mine tunnels, deserted buildings, bridges, culverts (Tatarian 2001), and caves (CDFG 1983). NECO notes that the two largest roosts are in mines in extreme southeastern California (BLM and CDFG 2002). Temperature requirements restrict roosts to mines with temperatures of approximately 80°F (BLM and CDFG 2002).

A population of at least 60 animals, and potentially a maternity roost, were observed at Kaiser Eagle Mountain and Black Eagle mines during surveys for the Eagle Mountain Landfill and Recycling Center (County of Riverside and BLM 1996). Based on available habitat, this species is possible near the hydropower project.

**Colorado Valley Woodrat** *(USFWS: None; CDFG: None)*. The Colorado Valley woodrat is a subspecies of the white-throated woodrat (*N. albigula*), inhabiting desert habitats in Imperial,
San Diego, and Riverside counties. Occupied plant communities include creosote bush scrub, mesquite bosques, woodland, chaparral, and piñon-juniper, often where cholla (Cylindropuntia sp.) and prickly pear cacti (Opuntia spp.) are present (Hoffmeister 1986).

Colorado Valley woodrat may be found throughout the Project, based on habitat associations (Figure 4-41).

**Nelson’s Bighorn Sheep (USFWS: None; BLM: Sensitive; CDFG: None).** Nelson’s or desert bighorn are widely distributed from the White Mountains in Mono County to the Chocolate Mountains in Imperial County (CNDDB 2001). They live most of the year close to the desert floor in canyons and rocky areas (Ingles 1965). In summer, they move to better forage sites and cooler conditions in the mountains. Migration routes can occur across valleys between mountain ranges.

BLM management of desert bighorn sheep is guided by the *Mountain Sheep Ecosystem Management Strategy (EMS) in the 11 Western States and Alaska* (BLM 1995). The EMS goal was to “ensure sufficient habitat quality and quantity to maintain and enhance viable big game populations, and to sustain identifiable economic and social contributions to the American people” (BLM and CDFG 2002). This management plan identified eight metapopulations, two of which are included in the NECO Planning Area: the Southern Mojave and Sonoran metapopulations. These metapopulations were further divided into demes, or populations. The Project is located in the Southern Mojave Metapopulation, adjacent to the Eagle Mountain deme and near the Coxcomb deme (Figure 4-43).

NECO further provides for enhancing the viability of these populations through maintenance of genetic variability, providing connectivity between demes, enhancing and restoring habitat, augmenting depleted demes, and re-establishing demes. To this end, a Bighorn Sheep Wildlife Habitat Management Area (WHMA) has been established that encompasses and connects the Eagle Mountain and Coxcomb demes (BLM and CDFG 2002) (Figure 4-43).

Bighorn scat were observed at the main project site during 1989-90 and 1995 surveys for the Eagle Mountain Landfill and Recycling Center and during related project surveys (County of Riverside and BLM 1996).

**Pallid Bat (USFWS: None; BLM: Sensitive; CDFG: Species of Special Concern; WBWG: High Priority).** The pallid bat is found in arid, low-elevation habitats from Mexico and the southwestern United States north through Oregon, Washington, and western Canada. It is found throughout most of California, where it is a yearlong resident (CDFG 2005c). (See Figure 4-40 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.) *A. pallidus* occupies a wide variety of habitats, including grasslands, shrublands, woodlands, and forests from sea level up through mixed conifer forests. This species is most common in open, dry habitats below 200 meters (660 feet), with rocky areas for roosting (Findley et al., 1975, CDFG 2005c). While rock crevices, caves, and mine tunnels are common roosts, roosts may also include the attics of houses, eaves of barns, hollow trees, and abandoned adobe buildings (Davis
and Schmidly 1994). Although it may be found in the absence of rocky terrain or water (Findley et al., 1975), water is important because of the high proportion of protein in this insectivorous bat’s diet and because of their high rates of evaporative water loss. Overall, accessible surface water, suitable maternity roost sites, and food are critical components of good habitat (Chung-MacCoubrey, 1995).

One pallid bat was captured and guano was observed at two adits west of the Project during 1990 surveys of the Eagle Mountain Landfill and Recycling Center (County of Riverside and BLM 1996). Based on available habitat, this species is possible near the hydropower project.

**Pocketed Free-tailed Bat** *(USFWS: None; CDFG: Species of Special Concern; WBWG: Medium Priority)*. This species is found in arid lowlands of the southwest, ranging from Baja California and southwestern Mexico through southwestern Texas, southern New Mexico, south-central Arizona, and southern California (Kumairi and Jones 1990, Pierson and Rainey 1998). One source (California Department of Health Services cited in Pierson and Rainey 1998) suggested that pocketed free-tailed bats could be expected anywhere in southern California south of the San Bernardino Mountains. (See Figure 4-39 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.) Reported elevational ranges include sea level to 2,250 meters (7,400 feet) (Kumairi and Jones 1990).

Habitats used by the pocketed free-tailed bat include pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis (CDFG 1983). In several collecting studies in Texas, Arizona, and northern Mexico, *N. femorosaccus* was collected in pine (*Pinus*) – oak (*Quercus*) forests, floodplains and low, arid valleys in desert scrubs (creosote bush, giant dagger [*Yucca carnerosana*], candelilla [*Euphorbia antisyphilitica*], sotol [*Dasylirion leiophyllum*]) and in river plain arroyo habitats (mesquite [*Prosopis* spp.] and sycamores [*Platanus*]). Cliffs or hills with rocky ledges were always adjacent to the trapping sites (see review in Kumairi and Jones 1990). In California, this species has been found only in the Lower and Upper Sonoran life zones, associated with creosote bush and chaparral habitats (Pierson and Rainey 1998). Pocketed free-tailed bat roosts primarily in rock crevices or under boulders on slopes and cliffs (Cockrum 1956, Barbour and Davis 1969); it has also been observed to roost in buildings and under roofing tiles (Barbour and Davis 1969, Jameson and Peters 1988).

On the Project site, this species may be found in association with the hydropower project, near the Eagle Mountains.

**Southwestern Cave Myotis** *(USFWS: None; CDFG: Species of Special Concern; WBWG: Medium Priority)*. *M. velifer brevis* is distributed from extreme southeastern California eastward to western New Mexico and south to Guatemala (Williams 1986). In California, it was historically known only from caves and buildings in the lowlands of the Colorado River and adjacent desert mountain ranges (Vaughan, 1959 in CDFG 1986). NECO cites that the large colonies known from abandoned mines in the Riverside Mountains adjacent to the Colorado
River are no longer inhabited by cave myotis, except for a few animals (BLM and CDFG 2002). Only two maternity roosts along the Colorado River are known to currently exist.

*M. velifer brevis* uses a variety of temporary roosts: buildings, caves, and mine tunnels (CDFG 1986, Williams 1986). During breeding season, in spring and summer, they form large colonies in warm caves and mines and less often in buildings and other structures (Barbour and Davis, 1969). Surveys in 1959 found that, in the vicinity of the Riverside Mountains, *M. velifer brevis* foraged primarily over the floodplain of the Colorado River (Vaughn 1959 in CDFG 1986). Optimal foraging habitat included dense, linear stands of mesquite, tamarisk, and catclaw acacia bordering still water of oxbow ponds (Williams 1986).

This species is unlikely to occur in the Project area (Figure 4-40).

**Spotted Bat** *(USFWS: None; BLM: Sensitive; CDFG: Species of Special Concern; WBWG: High Priority)*. Initially thought to be extremely rare, the spotted bat is now known to occupy a rather large range throughout central western North America from southern British Columbia to northern Mexico (Bat Conservation International 2005) and possibly southern Mexico (Watkins 1977). In the United States, it is most common in California, Arizona, New Mexico, southern Colorado, and southern Utah (Barbour and Davis 1969). Occupied habitats in California are broad, ranging from below sea level in arid desert regions, through grasslands, to montane coniferous forests (Watkins 1977). The species is apparently dependent on rock crevices in cliffs for refugia (Easterly 1973 in Watkins 1977, Bat Conservation International 2005). Foraging has been observed in forest openings, pinyon juniper woodlands, large riverine habitats, riparian habitat associated with small to mid-sized streams in narrow canyons, wetlands, meadows, and old agricultural fields.

Based on habitat associations, this species is most likely to occur near the hydropower project or the Chuckwalla Mountains.

**Townsend’s Big-eared Bat** *(USFWS: None; BLM: Sensitive; CDFG: Species of Special Concern; WBWG: High Priority)*. Townsend's big-eared bat is found throughout western North America, from British Columbia south to Oaxaca, Mexico. (See Figure 4-39 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.) In California, *C. t. townsendii* inhabits the humid coastal regions of northern and central California and *C. t. pallescens* resides in the remainder of the State, including desert regions (Zeiner et al. 1990). The species is known from both mesic and desert habitats, coastal lowlands, cultivated valleys, and hills of mixed vegetation types (see review in Kunz and Martin 1982). In California, the species has been encountered in every natural community in California except alpine and subalpine (Zeiner et al. 1990). Elevational limits range from sea level to above 3,160 m (10,000 feet) (see review in Kunz and Martin 1982). The species has been found in limestone and gypsum caves, lava tubes, and human-made structures such as mine tunnels and buildings (Williams 1986). Townsend’s big-eared bat requires roosting, maternity, and hibernacula sites and may use separate sites for each behavior (Williams 1986; Zeiner et al. 1990b).
Evidence of Townsend’s big-eared bat was found at an Eagle Mountain underground adit during 1990 surveys of the Eagle Mountain Landfill and Recycling Center (County of Riverside and BLM 1996). Based on available habitat, this species is possible near the hydropower project.

**Western Mastiff Bat** (*USFWS: None; BLM: Sensitive; CDFG: Species of Special Concern; WBWG: High Priority*). In the United States, western mastiff bat is found in California, Nevada, Arizona, Texas, and Mexico. In California, it is widely distributed, including significant populations in northern California, the central and southern coast ranges, and many Sierra Nevada river drainages, as well as southern California (Los Angeles, Imperial, Riverside, San Bernardino, and San Diego Counties) (Constantine 1998, Pierson and Rainey 1998). (See Figure 4-39 for the range of the species in the NECO Planning Area; BLM and CDFG 2002.) It is a non-migratory resident of caves and buildings, but makes seasonal movements throughout the year (Jameson and Peeters 1988). Mastiff bats prefer dry, open-country habitats, and because of their very large size appear to be unable to launch themselves from the ground. They require daytime roosts with crevices high enough to provide drop-off clearance for flight. These crevices can be in cliffs, trees, tunnels, or high buildings, usually with a minimum vertical drop of at least 20 feet (Barbour and Davis 1969). For raising young, tight, very deep crevices are required in rock faces or buildings (Zeiner *et al* 1990). After young are independent, colonies often rotate among alternate day roost locations (Barbour and Davis 1969) depending on temperature or other microclimate factors. The western mastiff bat is non-migratory and active year round (Zeiner *et al* 1990).

No western mastiff bats were observed during 1990 bat surveys of the Eagle Mountain Landfill and Recyling Center (County of Riverside and BLM 1996). But, based on available habitat, this species is possible near the hydropower project.

**Yuma Puma** (*USFWS: None; CDFG: Species of Special Concern*). The puma is a large, uniformly colored, tawny to grayish cat with a brown-tipped tail. In the NECO planning area, it is found from JOTR to the Colorado River (Figure 4-42), in direct association with burro deer populations (BLM and CDFG 2002).

While not previously observed on area surveys, this species is possible throughout the Project area where microphyll woodland habitat supports burro deer. Many of the more well-developed drainages that may be inhabited by deer occur near the Chuckwalla and Eagle Mountains, but there are moderately dense microphyll drainages east of the Chuckwalla Mountains as well.

### 4.8.3 Potential Impacts

The types of potential impacts to special-status species are similar to the general biological impacts described above. Project construction, operation, and maintenance can modify or destroy habitats and in some cases may result in a direct loss of individuals. The range of potential impacts varies with the species.
4.8.3.1 Construction

Construction activities associated with the Project include (1) renovation of the Eagle Mountain Mine to accommodate the reservoirs and generating facilities, (2) construction of the transmission line, and (3) construction of the water pipeline.

Equipment required for construction would include bulldozers, backhoes, graders, air compressors, man lifts, generators, drill rigs, truck-mounted augers, flatbed trucks, boom trucks, rigging and mechanic trucks, small wheeled cranes, concrete trucks, water trucks, crew trucks and other heavy equipment. Soil and construction materials may be temporarily stored or stockpiled.

Construction associated with the hydropower project would include construction of shafts, tunnels, the powerhouse, administration/storage area, and any necessary re-contouring of the pits. For the most part, the hydropower project construction would take place in a highly disturbed, heavily mined area. However, there may be some areas that have biological resources, either because they were not disturbed during mining, or, more likely, because they have regenerated naturally.

Construction of the transmission line would include:

- Preparation of staging/laydown areas;
- Access road and spur road construction/improvement;
- Clearing and grading of pole sites;
- Foundation preparation and installation of poles;
- Wire stringing and conductor installation;
- Temporary parking of vehicles outside the construction zone on sites that support sensitive resources (sites not designated as construction material yards); and
- Cleanup and site reclamation.

Construction of the water pipeline collection system would include activities similar to those of the transmission line, although the surface disturbance would probably be greater to accommodate both pipeline installation and the access road.

Depending on the schedule of construction (timing and length of the construction period) and the presence of special biological resources, direct impacts from construction could include loss of individuals and habitat. Special habitat resources, such as specific burrowing sites, may be lost during project construction. For species with relatively limited mobility; i.e., those that are underground during most of the day or year, or those that have a life stage in the soil or on plants.
(e.g., insects, nesting birds) - individual losses are more likely than for more mobile species. Some birds may be temporarily disturbed by construction activities and abandon the area, although others will become easily habituated to human activity (e.g., loggerhead shrike).

Population impacts to those species that may be affected by habitat loss on the linear facilities are generally expected to be minor due to the small footprint of habitat physically disturbed relative to the surrounding available habitat. Animals displaced due to the project would be able to return to the area once construction activities have ceased.

Loss of native habitat for the sole purpose of construction (as opposed to maintenance) is temporary, but should be considered semi-permanent for the Colorado Desert. Natural regrowth is constrained by limited and unpredictable precipitation and can require several decades to approach pre-disturbance conditions. During this time, the habitat is unavailable for use by native wildlife. As such, all surface disturbances during construction that results in the removal or displacement of vegetation and soil should be considered semi-permanent.

In addition to the semi-permanent loss of habitat, wildlife may experience temporary disruption of normal movements to achieve feeding, breeding, sheltering, and dispersal. This could occur if mitigation associated with construction of any Project component includes erecting temporary exclusion fencing.

Indirect impacts could include dust deposition on neighboring vegetation. This is expected to be temporary, however, and thus have no lasting impacts.

4.8.3.2 Operation and Maintenance

The primary direct impacts to species from operation of the Project could include the loss of individuals that move onto the site and the loss of use of special biological resources (e.g., springs or seeps) due to the proximity and operation of the facility. Based on the existing high level of disturbance on the hydropower project site and minimal expected habitat loss due to the linear facilities, it is anticipated that there will be negligible loss of resources to most species. However, all resources on the Project are currently unknown.

The presence of another transmission line could result in the losses of birds through collisions or electrocution, even if a transmission line of equal stature is already present in the adjacent right-of-way. Depending on the current existence of roads, new recreational access may also be provided by the water pipeline right-of-way. This may result in further habitat degradation and species loss if egress into formerly inaccessible areas results. Finally, maintenance of tower pads and spur roads on the transmission line would perpetuate the vegetation loss of tower pads and roads and, potentially, increase erosion.

Wildlife outside of areas of Project-associated surface disturbance and Project operation may also experience indirect, adverse effects. Such effects could include:
- Loss of dispersal areas and connectivity to other areas;
- Altered home ranges and social structure;
- Increased depredation by predators attracted to the site; and
- Altered plant species composition due to the introduction of exotic vegetation.

It is unlikely that the water pipeline or transmission line will restrict animal movement. However, the current use of the Eagle Mountain Mine by bighorn sheep and other species is unknown. It is conceivable that the normal movements of some species to achieve feeding, breeding, sheltering, and dispersal or migration may be indirectly affected by the Project. This could affect both individuals and populations.

Faunal community structure may be altered if predators are attracted to the landfill due to available water or lights. Plant community structure and resulting fauna may also be altered if non-native species introduced during construction and/or maintenance activities increase in both abundance and distribution.

### 4.8.4 Existing or Proposed Protection, Mitigation, or Enhancement Activities

General recommendations for special-status species are discussed below.

**Avoidance and Minimization of Habitat Degradation.** In general, disruption of ecological processes and biological resources should be avoided, where possible, or minimized. Habitat degradation should be limited to essential areas only and, where practical, previously disturbed areas should be used for driving, parking, and storing equipment. A plan can be developed to ensure that vegetation removal and damage to soil surfaces is minimized through pre-construction surveys, delineation, and staking/flaing of avoidance areas. Where avoidance is infeasible, the plants may be salvaged and planted in an adjacent, undisturbed site. Plant salvaging is described in a Project Restoration Plan.

**Pre-Construction Surveys.** Pre-construction surveys of the potential disturbance areas, including access roads, tower pad sites, pulling sites, equipment storage sites, and all use areas that are not fenced by wildlife exclusion fencing, would be conducted to ensure that special-status species are avoided or mitigated. Areas fenced by wildlife exclusion fencing would be searched for special species following fencing, and special-status would be removed according to permits for the Project.

**Construction- and Operations-Related Environmental Protection.** Prior to the start of construction, activities and contingencies related to construction, operation, and environmental protection must be delineated in a comprehensive mitigation and monitoring plan. Issues addressed should include, but not be limited to, designated working areas and equipment storage, stream protection, equipment maintenance and cleaning, fueling and accidental fuel spills,
removal of all debris, hazardous waste, and other construction-related materials, and worker education. The worker education program for Project personnel should include measures for desert tortoises and all special-status species, as well as general working procedures (e.g., minimization of habitat degradation, garbage control, vehicular speed limits, and working with biological monitors).

**Designation of a Project Biologist.** A Project biologist should be assigned to ensure successful monitoring of construction activities, implementation of the worker education program, and successful implementation of all other mitigation measures. The Project biologist would be approved by the agencies and would be responsible for reporting to the agencies.

**Weed Control.** A weed control program would be developed prior to construction that identifies (1) existing weed populations on the Project and in the surrounding area, (2) methods to quantify weed invasion, (3) methods for minimization of weed introduction, and (4) methods and a schedule for weed eradication, should populations invade the Project.

**Restoration Program.** A detailed revegetation program should be developed prior to surface disturbance that will ensure realistic and adequate restoration of semi-permanently disturbed sites. The program would include:

- Quantitative identification of the baseline annual, herbaceous perennial, and woody perennial plant community;
- Soil salvage and preparation;
- Plant salvage during construction;
- Soil testing and appropriate amendments and/or inoculation of mycorrhizal fungi to develop a healthy soil micro-community;
- Seeding and/or planting of seedlings of colonizing species and mycorrhizal net builders;
- Test plots;
- Plant protection;
- Erosion and weed control;
- Irrigation alternatives, as necessary; and
- A realistic set of success measures.

**Reporting.** During construction, the Project biologist would provide progress reports at regular intervals to the BLM and other relevant agencies to describe the Project progress, mitigation measures implemented, mitigation successes or difficulties, and recommendations. Any
harassment or mortality take of listed species, with suggestions for mitigation improvement, would be documented.

Adaptive Management. When data show that alterations in techniques, mitigation measures, or permits are required to adequately protect wildlife and habitats, then these should be analyzed with the relevant agencies and changes implemented.

Special-Status Plants. In general, impacts to special-status plants can be minimized by avoidance of individuals of these species. Populations can be flagged during surveys prior to construction. Where avoidance is infeasible, the plants may be salvaged and planted in adjacent, undisturbed sites; other options include salvaging seed for revegetation. NECO requires the following mitigation measures:

- Conduct surveys in a proposed project area for any special-status plants with ranges mapped in the NECO Plan and at all species locations in the Plan area.
- Avoid plant populations during construction. Where avoidance is not practical, project effects on the species and population must be assessed.
- Disturbance of a listed species will not be allowed.
- Require mitigation of project impacts in suitable habitat within the range of the impacted species, using commonly applied mitigation measures.

Special-Status Animals. NECO requires the following mitigation measures:

- Conduct surveys for any proposed project that occurs in a Multi-Species Conservation Zone and at all species locations that occur in the project area.
- Require mitigation of project impacts in suitable habitat within the range of the impacted species using commonly applied mitigation measures.

In addition, in areas without wildlife exclusion fencing or those areas that have not been cleared of tortoises, construction activities would only take place during daylight hours. This will avoid construction-related mortalities of fossorial, diurnal species such as the desert tortoise, or nocturnally active species, such as desert rosy boa.

Special-Status Species and Natural Communities. NECO requires compensation for disturbance of Desert Dry Wash Woodland and Desert Chenopod Scrub at the rate of 3:1. In addition to compensation and, in general, minimizing disturbance (see General Mitigation Measures above), new spur roads and improvements to existing access roads should be designed to preserve existing hydrology. All disturbed washes should be restored to eliminate erosion and encourage the reestablishment of the drainage to its pre-construction condition.

Seeps and Springs. NECO requires the following mitigation measures:
- Avoid construction disturbance of any seep or spring for the duration of a project.
- Close any routes within ¼ mile of any seep, spring, or guzzler.
- Improve seeps and springs that may be in need of rehabilitation, including but not limited to, removing exotic vegetation (e.g., tamarisk), planting native species, excluding livestock and burrows, eliminating water diversions, and controlling bird pests (e.g., starlings).

**Desert Tortoise.** The most important protection measures for desert tortoises include habitat compensation and a thorough construction-associated clearance and monitoring program to minimize tortoise injuries and loss.

Designated critical habitat overlaps the project area from approximately 1.3 miles east of Wiley Well Rd. for approximately 20 miles to the west (Figure 4-29). A formal consultation with USFWS would be necessary to “take” critical habitat, as well as desert tortoise.

The Chuckwalla DWMA intersects the Project from Wiley Well Rd, approximately five miles west of Midpoint Substation, to approximately 12.5 miles west (Figure 4-29). NECO (BLM and CDFG 2002) states that all lands within a DWMA will be designated as Category I Desert Tortoise Habitat1 (Figure 4-44) with required compensation of five acres for every acre disturbed. NECO considers all land outside a DWMA as Category III habitat. Category III habitats receive a 1:1 compensation ratio (BLM 1988).

In order to minimize losses of or injuries to desert tortoises and habitats, the development of an adequate protection program is essential. The program must include both pre-construction and operational measures. The following list outlines elements of this program that represent tested and successful protection measures; these would be elucidated in substantial detail in a project’s protection program. This list includes all of the NECO recommendations not previously identified in the General Mitigation Measures section above, as well as other measures commonly requested by USFWS and CDFG.

- **Designated Persons** - This includes a project lead biologist2, experienced with both construction monitoring and desert tortoise behavior and ecology and biological monitors.

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1 BLM habitat categories, ranging in decreasing importance from Category I to Category III, were designed as management tools to ensure future protection and management of desert tortoise habitat and its populations. These designations were based on tortoise density, estimated local tortoise population trends, habitat quality, and other land-use conflicts. Category I habitat areas are considered essential to the maintenance of large, viable populations.

2 NECO uses the terms “Authorized Biologist”, and “Qualified Biologist” to distinguish between levels of experience and tasks for which the biologist may be approved. USFWS currently uses the terms “Authorized
All biological monitors must be approved by BLM, USFWS, and/or CDFG. A Field Contact Representative is designated as the liaison from the project to the agencies, is responsible for compliance and must be on the project site during all project activities.

- **Adequate Monitoring** - An adequate number of trained and experienced monitors must be present, depending on the various construction tasks, locations, and season;

- **Tortoise Exclusion Fencing** – Permanent tortoise exclusion fencing shall enclose large and long-term project areas to keep tortoises out of work areas. Temporary fencing may be used in very short-term situations. No hazards (e.g., open trenches, pits, auger holes) may present an unmonitored or unfenced hazard to tortoises. All trenches must be closed at night. When fences are erected, an adequate fence monitoring program must be implemented to ensure fence integrity.

- **Pipeline Trenches** – Trenches may not remain open for longer than one week and must be inspected at least once daily by the Authorized Biologist. (Note: This NECO requirement is contradictory to their requirement to close all trenches each night.)

- **Pre-Construction Surveys and Clearance** – A pre-construction survey immediately in advance of earth-moving equipment will search for and remove any tortoises in harm’s way. Avoidance is desirable, if possible. Any areas fenced with tortoise exclusion fencing will be cleared prior to construction-related work in those areas.

- **Presence of Monitors** – Between March 15 and November 1, a Qualified Biologist must accompany all construction and operation activities where tortoises might be present.

- **Seasonal Restrictions** – NECO suggests that activities occur when tortoises are inactive – November 1 to March 15 - where possible.

- **Dogs** – Dogs must be confined in project areas to ensure that tortoises are not harmed.

- **Raven Control** - Proposed projects on federal lands that may result in increased raven populations must incorporate mitigation to reduce or eliminate the opportunity for raven proliferation.

- **Injured Tortoises** – If a tortoise is injured or killed, all activities must cease and the Authorized Biologist must be contacted. Injured tortoises should be taken to a qualified.

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Biologist” and “Biological Monitor” in place of NECO’s terms, respectively (http://www.fws.gov/ventura/sppinfo/protocols/deserttortoise_monitor-qualifications-statement.pdf).
veterinarian if their survival is expected. USFWS will determine if the tortoise can be returned to the wild if it recovers.

**Couch’s Spadefoot.** In order to meet NECO mitigation requirements, the following measures must be followed:

- Survey for potential ephemeral impoundments in any area that might be affected by a project.
- Survey for Couch’s spadefoot at ephemeral and permanent (e.g., springs) water sources.
- Avoid disturbance of impoundments and restriction of surface flow to impoundments.
- Close all routes within ¼ mile of any known occurrence of Couch’s spadefoot.

In addition, should ephemeral pools develop in response to intense rainfall showers from early spring through fall, these should be examined for larvae of Couch’s spadefoot. If larvae are present, the pools should be flagged and avoided by construction activities.

**All Birds.** Surveys must be completed in all potential nesting sites for active bird nests, prior to any construction activities occurring between approximately March 15 and July 30. If an active bird nest is located, the nest site shall be flagged or staked a minimum of 5 yards in all directions, and this flagged zone will not be disturbed until the nest becomes inactive, unless otherwise directed by the CDFG.

Techniques will be incorporated to minimize avian mortalities by electrocution and collision with the transmission line.

**Burrowing Owls.** The Burrowing Owl Consortium (1993) outlines a set of surveys to determine if burrowing owls might be on a project site; CDFG supports these guidelines.

- **Phase I Survey** – Habitat assessment of the project footprint, plus 150 meter buffer.
- **Phase II Survey** – If burrowing owl habitat occurs on the site, a survey must be completed on the site and a buffer zone set up to search for owl sign.
- **Phase III Survey** – If burrows that could be occupied are found on the Phase II survey, nesting season surveys must be completed, followed by winter surveys if no burrows or owls are observed during the nesting season. Each of these surveys spans several visits and days.
- **Preconstruction Survey** - A survey may be required within 30 days of project construction to assess species presence and the need for further mitigation.
CDFG (1995) has recommended several onsite mitigation measures for resident owls. Disruption of burrowing owl nesting activities or nesting activities of other special-status bird species should be avoided. In fact, NECO limits the construction period to September 1-February 1 if burrowing owls are present, to avoid disruption of breeding activities. If owls are nesting during construction, nests should be avoided by a minimum of a 250-foot buffer until fledging has occurred (1 February through 31 August). Following fledging, owls may be passively relocated. CDFG (1995) also recommends off-site compensation for loss of occupied habitat. This consists of a minimum of 6.5 acres of lands, approved by CDFG and protected in perpetuity, for each pair of owls or unpaired resident bird. In addition, existing unsuitable burrows on the protected lands should be enhanced (i.e., cleared of debris or enlarged) or new burrows installed at a ratio of 2:1.

**Raptors.** NECO recommends the possible closure of any route within ¼ mile of a prairie falcon or golden eagle aerie.

**Thrashers.** NECO recommends limiting the construction period to July 1-December 1 if crissal thrashers are present. In addition, harvesting of live vegetation in the WHMAs, especially cactus and yucca, is prohibited in order to protect perches and nest sites for thrashers.

**Desert Bighorn Sheep.** NECO recommends fencing potential hazards to bighorn sheep and constructing new water developments to expand usable habitat for bighorn sheep.

**Desert Mule Deer.** NECO recommends constructing new water developments to expand usable habitat for deer.

**Bats.** The following measures are required by NECO:

- Survey for bat roosts within one mile of a project, or within five miles of any permanent stream or riparian habitat on a project site.

- Projects authorized within one mile of a significant bat roost site would have applicable mitigation measures, including, but not restricted to, seasonal restrictions, light abatement, bat exclusion, and gating of alternative sites. Any exclusion must be performed at a non-critical time, by an authorized bat biologist.

- All riparian habitat within five miles of a maternity roost of Townsend’s big-eared bat would have a riparian proper functioning condition analysis and receive an annual inspection, followed by a monitoring report. Those riparian sites degraded by use or exotic plants, or otherwise not functioning properly, would receive treatment and/or protection to restore them to proper functioning condition.
4.9 Recreation and Land Use

4.9.1 Current Plans, Policies, Needs, and Issues

Numerous federal, state, local, and private plans will have a bearing on the final design, construction, operation, and management of the Eagle Mountain Pumped Storage Hydroelectric Project. Following is a brief summary of relevant plans, policies, needs, and issues identified to date relative to recreational resources and land use.

4.9.1.1 Landfill Project - Riverside County Eagle Mountain Policy Area

The County of Riverside has established the Eagle Mountain Policy Area in their General Plan (Desert Center Area Land Use Plan). The Policy Area encompasses the Kaiser mine and town sites described in Specific Plans #305 and #306 respectively. The proposed Landfill Project encompasses over 4,600 acres of land covering some of the same area that is included in the Project. Assuming approval of the hydroelectric project, Riverside County will require an amendment to their General Plan to incorporate the specifics of the project.

4.9.1.2 Area Alternative Energy Projects

BLM staff indicated during discussions that several solar energy projects are being proposed in the vicinity of the project area. One in particular, OptiSolar, abuts the project area to the east, includes over 14,000 acres of land, and proposes to utilize Kaiser wells for a water source. Coordination with this project will be desirable relative to construction and use of resources.

4.9.1.3 Area Energy Projects

A number of transmission line projects currently are being proposed for the area. These include SCE’s Devers-Palo Verde No. 2 Project, the Desert Southwest Transmission Line Project, and the Blythe Energy Project Transmission Line Modifications. Close coordination will be required among all energy companies relative to the future routing and construction of transmission lines.

4.9.1.4 CVMSHC Plan

The Coachella Valley Multiple Species Habitat Conservation Plan represents a complex study prepared for the Coachella Valley Association of Governments (CVAG). The intent of the Plan is to provide protection for endangered species and establish a process for the issuance of permits that will allow the “Take” of species covered by the Plan (CVAG, 2007). The transmission line route will require coordination and compliance with the terms and conditions of this plan.

4.9.1.5 CDCA Plan

As noted earlier, the proposed project would be located within the California Desert Conservation Area, a planning area under the management jurisdiction of the BLM. The CDCA Plan identifies designated utility corridors in which more intensive utility development may occur. If segments of the final alignment of the transmission line fall outside this corridor
defined by the BLM, an amendment to the CDCA Plan may be necessary. Routes within the defined corridor would require authorization of a Right-of-Way Grant from the BLM.

4.9.1.6 Community Development Plans Coordination

The proposed project and transmission line route will reside within current unincorporated areas under Riverside County jurisdiction. The transmission line and its terminus at Midpoint substation, however, will be in close proximity to the incorporated boundaries of the community of Blythe. Coordination with this community will be necessary regarding compatibility with future growth plans.

4.9.2 Existing Resources and Use

4.9.2.1 Regional Setting

The proposed project is located in northeastern Riverside County, California. Physiographically, the project lies within the Little San Bernardino Mountains and Colorado Desert, an area characterized by limited water and extremes in temperature. Recreational resources within the area provide for a variety of activities that attract visitors, including hiking, camping, backpacking, hunting, nature appreciation, rock hounding, rock climbing, mountain biking, horseback riding, jeep tours, and off-highway vehicles.

The most important public land for recreation in the vicinity of the project is the JTNP and Wilderness, which lies within three miles of the Project (Figure 4-45). Other public lands within the region open to recreation include lands owned by the Bureau of Land Management (BLM), and State lands. The majority of activity on BLM lands includes hiking and off-highway vehicle (OHV) use. The BLM maintains an inventory of trails and areas open or closed to OHV activity. The BLM also maintains several primitive campsites within the region, but keeps no records of visitor use. The nearest BLM campground to the project site is Corn Springs, located approximately 15 miles southeast of the project. Overflow camping is also permitted by the BLM north of Interstate 10 just outside the south entrance to JOTR. Camping is not permitted in these areas within 300 feet of the roadway and there are no developed facilities.

Other nearby public lands open to day-use activity includes the Desert Lily Sanctuary located approximately 8 miles southeast of the project area adjacent to Highway 177. This area encompasses over 2,000 acres and is managed by the BLM.

Access to regional recreation opportunities is provided primarily from Interstate 10. Private recreation adjacent to Interstate 10 and near the project includes the Patton Museum at Chiraco Summit. This facility also borders a large historic area known as Camp Young, which was established by Patton as a desert tank warfare practice area. This area is predominantly public land, managed by the BLM. Other public lands in the vicinity adjacent to I-10 include Ford Dry Lake, an OHV use area managed by the BLM, Palen Dry Lake, and Chuckwalla Valley Dune.
Thicket Areas of Critical Environmental Concern (ACEC). The ACECs are managed by BLM, and are designated for the protection of wildlife.

Lands adjacent to the proposed water and transmission line corridors are relatively undeveloped. The proposed transmission line route crosses through some existing citrus orchards near the Route 177 road crossing. With that exception, the route crosses through a mix of undeveloped public and private ownership (Figure 4-46).

4.9.2.1.1 Joshua Tree National Park and Wilderness

The majority of recreation activity in the region occurs within the nearby JTNP and Wilderness. The Park encompasses unique geology, flora, and fauna as a result of two ecosystems - the higher elevation Mojave Desert and the lower elevation and dryer Colorado Desert – meeting in a relatively short distance.

The JOTR was established first as a national monument in 1936 and later changed to a National Park in 1994. Also at this time, an additional 234,000 acres of land was added and included as a Wilderness Area known as the Eagle Mountain Wilderness Area. Wilderness Area designation allows only non-motorized, non-mechanized activities to occur within its boundary, with minimal trail creation and maintenance.

Access to the JTNP is from Interstate 10 to the south and California State Highway 62 to the north. The Park includes a variety of dispersed recreational activities and camping. Due to its unique geology and rock formations, the Park is internationally known as a prime rock climbing destination. The Park 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 the Park is now considered a year-round destination. Throughout the fall, winter, and spring, it is not uncommon for all of the Park’s campsites to be filled to capacity.

Generally speaking, the northwestern half of the Park is more developed with trails, camping, picnic, and day-use facilities; the eastern half is less developed with a few backcountry roads and trails. Cottonwood Visitors Center greets visitors at the southern access to the Park, 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 Park are located in the high desert western half of the Park.

Backcountry hiking and camping are popular in the Park. Trails and facilities are more limited in the eastern Park area near the project site due to the greater amount of designated wilderness, which restricts certain uses and access. One backcountry unpaved road, Black Eagle Mine Road, traverses canyon areas within the Park and exits towards the project area. Trail head use records were not available from the Park Staff.
4.9.2.2 Central Project Area

4.9.2.2.1 Project Site

The Project is located within lands which were mined in the past. The Eagle Mountain Mine was operated by Kaiser Steel Corporation from 1948-1982. Four open pits or quarries were excavated for iron ore. The central pit and the east pit are proposed for the reservoirs. Currently, the proposed central project area encompasses land comprised of patented mining claims and fee simple lands owned by Kaiser Steel Resources, unpatented mining and mill site claims held by Kaiser by right of location. Approximately 3,500 acres of public land was exchanged to Kaiser Eagle Mountain, Inc. for private lands under the authority of Section 206 of the Federal Land Policy Management Act (FLPMA) to support a sanitary landfill project. This proposed landfill would exist between the two quarries proposed as upper and lower reservoirs for this project. This land exchange is the subject of pending litigation in U.S. Circuit Court of Appeals (9th Circuit).

The project site consists of mountainous, rocky terrain that has been disturbed extensively as a result of mining activity. The area consists of open pit and surface mines, tailings piles, and tailings ponds. Many of the structures associated with the mining, including railhead, haul roads, and ore processing/refining facilities are also located within the central project area, though most of the ore processing and refining facilities have been removed.

Due to the extensive past mining activities and disturbed nature of the project area, including perimeter fencing and controlled access, existing recreational opportunities within the project area essentially do not exist. Similarly, the townsite, which was developed during the mine's activity and is located south of the proposed project site, is currently fenced with controlled access. The townsite itself contains several “urban” recreation amenities, including parks, trails, recreation center, and theater. Parts of the townsite were actively utilized for an adult detention center and school, but these have now closed.

Land use designations and management within the central project area is governed by a number of land use plans, which are noted in the next section. The Riverside County General Plan, (Desert Center Area Land Use Plan, October 7, 2003) indicates the mine area as a Specific Plan Policy Area. Outside the Specific Plan boundary, County land use designations indicate most of the land is classified as “Rural Open Space.” Lands to the north/northwest of the Specific Plan area are designated as “Open Space-Mineral Resources.”

Public lands adjacent to the central project area are part of the 25 million acre California Desert Conservation Area (CDCA), which are managed by the BLM according to land use designations and guidance established in the CDCA Plan. Specifically, the central project area is included within one of six concurrent CDCA plan amendments - the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO). Recent plan amendments noted in NECO indicate that BLM changed some of its Multiple Use Class (MUC) designations for lands around the central project area. Public lands are assigned a MUC according to the 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 2002).

Public lands west of the patented Kaiser lands were changed from MUC-Moderate, to MUC-Limited in order to protect and better manage habitat for the Desert Tortoise (pers. comm. M. Bennett, BLM). Public lands east of the Kaiser Specific Plan boundary are managed according to MUC-Moderate guidelines.

4.9.2.2.2 Surrounding Land Uses

Several existing, non-recreational land uses exist within close proximity to the proposed project site. These are briefly summarized below.

Town of Eagle Mountain

The Town of Eagle Mountain is a 460-acre townsite owned by Kaiser Steel Resources. It is located adjacent to the project area facilities described earlier. The town was developed by Kaiser to house mine workers and consists of 250 single-family dwellings, a store, café, two churches, a school, and a post office, among other features. After the mine closed the town became largely vacant. A State-run correctional facility utilized some of the features, but has since been relocated. The townsite is fenced with controlled access and is currently vacant. The townsite is serviced by public utilities, and a wastewater treatment plant is located southeast of the town.

Lake Tamarisk and Desert Center Communities

The small communities of Lake Tamarisk and Desert Center are located approximately nine and ten miles southeast of the central project area. Lake Tamarisk consists of approximately 70 single family dwellings, an executive golf course, a recreational vehicle park, undeveloped lots (150), and two small lakes.

Desert Center is located at the junction of Interstate 10 and State Route 177. Desert Center consists of a few small single-family dwellings, gas stations, mini market, café, and bar. Public facilities include a county fire station, branch library, post office, and several churches.

Both communities, as well as the Eagle Mountain Townsite are accessed by Kaiser Road, which connects to Interstate 10 at Desert Center.
Roads, Utilities, and Facilities

Numerous roads, utilities, and communication facilities are located in the desert areas surrounding the central project area. The Eagle Mountain Rail Line also runs through the area from Interstate 10 north to the project site. A 230 kV electrical transmission line (MWD line) crosses the Coxcomb Mountains from the northeast and continues through the Eagle Mountains to the south. A 160 kV transmission line, owned by SCE, runs southeast from the Eagle Mountain Townsite to the community of Blythe located approximately 50 miles to the east. A small disposal site operated by Riverside County is located west of Kaiser Road between Desert Center and Eagle Mountain. This facility provides solid waste disposal for the small communities in the area.

The Colorado River Aqueduct, which is managed by MWD, passes within a few hundred feet of the central project area. The Aqueduct runs a northeast-to-south route and varies between open channel and tunnel. The portion closest to the project area consists of an open channel.

Joshua Tree National Park and Wilderness

The Joshua Tree National Park and Wilderness was described earlier, but mentioned again here due to its proximity as a surrounding land use near the project area. The JOTR and Wilderness encompasses nearly 792,000 acres of land of which approximately 700,000 acres have been designated Wilderness. The closest Park boundary is located about three miles north of the central project area.

4.9.2.3 Water and Transmission Corridors

Existing recreation and land uses adjacent to the project’s proposed water conveyance system and transmission corridor vary. Near the project site, lands are largely undeveloped and publically owned. The water transmission corridor proposes to cross land managed by the BLM and patented lands. The majority of the water line will parallel Kaiser Road (within the right-of-way) into the project’s lower reservoir. No developed recreation exists along this route although the lands generally are available for dispersed recreational use (hiking and OHV opportunities). BLM managed lands along the proposed water conveyance corridor are designated as MUC-Moderate, which has been described previously.

As described earlier in Section 3, power will be supplied from the project by a single circuit 500 kV transmission line. A 200-foot-wide corridor is currently anticipated for the transmission line construction, maintenance, and management. As planning and design for the project proceeds, other options may become available that may allow this width to be reduced (overbuilds of existing lines, compact tower designs, etc).

The transmission line will originate from the project switchyard and extend southeast, paralleling the existing SCE 161 kV transmission line. The line will cross Route 177 and continue southeast for another nine miles. At this point the line will continue to parallel the existing transmission line and cross Interstate 10. South of Interstate 10 the route will continue to parallel the SCE line.
as well as the existing and proposed SCE Palo Verde-to-Devers transmission corridor for eight miles. Past this point, the proposed route will turn east, split from the existing 161kV line, and parallel the Palo Verde-to-Devers corridor 17 miles to a proposed substation site known as Mesa Verde Midpoint.

Land ownership and uses along this route are comprised mostly of undeveloped public and private rural open space land sections in a checkerboard pattern. Undeveloped public lands are managed by BLM. BLM land management classifications include MUC-Moderate and MUC-Limited. Limited classification occurs within the lower (southern) half of the route and is due to its location within desert wildlife management areas (DWMA) and concern for Desert Tortoise habitat. Additionally, the CDCA “NECO” Plan identifies a utility corridor in the vicinity of this proposed route segment.

The proposed transmission line will cross through a wildlife management area known as Chuckwalla Valley Dune Thicket ACEC. This area is managed by the BLM and is located north of the Ironwood and Chuckwalla Valley State Prisons, operated by the California Department of Corrections. The proposed project would be located approximately two miles north of these facilities and would not affect their operations. Since the proposed transmission line route will parallel existing transmission lines through the Dune ACEC, adverse effects are expected to be incremental and less than significant, and minimized through specific design and construction treatments.

A more detailed analysis of land use will be conducted for the final application submittal once the final alignment is determined.

4.9.3 Potential Impacts of Project on Recreation and Land use Resources

4.9.3.1 Recreation Changes

Access to or use of existing recreational areas in the region is not expected to be affected significantly by the project. Little to no recreation activity presently occurs at the site as much of it is not conducive to recreational activity and is fenced off and closed to public access. Staff at the NPS has expressed an interest in closing off OHV access to a backcountry road (Black Eagle Mine Rd) that provides access into the JTNP and Wilderness from the upper, west edge of the proposed project area, in order to reduce the potential for increased use and impacts into the Park.

Project construction may have a short-term, temporary impact on dispersed recreational activities in the area, but due to the relatively low use presently occurring, it is not anticipated that the construction activity or traffic will have a significant effect on recreation.

As there presently are no developed reservoirs, no shoreline buffer zones exist nor need for a shoreline management plan relative to recreation resources. The addition of water in the existing quarries may attract wildlife. While this may create an opportunity for wildlife viewing and bird
watching, it is anticipated that the project reservoirs and facilities will be fenced with controlled access, and opportunities for such activity will be limited.

Development of the project’s transmission line is not expected to have a noticeable effect on recreation. Transmission line right-of-ways can be used for OHV activity. While that may be viewed as both good or bad, depending on the location, the proposed line’s close proximity to existing transmission lines is not expected to noticeably change current use patterns.

### 4.9.3.2 Land Use Changes

Implementation of the proposed project will result in a change in the use of land from an existing, inactive iron mine to a hydroelectric facility with its associated features. This change is not expected to be incompatible with the current condition. The project could also potentially be operating in conjunction with a proposed landfill.

Access to the project will be from existing, well maintained roads (Kaiser and Eagle Mountain Roads). Both roads were developed for the mine and designed to accommodate a much larger traffic load than what the project will create or what presently exists. Interstate 10 is capable of absorbing increased traffic and no significant effect is foreseen.

None of the facilities or structures, or general arrangement of the project are anticipated to have a significant effect on existing land uses. Area communities will likely experience a temporary increase in population through rentals, new residence construction, or temporary RV permits resulting from the temporary work force for the duration of project construction. This temporary influx of workers will also create an increase in the demand for services and goods, albeit temporarily. These effects will be short-term and largely beneficial to area communities.

The proposed transmission line and water conveyance corridor are not expected to significantly affect land uses along their routes as most of the facilities will be on undeveloped lands and adjacent to existing transmission line corridors. The transmission line will pass within a mile of the Desert Center airstrip, which may require special mitigation and coordination with Riverside County. The route also will cross through a number of private citrus orchards within the area northeast of the Lake Tamarisk community, requiring coordination with private entities. During final route determinations, it will be necessary to assess the adequacy of right-of-way to minimize impacts to any residential developments presently occurring in the area.

### 4.9.4 Probable Protection, Mitigation, or Enhancement Measures

No active recreation activities or facilities are currently being proposed for the project as such recreation is not conducive to the setting or desired by public agencies due to the potential for adverse impacts on area wildlife resources, and off-site National Park and Wilderness areas. The project reservoirs will be fenced and access to the project controlled in general through security gates, fencing, and staffing.
Consideration may be given to developing a small interpretive overlook facility. The overlook would include educational and historical interpretive signage, and provide a staging area for periodic guided tours. If desired, siting and design drawings for this overlook will be developed as part of the license application development.

New transmission line construction and maintenance roads may be cause for unwanted OHV use. The Applicant will work with other resource agencies to identify such “concern” areas. In such areas it may be possible to avoid developing continuous access/maintenance roads parallel to the line, and instead provide direct access only to specific tower locations.

Additional transmission mitigation may include the application of compact tower designs in order to reduce right-of-way widths through developed areas, if necessary. Near the Desert Center airstrip reduced tower heights and visibility features on conductors may be necessary, or rerouting. Such measures will be evaluated during the final license application phase.

### 4.10 Aesthetic Resources

#### 4.10.1 Description of Existing Aesthetic Resources

The description of existing aesthetic resources for the proposed project and this PAD is based on a compilation of existing aesthetic resource studies completed for several area projects. This summary will be augmented with additional site specific information as the project licensing process continues. Descriptions have been broken into two categories. These are: (a) the Central Project Area, which includes the project boundary and core facilities (reservoirs, powerhouse, access roads, etc.) and immediate surrounding area, and (b) the linear transmission corridor.

#### 4.10.1.1 Assessment Approach

The following description of existing aesthetic resources follows a methodology developed by the BLM. It is based on a three-step process that involves an assessment of (1) scenic quality, (2) visual sensitivity, and (3) viewing distance zones. Results of these three assessment categories are grouped into established Visual Resource Management Classes, which are used by the BLM to evaluate the significance of visual impacts from proposed projects. More detail on this methodology and its application will be provided in the license application. The following descriptions are summarized from existing visual resource studies on file.

#### 4.10.1.2 Regional Landscape Setting

The proposed project lies within a geographic area known as the Basin and Range Province (Fenneman, 1931). This area is characterized by a combination of arid and semi-arid landscapes set at the base of rugged mountain ranges including the San Jacinto, San Bernardino, Little San Bernardino, and Santa Rosa Mountains. These contrasting landforms with their varied colors and dappled vegetation patterns result in exceptional scenic quality and dramatic long views from key viewpoints. Elevations range from a high of 11,502 feet at Mt. San Gorgonio Peak, to a low of -228 feet below mean sea level at a water feature known as the Salton Sea.
The lower elevations include numerous alluvial fans, washes that form at the mouth of many of the canyons draining the mountains. These areas create a visually interesting transition between the mountains and the valley floor. The valley floor is comprised of a mix of sand dunes and sand fields that are often enhanced by the presence of mesquite hummocks that provide a vivid contrast of green against the lighter sand color. In the spring, particularly after an above average precipitation event, the dunes and sand fields are frequently covered with a profusion of annual plants that create a mosaic of color (CVMSHCP, 2007). Additional spots of dark vegetation create a strong visual contrast against the rocky terrain at the base of the Little San Bernardino Mountains. Here, blocked groundwater from the San Andreas Fault creates seep areas that are populated by the native desert fan palms.

The mountainous portions of the project area give way to the lower Coachella Valley and the more urbanized settings of Palm Springs, Palm Desert, Indio, and Cathedral City. The Palm Springs and San Gorgonio Pass area at the western end of the Coachella Valley is known for its extensive wind farm developments that dominate the landscape.

4.10.1.3 Central Project Area

4.10.1.3.1 Scenic Quality

The Project site is proposed within an inactive iron ore mine complex that is located along the eastern edge of the Eagle Mountain foothills and mountains (Figure 4-47). The Project site transitions from the mountains and foothills to the Chuckwalla Valley, to the south/southeast.

While the mine area itself is a highly disturbed, human-modified environment with low scenic quality, the surrounding mountains, with their rugged, rocky, and steep grades, sparse vegetation, and variety of colors create a very scenic backdrop. The nearby Coxcomb Mountains to the east, rise higher and are more rugged, and are considered higher in relative scenic quality. Overall scenic quality of the immediate project surroundings is considered moderate to high.

Access to the project site is through the Chuckwalla Valley. The Valley is representative of desert basin features, as is the Pinto Basin, which is located to the north of the project on the other side of the Eagle Mountains and effectively out of the project viewshed. These expansive basins consist of relatively flat to gently sloping topography that visually separate and accent adjacent mountain ranges. The basins consist of a variety of colors 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 Townsite, Lake Tamarisk, and Desert Center. Linear landscape elements within this landscape unit include roads, transmission lines, railroad tracks, OHV tracks, and the Colorado River Aqueduct. Primary transportation corridors within the unit include Interstate 10 and Highway 177. Overall scenic quality of the Chuckwalla Valley within the viewshed of the project is considered low, due to the existing developments within it that alter the natural qualities of the landscape. However, the relatively flat topography of this landscape serves to
heighten the visual quality of surrounding mountain ranges through unobstructed panoramic view opportunities.

**4.10.1.3.2 Visual Sensitivity**

An analysis of visual sensitivity takes into account several elements. These include viewer activity and expectations, viewer numbers, view duration, and viewer distance. The following summaries reflect a combined analysis of these elements as evaluated from key observation locations.

**JOTR.** The JTNP surrounds the project on three sides. While the rugged terrain and focus on backcountry use limits viewer numbers, viewer expectations of natural landscapes and view durations from ridge top trails would be high. Additionally the view distance from nearby ridge tops is relatively short (foreground/middleground views, \( \frac{1}{4} - 3 \) miles). Consequently, visual sensitivity surrounding the project is considered high.

**Residential/Commercial Areas (Townsite, Lake Tamarisk, Desert Center).** Visual sensitivity of the various developed communities in the vicinity range from moderate-to-low. The Townsite’s view zone is close, but an Adult Detention Facility was recently closed, and currently no residents are known to occupy the site. The site may be utilized by construction workers for the landfill (see Section 1 for additional discussion on potential landfill project), but this population is not expected to be large, will be largely temporary, and, this viewer group is classified as having a moderate sensitivity to the project’s visual setting.

While view durations from residents of Lake Tamarisk and Desert Center are long, the relatively low viewer numbers and long view distances (+/- 10-12 miles) visual sensitivity is considered moderate to low. Additionally, views of the mine site are partially blocked by intervening landforms, muted by distance and viewers are familiar with the mine’s presence over the past 30 years.

**Travel Routes.** Motorists traveling on I-10 in the vicinity of Desert Center represent the largest numbers of viewers in the project vicinity. Additionally, according to the Riverside County Comprehensive General Plan, this section of I-10 that passes by the project vicinity is designated as an Eligible County Scenic Highway. This is a result of the long, panoramic views of the surrounding mountains created by the flat landscape of the Chuckwalla Valley that I-10 travelers pass through. While off-site views of the mountains are dramatic, view durations are relatively short as motorists are traveling this corridor at high rates of speed. Additionally, intervening landforms screen lower reaches of the project site from view, and the viewing distance is over 11 miles (background view zone). Due to the high viewer numbers and elevated significance of I-10 as an Eligible County Scenic Highway, the visual sensitivity is considered high. While State Route 177 is similar in landscape setting, viewer numbers are much less and it has no scenic corridor designation. Consequently, visual sensitivity is rated moderate for Route 177.
4.10.1.4 Transmission Corridor

4.10.1.4.1 Scenic Quality

The proposed project transmission corridor consists of two principal segments. The segment from the project site to Interstate 10 travels through the Chuckwalla Valley landscape unit, paralleling an existing 161 kV transmission line to the southeast for approximately 29 miles. Scenic quality is rated low (class C) due to the landscape’s relative lack of landform contrast and existing level of man-made developments (roads, railroads, transmission lines).

The second transmission line segment turns southeast after crossing the Interstate 10 corridor and parallels the existing SCE 161kV transmission line and the Devers-to-Palo Verde transmission line corridor for approximately eight miles before it turns east and continues to parallel the existing PV-D transmission line for 17 miles where it will connect to a substation site known as Midpoint. Similar to the previous segment, landforms in this area include flat valley bottoms, dry lake beds, and low rolling terrain with few interesting or dominant landscape features. Overall scenic quality along this transmission segment consequently is considered moderate to low, due to the relatively low contrast in landscape character and high degree of cultural (manmade) modifications.

4.10.1.4.2 Visual Sensitivity

Visual sensitivity within the area containing the transmission line from the project site to I-10 is considered moderate in its classification. The volume of use within the area is relatively low resulting in low viewer exposure and with the exception of Eagle Mountain Road, which is infrequently used, viewing distances from population areas (Desert Center and Lake Tamarisk) are over three miles. One exception will be the section of transmission line that approaches I-10 in the foreground, which is considered high in visual sensitivity.

Visual sensitivity of the east transmission line segment is considered high, due to the large number of viewers on I-10 and generally high expectations of scenic quality.

4.10.2 Potential Aesthetic Resource Impacts

The proposed project will alter the visual landscape as viewed from various viewpoints. The degree to which these visual impacts are considered significant depend on the perceived change in the overall visual quality of an area and whether the change meets established visual resource classification objectives. Combinations of scenic quality, visual sensitivity, and distance zone ratings described previously form the basis for the visual resource classifications as described in the BLM Visual Resource Management (VRM) Program. These classifications are:

- **VRM Class I.** The objective 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.
- **VRM Class II.** The objective 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 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.

- **VRM Class III.** The objective is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate or lower. 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.

- **VRM Class IV.** The objective is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

4.10.2.1 Central Project Area

Visual characteristics of the project site will be altered as a result of construction of the proposed project. Project features including upper and lower reservoirs, access roads, switchyard, surge chamber, access tunnel portal, staging and storage areas, and an administrative building will modify the existing landscape and be visible from some viewpoints in the area. Review of previous visual studies completed for the area indicates that the project site falls mainly within VRM Classifications III and IV.

VRM Class III designations generally apply to the higher slopes of the Eagle Mountains on the north edge of the project site. The majority of the project site falls within VRM Class IV, which allows for modification of the existing character of the landscape. Overall visual resource impacts within the project site are not expected to be significant given the highly disturbed nature of the existing landscape setting from past mining activities and abandoned facilities.

During meetings with agencies, the JOTR representatives noted that the backcountry portions of the JTNP (areas near the project site) are very light-sensitive areas and expressed concern regarding increases in night lighting. The proposed project is not expected to noticeably increase light pollution over existing conditions. Existing lighting from the Eagle Mountain Townsite, Desert Center, and Lake Tamarisk apparently is quite noticeable and visible throughout the Chuckwalla Valley. The proposed project may increase lighting over ambient levels temporarily during construction. After construction, lighting of facilities that may cause an increase in “night pollution,” such as the higher elevation reservoir and structures, is not anticipated to occur. Areas requiring lighting such as the switchyard will be located in lower elevation locations.
Additional mitigation measures, such as directional lighting or hoods, may also be applied, if necessary.

4.10.2.2 Transmission Corridor and Water Conveyance System

The proposed transmission segment located within the Chuckwalla Valley will be visible from a number of view locations. The addition of new 500 kV transmission line towers with a different structure and shape will create a moderate contrast to the existing visual resource character. VRM Classifications range from Class III to Class IV depending on view distances. Specific tower designs and other mitigation measures may be necessary to ensure that facilities do not dominate the landscape, but overall, construction-related activities are expected to be consistent with the established management objectives for Class III and IV areas. Additionally, since the proposed transmission line will route in close proximity to the existing SCE 161 kV transmission line, visual impacts are expected to be less than significant and incremental to existing visual impacts presented by the existing facilities.

The proposed water conveyance system is expected to be buried below ground and with the exception of short-term, temporary construction impacts, will not present adverse visual impacts from key viewpoints within the region.

Visual impacts for the proposed transmission line segment paralleling the existing PV-D transmission line to the Midpoint Substation is expected to be similar to visual resource impacts summarized in the study completed for the SCE Devers-Palo Verde No. 2 Transmission Line Project (SCE, Draft EIR/EIS, 2006). This portion of the transmission line passes through a variety of public and private lands.

While the installation of project towers and conductors will result in long-term visual impacts, notably within foreground view zones from I-10, most of these impacts will be incremental to existing visual impacts from adjacent existing transmission lines and other utility and roadside infrastructure. These low-to-moderate levels of change are expected to meet the VRM Class III and IV objectives in this area. Lattice tower structures, which are proposed for the project, reduce visual contrast significantly as the view distance increases. Structures viewed from two miles or more appear indistinct against the mottled landforms in the background.

4.10.2.3 Midpoint Substation

The proposed Midpoint Substation is an alternative location described in the Devers-Palo Verde No. 2 (DPV2) Draft EIS. The site is approximately 1.5 miles south of I-10, located at a point where the DPV transmission corridors turn from east to southeast. The site is located some 8-10 miles west of the incorporated limits of the community of Blythe, and near an un-incorporated area known as Mesa Verde.

The propose substation would require the construction of new access road and would be within the foreground view zone of I-10 users.
4.10.3 Probable Protection, Mitigation, or Enhancement Measures

As part of the detailed licensing process, the Applicant will conduct a comprehensive visual resource survey in a cooperative effort with state and federal resource agencies. Results of this survey will help identify specific impact locations due to tower placements and facility designs. Mitigation measures will focus on higher, or more significant, impact areas as a priority. Mitigation measures may include but not be limited to the following:

- Tower Design (lattice vs. pole designs)
- Tower Placement
- Tower Color
- Conductor spans and design treatment
- Landscape restoration and screening
- Lighting control
- Construction access and staging modifications

As part of the licensing process, an approved reclamation plan will be prepared in coordination with BLM relative to project facilities and construction activities on public lands.

4.11 Cultural Resources

The following Cultural Resource section represents a summary of known resources, previous studies, and tribal interests within the project site for the Project and associated transmission line. The proposed transmission line will follow an existing 160 kV transmission line from the project site to the southeast and then follow the proposed Devers-Palo Verde No. 2 Transmission Line route to the Midpoint substation.

4.11.1 Previous Studies

Several cultural resource studies and inventories have been completed for locations within the project area. These include:

- 1993- Cultural Resource Reconnaissance of Eagle Mountain Pumped Storage Transmission Corridor performed by CRM TECH.
4.11.2 Description of Environment

4.11.2.1 Project Site

4.11.2.1.1 Historical Context

The project site is located within the dormant Eagle Mountain mine and surrounding Eagle Mountain Townsite. The area was prospected for gold, silver, and other precious metals in the 1880s and a small gold mine known as the Iron Chief Mine was started in the area and closed in 1907 due to poor gold yields with high iron content. The area was purchased by Southern Pacific Railroad Co. in 1942 who sold to Henry Kaiser soon after. The Eagle Mountain mine was started by Henry Kaiser who also started the private company-owned Town of Eagle Mountain next to the mine in 1948 to provide for living arrangements for the workers of the remote mine.

The mine was started to mine iron ore for the Kaiser steel mill in Fontana, California. A rail line was also extended from the mine to the Southern Pacific Line approximately 50 miles to the southwest. The town reached a peak population of approximately 4,000 people. The town slowly shrank as production from the mine was reduced in the 1970s and eventually closed in 1980 due to the phasing out of the steel mill that was fed by the mine. The town was shut down soon after the closing of the mine. The town shopping mall was converted to a private detention center in 1988 that was later closed in 2003. The town is now a modern day ghost town with many of the original buildings still standing.

4.11.2.1.2 Cultural Resources

The Eagle Mountain Landfill and Recycling Center EIS/EIR report stated that archaeological surveys were conducted in 1989 and 1991 for the project boundaries for the landfill that would closely match the boundary for the pumped storage project. The report concluded that...
disturbances from the mining and associated activities had removed or covered any cultural resources that may have existed on the property. The report found that no cultural resources were found within the project site. The report also concluded that no historic properties within the proposed project site would qualify as a cultural resource that could be listed in the National Register listing (Kaiser, 1991).

4.11.2.2 Transmission Line

4.11.2.2.1 Historical Context

The Colorado River Aqueduct runs near the project site and crosses the proposed path of the transmission line. The aqueduct was constructed by MWD from 1933 to 1941 to provide water to Los Angeles from the Colorado River. The aqueduct eventually served a large area of the region and has been listed as a major reason for the industrial growth of southern California. The aqueduct utilizes both open channels and tunnels with pump stations to carry the water from the Colorado River across the deserts and over mountains to Los Angeles. The American Society of Civil Engineers has named the aqueduct one of the seven wonders of the American engineering world.

4.11.2.2.2 Cultural Resources

The project transmission line will come out of the project site and generally follow the existing SCE 160kV transmission line to the southeast where it will cross I-10. From this point the route will follow the proposed Devers-Palo Verde No. 2 Transmission line to the Midpoint substation west of Blythe.

Few cultural resource studies appear to have been conducted for the transmission line segment that parallels the existing SCE 160 kV transmission line. This section of the proposed route will require detailed inspection and investigation for cultural resources. The route will pass north of the Eagle Mountain Pumping Station and Lake Tamarisk neighborhood. The route will cross I-10 to the west of the Palen Dry Lake ACEC.

Beyond the SCE transmission line segment, the transmission line will follow the proposed Devers-Palo Verde No. 2 and Desert Southwest Transmission line corridors to the midpoint substation to the east, a distance of approximately 17 miles. Both of these transmission line projects have recently completed cultural studies of the proposed routes. The cultural resources study completed for the Devers-Palo Verde No. 2 Transmission Line Project identified 69 cultural resource sites within and adjacent to the transmission line corridor between Devers and the Colorado River. The report states that many of the sites have been impacted by the construction of the Devers-Palo Verde No. 1 transmission line, recreational activity, vehicle traffic, and World War II era military training associated with the Desert Training Center (Devers II, 2006).
The proposed transmission line will route through areas previously utilized as part of the Desert Training Center (DTC). The DTC was established in 1942 by General George S. Patton Jr. to train soldiers for desert combat. The DTC occupied much of the land that the existing and proposed transmission lines route through. The camps and training center only lasted from 1942 to 1944 and played a significant role in training soldiers for World War II. The BLM is making efforts to preserve the camps and remnants of the DTC.

Relevant findings from these studies and others will be researched and incorporated into the more detailed license application for this project.

### 4.11.2.3 Water Supply and Conveyance

The 1994 FERC license application for the Project conducted a cultural resource survey for the proposed routing of the water supply and conveyance system to the project site. The research and field inspections concluded in negative findings for known or potential cultural resources except at the far northern end where a slight potential for cultural resources could be found where desert pavement exists. The report states that the records search, historic map search, and field inspections concluded that the project area had a low sensitivity for cultural resources (Eagle Mountain Energy Company, 1994).

### 4.11.2.4 Tribal Interests

The Eagle Mountain Landfill Recycling Center EIS/EIR stated that the Eagle Mountains around the project site may have been utilized by the Native American Tribes such as the Mojave, Chemehuevi, and Cahuilla for hunting grounds of mountain sheep and deer. The report concluded after consultation with several Native American tribal representatives that no known special ancestral significance was associated with the Eagle Mountains.

The proposed transmission line does not run through any tribal reservations (Figure 4-48). The Aqua Caliente and Morongo Indian Tribes have been consulted and will continue to be contacted for information and cultural affiliation and knowledge of the proposed project site and transmission lines as the project progresses.

### 4.11.3 Potential Adverse Impacts

Considerable cultural resource studies have been conducted within and around the proposed project site and associated transmission lines. Due to the highly disturbed nature of the project site, the proposed pumped storage facility is not expected to have an adverse effect on cultural resource sites. The proposed transmission line and associated construction could cause an adverse change to known and unknown cultural resource sites. The siting of the transmission lines adjacent to existing corridors should minimize the impacts from construction activities. A more detailed cultural resource inventory of the proposed transmission route will need to be completed for conclusive evidence of historic and prehistoric cultural resources along any unsurveyed sections of the proposed route.
4.11.4 Probable Protection, Mitigation, or Enhancement Measures

Careful location of project facilities and construction/maintenance activities can reduce the impacts to existing historic sites. In cases where disturbance to known cultural resources are unavoidable, mitigation measures shall be identified and implemented to reduce adverse effects.

As part of the licensing process, the Applicant will continue to coordinate with the State Historic Preservation Office in accordance with requirements of Section 106 of the National Historic Preservation Act. As details of the project, and particularly the final transmission alignment, become available the Applicant will define an area of potential effect (APE) in consultation with area state and federal agencies. The APE is defined as a geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of cultural resource sites, if any such sites exist.

Detailed cultural resource inventories of previously unsurveyed locations will be completed by a qualified cultural resource consultant.

A Cultural Resources Management Plan will be prepared for the project that will identify appropriate measures of protection for identified cultural resource sites.

4.12 Socio-Economic Resources

4.12.1 Description of Environment

4.12.1.1 Land Use Patterns

4.12.1.1.1 Countywide Trends

Riverside County was formed in 1893 from parts of San Bernardino County and San Diego County. 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 Ocean to the west.

Riverside County is the fourth largest county in California with an estimated population of 2,026,803 people in 2006 (Census). The 2003 Riverside County General Plan (RCGP, 2003) provides a summary of existing and proposed land use patterns within the County. The county encompasses approximately 7,300 square miles of which in 2007, 89.5 percent is unincorporated (Riverside County GIS). Much of the central and eastern portions of the county are contained within open space and protected areas. Government agencies such as the BLM, Bureau of Indian Affairs, National Park Service, US Forest Service, Department of Defense, and the California Department of Parks and Recreation own large parts of Riverside County. There is a large portion of land in government and non-government ownership that is contained within many different preserves. There is a National Park (Joshua Tree), two National Forests (Cleveland and San Bernardino), a National Wildlife Refuge (Coachella Valley), a National Monument (Santa
Rosa/San Jacinto Mountains), the California Desert Conservation Area, several state parks, and many Wilderness Areas and areas designated by the BLM as ACECs.

The urban areas within Riverside County are concentrated in the western portion of the county. Centrally located is the urban area of the Coachella Valley consisting of Bermuda Dunes, Cathedral City, Coachella, Desert Hot Springs, Indio, La Quinta, Palm Desert, Palm Springs, and Rancho Mirage. The City of Blythe is located on the eastern edge of the county along the Colorado River and had a population of 22,625 in 2007. The rest of the county is mainly open space with small rural communities dispersed among the large open areas.

Riverside County has seen large growth in land use for public utility and facilities dealing with renewable energy. Many wind energy generation facilities are located in the San Gorgonio Pass and Coachella Valley and there is interest being shown in solar power facilities in the eastern part of the county.

4.12.1.1.2 Project Area Trends

The project area has seen a fluctuation in population in past years. The area is relatively sparsely populated. The Eagle Mountain Townsite that is associated with the Eagle Mountain Mine was once a city of almost 4,000 people before the mine was closed. The private town has since been closed. The closing of the mine also slowed or stopped growth in nearby communities such as Desert Center and Lake Tamerisk. The project site is located approximately in the center of a Census block group that is approximately 802 square miles. The Census block group had a population of 977 people in 2000 giving a population density of 1.2 people per square mile.

4.12.1.2 Population Patterns

Native Americans such as the Serranos, the Luisenos, the Cupenos, the Chemehuevi, and the Cahuillas were the first people to live within the area of Riverside County. The County currently has 24 cities plus large amounts of unincorporated lands.

4.12.1.2.1 Population

Current Population

The population of Riverside County in the 2000 census is 1,545,387 and estimated to be 2,026,803 in 2006 (Census) (Figure 4-48). The County’s population ranks fourth of California’s 58 counties and is larger than 15 states in the United States. The City of Riverside, which is the County seat, has an estimated population in 2006 of 311,575, with 15 percent of the County’s residents (Census).

Population Projections and Distribution

Riverside County is expected to double its population between the years 2000 to 2020, adding an additional 1.4 million people for an estimated population of 2.9 million people in 2020 (RCGP
2003). The county has seen large urban growth patterns and grew in total population by 31.2 percent between 2000 and 2006, while the State of California only grew by 7.6 percent during the same time period (Figure 4-50). The vast majority of the population within the county lives within urban areas and has seen a trend towards further urbanization. In 1990, 13.7 percent lived in rural areas, which was reduced to 6.9 percent in 2000 (Census). The same period showed a total rural population in 2000 decline by almost 54,000 people, 33.6 percent less than in 1990. The county has a population density of 214.4 people per square mile in 2006 that is skewed by the more dense urban cities in the west and vast open spaces in the central and east portions of the county. According to the Riverside County Center for Demographic Research, between 1991 and 2006 the county added an average of 26,000 people annually due to births while only losing 11,700 people per year in the same period. While the original growth of the county was attributed to agricultural opportunities, it currently sees growth due to commerce, construction, manufacturing, transportation, and tourism.

The median age in of the population in 2006 was 31.8 in Riverside County and 34.4 for California (Census) (Figure 4-51). The County has seen some shifts in the median age of the population, in 2000 it was 33.1, and in 1990 it was 31.5. The County had an almost even split in 2006 of 49.96 percent male and 50.04 percent female. The 2006 estimates for the County indicated that there were 643,239 households, with an average of 3.1 people per household.

**Education**

In 2006, 1,254,094 (62 percent) of Riverside County residents were over 25 years old, with 78.2 percent having graduated high school and 18.9 percent having a bachelor’s degree or higher. Nursery school, preschool, and kindergarten enrollment was at 55,221 individuals; elementary and high school enrollment was 381,333 individuals; and college or graduate school enrollment was 125,458 individuals.

**Citizenship and Birthplace**

The United States Census 2006 estimates for Riverside County show that 1,559,091 (76 percent) of the residents in the County were born within the United States and of the foreign-born population, 299,962 (64 percent) are not United States citizens. Of the foreign-born population in 2006, 372,319 (79 percent) entered the United States before 2000, and 348,103 (74 percent) are from Latin America, 75,754 (16.2 percent) from Asia, 27,811 (5.9 percent) from Europe, 10,409 (2.2 percent) from North America, 4,606 (1.0 percent) from Africa, and 1,029 (.2 percent) from Oceania.

**Language**

The spoken language at home in 2006 for residents over the age of 5 was 61.3 percent English-only, 38.7 percent was language other than English, and of the total, 18.3 percent of the residents spoke English less than “very well.” The predominant language spoken at home other than
English is Spanish, with 608,706 (32.4 percent) residents, and 299,108 (15.9 percent) of the residents speaking English less than “very well.”

4.12.1.2 Housing

Housing Characteristics

In 2006 the United States Census estimated Riverside County had a total of 732,433 housing units with 12.2 percent being vacant compared to 584,674 housing units with 13.4 percent being vacant in 2000. Of the total housing units 65.6 percent are classified as being 1-unit detached, 10.2 percent mobile homes, 6.4 percent 1-unit attached, and the rest 2 units or more. Heating for homes supplied by utility gas serviced 75.8 percent of the occupied units with 18.0 percent being served by electricity. Of the total housing inventory 20.7 percent had been built since 2000 and 39.3 percent since 1990. Of the households within the county, 65.1 percent have moved into the current residence since 2000 and 87.4 percent since 1990. Of the total occupied units 69.2 percent were owner-occupied with 30.8 percent renter-occupied. Of the occupied units, 4.4 percent had no vehicles available with 64.5 percent having access to 2 or more vehicles.

Housing Costs

The 2006 median owner-occupied unit value was $414,000, which is below the California median of $535,700 and above the national median value of $185,200. The median monthly gross rent for rental units within the county was $1,015, with the median monthly owner cost of a unit with a mortgage of $2,012 and without a mortgage of $421.

4.12.1.3 Economics/Employment

4.12.1.3.1 Labor Force

The Riverside County Economic Development Agency shows in September 2007 the civilian labor force was 924,700 residents with 864,700 employed and an unemployment rate of 6.5 percent. The employment data for January 2007 shows a civilian workforce of 904,500 residents with 855,800 employed and an unemployment rate of 5.4 percent. The County has seen an unemployment rate of between 5.0 and 6.7 percent from 1998 to 2007 with higher percentages of 7.2-12.2 percent between 1990 and 1997. The Riverside County Economic Development Agency states that the unemployment rate within Riverside County from 1990-2006 has been above the state and national averages. The County has seen positive job growth rate since 1990 and has been above the state average between 1991-2005 with the state losing jobs between 1991-1993 and 2002-2003 (RCCDR). The Riverside County Center for Demographic Research projects the County to more than double the number of jobs between 2005 and 2035 (Table 4-13, RCCDR).
4.12.1.3.2 Occupation and Type of Employer

The United States Census figures show that the top industries in Riverside County by percentage of workforce; 16.7 percent education, health and social services, 13.6 percent retail trade, 12.7 percent construction, 10.3 percent manufacturing, and 10.2 percent arts, entertainment, recreation, and food services (Table 4-14). The largest employer type within the county is the government sector including federal, state, local, public schools, and colleges and universities (RCCDR). The largest growth sectors between the years 1990-2005 have been in government, retail, and construction jobs (RCCDR). During the same period, agriculture experienced job losses.

Table 4-13. Projected Employment/Jobs in Riverside County

<table>
<thead>
<tr>
<th>Year</th>
<th>Employment/Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>650,319</td>
</tr>
<tr>
<td>2010</td>
<td>784,998</td>
</tr>
<tr>
<td>2015</td>
<td>911,381</td>
</tr>
<tr>
<td>2020</td>
<td>1,042,145</td>
</tr>
<tr>
<td>2025</td>
<td>1,168,769</td>
</tr>
<tr>
<td>2030</td>
<td>1,295,487</td>
</tr>
<tr>
<td>2035</td>
<td>1,413,522</td>
</tr>
</tbody>
</table>

Source: Riverside County Center for Demographic Research

Table 4-14. Occupations in Riverside County.

<table>
<thead>
<tr>
<th>Occupations (2006)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management, professional, and related</td>
<td>26.8 percent</td>
</tr>
<tr>
<td>Service</td>
<td>18.0 percent</td>
</tr>
<tr>
<td>Sales and office</td>
<td>27.4 percent</td>
</tr>
<tr>
<td>Farming, fishing and forestry</td>
<td>1.0 percent</td>
</tr>
<tr>
<td>Construction, extraction, maintenance and repair</td>
<td>13.7 percent</td>
</tr>
<tr>
<td>Production, transportation and material moving</td>
<td>13.1 percent</td>
</tr>
</tbody>
</table>

Source: Bureau of the Census (2006)
4.12.1.3.3 Household Income

The United States Census states the median household income in 2006 was $53,508 for Riverside County, which is 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 and was 73.6 percent of the California average. The United States Census shows in the percent of total people below the poverty level in 2006 was 12.2 percent, down from 14.2 percent in 2000 and up from 10.8 percent in 1990.

4.12.1.3.4 Travel to Work

The United States Census figures show that in 2006, 73.8 percent of Riverside County residents drove to work alone, 16.7 percent carpooled, 1.4 percent used public transportation, 1.9 percent walked, 1.5 percent used other means, and 4.6 percent worked at home. The mean travel time to work was 31.4 minutes.

4.12.1.3.5 County Sales Tax

The Riverside County Center for Demographic Research shows the taxable sales within the county were $28,256,491 in 2005, up from the 2001 total of $18,231,555. The tax rate for Riverside County including state, local, and district tax is 7.750 percent.

4.12.2 Potential Impacts

The Project is expected to have a positive long-term impact on the socioeconomic resources within the region. The project will contribute to the county tax base with property tax income. The project will provide many temporary construction jobs at the project site and along the transmission line as well as permanent jobs at the project site.

The project will have a temporary impact on local traffic especially during the construction phase while material and workers will need to be transported to the site. Most of the workforce will access the site from I-10 and the Kaiser Mine Road, both of which have adequate capacity to absorb the increase in traffic. The 1994 license application for the project showed 462 workers at the peak of the construction phase and would require approximately 24 people during the operating phase. The workforce is planned to locate within surrounding communities such as Blythe and the Coachella Valley and utilize existing housing stock. This temporary increase in population may reduce the vacancy rate for available housing during the construction phase of the project. The increase in workers and temporary construction workers will create a demand for secondary business needs for convenience and service uses within the surrounding areas. These needs typically fall under an employment multiplier of 1-1.5 jobs created in the retail service sector for each job created within the project. The County and local communities will see increased property tax revenues and sales taxes for materials purchased for the project.

It is anticipated that the project will create 6,000 GWh of power per year to help with peak energy usage and work as a “battery” for existing and proposed renewable power sources such as
nearby wind farms. This will provide a benefit to the local economy by increasing the productivity and efficiency of local wind farms by utilizing power from off-peak times to be stored for use when power demand is high.

### 4.12.3 Existing or Proposed Protection, Mitigation, or Enhancement Activities

No mitigation measures have been identified at this time.

### 4.13 Tribal Resources

The following section provides a general description of Indian tribes, tribal lands, and interests that may be affected by the proposed pumped storage project and associated transmission line.

#### 4.13.1 Data Studies or Summaries

Previous studies completed for the project area (Eagle Mountain Landfill Recycling Center EIS/EIR) concluded, after consultation with several Native American tribal representatives that no known special ancestral significance was associated with the Eagle Mountains. While this may be the case, consultation with Native Tribes noted above will occur as part of the licensing process.

The Agua Caliente Band of Cahuilla Indians and Morongo Band of Mission Indians have been contacted and have expressed interest in the consultation for cultural resources. Each Tribe has requested that the applicant coordinate studies and results with them.

#### 4.13.2 Description of Environment

While the proposed project will not directly affect Tribal reservation lands, the proposed project site and surrounding areas have been identified as having been associated with several Native American Tribes relative to tribal uses (Figure 4-48). These include:

- The Colorado River Indian Tribes
  - Chemehuevi
  - Hopi
  - Mohave
  - Navajo Indians
- The Agua Caliente Band of Cahuilla Indians
- The Cabazon Band of Mission Indians, and
- The Morongo Band of Mission Indians.
The Colorado River Indian Tribes reside on the Colorado River Indian Reservation, which spans the Colorado River and is located in the northeast corner of Riverside County, southeast corner of San Bernardino County, California, and in La Paz County, Arizona. The Mohave Indians have inhabited these tribal lands for centuries while the tribes of the Chemehuevi, Hopi, and Navajo Indians were relocated to the reservation in the 1940s.

4.13.3 Potential Impacts

Land disturbing activities can disturb Tribal cultural resources, or disrupt traditional cultural activities. The potential for impact to Tribal Resources will be further defined during the licensing process and Tribal consultation.

4.13.3 Existing or Proposed Protection, Mitigation, or Enhancement Activities

As part of the licensing process, the Applicant will continue to coordinate with the State Historic Preservation Office and Tribal Historic Preservation Officers in accordance with requirements of Section 106 of the National Historic Preservation Act. As details of the project, and particularly the final transmission alignment and site design, become available, the Applicant will define an area of potential effect (APE) in consultation with local tribes and Tribal Historic Preservation Officers.

Qualified cultural resource consultants will work to identify locations requiring additional surveys. Results of surveys will be documented and reviewed with agency and tribal representatives. A Cultural Resources Management Plan will be prepared for the project that will identify appropriate measures of protection for identified cultural resource sites, including management and protection of Native American values.
5 Preliminary Issues and Studies

5.1 Project Operations

5.1.1 Proposed Studies

The discussion on project operations provided in Section 3 is general and preliminary in nature. Further studies of the demand for peaking power and the markets for both pumping energy and on-peak generation will be conducted as part of the license application process. These studies may result in changes to the number and sizes of the pump-turbine units, the amount of energy storage, and the operating modes of the Project.

5.2 Geology and Soils

5.2.1 Preliminary Issues

During the life of the project, additional extraction of ore from the Central and East Pit would be precluded. In the future, in the event that iron ore increased in value to where it was more valuable than the electricity generated by the project, mining could resume at the project site.

Studies by GeoSyntec (1996) indicate that the natural groundwater flow is initially to the south from the area of the Central Pit. Those studies also indicated that because of fractures in the bedrock, seepage from the Central Pit (Upper Reservoir) will occur, particularly if the reservoir is unlined. Consequently, the proposed operations will artificially raise groundwater levels in this local area to some degree. In the case of consistently high reservoir levels and efficient interconnectivity of bedrock fractures to the south, there is a finite possibility that this groundwater could exit on the hillside south of the Upper Reservoir. If a landfill was constructed south (down-gradient) of the Upper Reservoir, this groundwater could potentially collect against the lining of the landfill. The potential and timing for groundwater to migrate to the southern slopes is dependant on the local hydraulic conductivity of the rock and project operations, including the levels, duration, and frequency of filling of the Upper Reservoir.

Project construction may result in increased soil erosion in areas where existing vegetation is removed.

5.2.2 Proposed Studies

The seismic analysis of the site, including calculations of peak ground acceleration (PGA), will be updated using applicable attenuation relationships introduced in 1997 and more recently. The updated evaluation of site seismicity will be performed during the license application process.
The potential for seepage from the Upper Reservoir to raise groundwater levels such that springs develop on the slopes to the south will require further investigation. The data existing from previous studies will be further evaluated and used in modeling to estimate the amount of seepage entering the bedrock around the reservoir and the ability for it to migrate to the south. The cyclic nature of the reservoir filling, the potential reduction in seepage due to reservoir lining, and the practical lifetime of the project will also be considered in modeling. If the analysis suggests the potential for the raised groundwater front to intersect the southern slopes, additional means to reduce migration of the water from the reservoir will be evaluated. These may include additional effort in construction of a reservoir lining to reduce seepage, patterned grouting around the reservoir to lower rock permeability, and/or changes in reservoir operations.

An erosion control plan will be prepared prior to commencement of ground disturbing activities.

5.3 Water Resources – Water Supply

5.3.1 Preliminary Issues

Using groundwater for both startup and makeup water will place the groundwater basin into overdraft for a period of about two years but the groundwater levels will not return to pre-project levels for 17 years. The groundwater basin can provide make-up water without placing the basin into overdraft. Although this impact may not be significant, an alternative would be to seek to purchase an alternative water supply for the startup water.

Cumulative impacts show if the project and proposed landfill to both be constructed and attempt to use groundwater, the perennial yield of the basin would be exceeded, and overdraft would occur.

5.3.2 Proposed Studies

To obtain an alternative short-term water source for the initial startup filling of the reservoir, a willing seller(s) and wheeler of water must be found. A key agency in transferring water to the project area is MWD. We have had preliminary discussions with MWD about the potential use of MWD facilities. MWD has indicated that it will be willing to negotiate an agreement to convey water for the project as long as it does not impact its water delivery operations. The work should include:

- Discuss the water transfer program with agencies involved to receive their comments,
- Find willing entities to purchase the water from for transfer,
- Conduct a detailed technical feasibility study of all options,
- Prepare cost estimate for the water supply options, and
- Formulate and negotiate an option to purchase the water prior to project construction.
The applicant intends to conduct a water source survey to determine how much land should be acquired with its groundwater rights to provide annual make-up water. In addition, well sites and locations will be identified. The well yield, efficiency, and water quality will be evaluated prior to purchase.

The applicant will reassess the amount of number of inmates and water being used by the Chuckwalla Valley State Prison. At the time of the estimates, the prison was at almost double its intended capacity and recent rulings mandate the state eliminate overcrowding. This may show both projects could rely on groundwater without creating detrimental effects.

5.4 Water Resources – Water Quality

The Army Corps of Engineers has expressed concerns that the project site may contain Waters of the United States. There are presently no perennial surface waters in the project area. However, if it is determined that there are Waters of the United States that would be effected by the project, it is possible that other use classifications may be applied to the project reservoirs, such as aquatic life, recreation, and wildlife. Addition of those uses would likely result in a more diverse list of water quality standards with more stringent limits than those that apply to domestic/industrial uses. The project proposes to limit use of the reservoir for recreation, aquatic life, and wildlife. Coordination with the Corps of Engineers will be undertaken to determine if Waters of the United States are present.

A determination of the project’s need to acquire Certification under section 401 of the Clean Water Act through the California State Water Resources Control Board will be required and application for certification would be made during the licensing process.

5.4.1 Proposed Studies

Additional testing should be conducted to better characterize the potential for metal contamination of project waters. Results from these tests would help determine if additional measures (i.e., lining of the pits and/or recovery wells) need to be taken to prevent leakage to groundwater.

Further development of the reverse osmosis facility will be conducted during the pre- and post-license period. The applicant will conduct studies to accomplish the following:

1. Confirm the RO design needed to treat the source groundwater. The applicant will complete a preliminary design to identify the technology and size of the facility to achieve the target water quality needed over the life of the project.

2. Study in detail site geology and the potentials for reservoir seepage leakage and design appropriate control and collection measures.

3. Study in detail evaporation potential, both on average and over extended drought conditions. The purpose will be to ensure proper sizing of the desalination facility.
4. Assess the site specific geology of the proposed location for the brine ponds and develop a design to prevent leakage into surface or groundwater environments.

5. Assess the potential for other options for managing the brine including commercial uses or alternate disposal methods.

5.5 Fish and Aquatic Resources

No studies are proposed for this issue area.

5.6 Wildlife and Botanical Resources

Once access to the project site is acquired, surveys will be conducted to:

- Identify special habitats, especially seeps and springs and other water sources (artificial and natural), that might be affected by the Project. For each seep or spring, estimate the condition and size, current use by fauna, potential Project impacts, and mitigation.

- Estimate any lowering of the groundwater as a result of the Project, particularly as it might affect local seeps and springs or other water sources.

- Conduct a detailed habitat analysis on the Project, especially in the area of the pipelines and in the central project area, where data are incomplete.

- Identify the exotic species issues on the Project

In addition, it will be necessary to:

- Identify new construction and operations details that may affect biological resources, including, but not limited to scheduling, work force, length of construction, and other Project details.

- Examine any relevant papers and reports and new information that has been unavailable to date.

5.7 Wetlands, Riparian, and Littoral Habitat

No issues or additional studies have been identified for this issue area at this time.

5.8 Rare, Threatened, and Endangered Species

5.8.1 Proposed Studies

Once access to the project site is acquired, the site and immediately surrounding area will be assessed to determine the presence of special-status species and potential impacts to individuals and populations both on the Project and in the affected surrounding area. This process will include:
- Reconnaissance surveys to determine the presence of habitat for each species and map the extent of that habitat
- Protocol-level surveys for those species for which survey protocols exist (e.g., desert tortoise, burrowing owls)
- Focused surveys in potential onsite habitat for other special-status species
- Focused surveys in areas adjacent to the Project for special-status species that might be affected by Project-associated activities (e.g., bats, nesting raptors)

In addition, it will be necessary to:

- Identify existing and potential threats to special-status species.
- Identify new construction and operations details that may affect biological resources, including, but not limited to scheduling, work force, length of construction, and other Project details.
- Examine any relevant papers and reports and new information that has been unavailable to date.

### 5.9 Recreation and Land Use

#### 5.9.1 Preliminary Issues

The nature of the proposed project and its setting as an inactive mine site is not very conducive to developed recreation activities. Recreation limited to overview locations and project/setting interpretation may be desirable, however, as well as controlled public access.

Transmission line routing currently is based on a preliminary investigation of the project site and current system studies. Refinements in routing and specific design treatment will likely be necessary in select locations.

#### 5.9.2 Proposed Studies

If it is determined through the public involvement process that a scenic overlook and interpretive signage are desired for the project, then a recreation plan, detailing facilities, locations, operation, and maintenance will be developed as part of the license application development.

Detailed final transmission line route selection, including tower locations and specific treatment of facilities, construction access, staging, and pull areas will be completed in consultation with local agencies.
5.10 Aesthetic Resources

5.10.1 Preliminary Issues

Elements of the proposed project, notably upper reservoir and transmission line components may be visible from various key observation points. A considerable amount of the proposed transmission line route has been studied previously as a result of visual resource studies conducted for other transmission line projects in the vicinity.

5.10.2 Proposed Studies

As part of the detailed licensing process, the Applicant will conduct a comprehensive visual resource survey in a cooperative effort with state and federal resource agencies, focusing on project components that have not undergone detailed visual resource investigations.

5.11 Cultural Resources

5.11.1 Preliminary Issues

A number of cultural resource investigations have been conducted in the vicinity of the project and the proposed transmission line route. Some of the studies well document cultural resource conditions while others appear to less systematic in their methods and results.

5.11.2 Proposed Studies

A more detailed cultural resource inventory of the project area and transmission route will need to be completed for conclusive evidence of historic and prehistoric cultural resources, particularly within unsurveyed sections of the proposed project and route.

Detailed cultural resource inventories of previously unsurveyed locations will be completed by a qualified cultural resource consultant.

A Cultural Resources Management Plan will be prepared for the project that will identify appropriate measures of protection for identified cultural resource sites.

5.12 Socio-Economic Resources

5.12.1 Preliminary Issues

The proposed project will have minimal effect on socioeconomic resources for the region as a whole. One aspect that will require closer scrutiny, however, will be the handling of the construction work force, particularly during the peak construction period, which may incur a workforce of close to 500 employees.
5.12.2 Proposed Studies

During the detailed licensing process, the feasibility of area communities to absorb the temporary construction workforce will be investigated including the resultant effects of the proposed plan for handling the work force.

5.13 Tribal Resources

5.13.1 Preliminary Issues

No Tribal lands will be directly impacted by the proposed project and transmission line. However, as Tribal influence or use areas can be far ranging, area Tribes will be consulted during the licensing process.

5.13.2 Proposed Studies

As part of the licensing process, the Applicant will continue to coordinate with the State Historic Preservation Office and Tribal Historic Preservation Officers in accordance with requirements of Section 106 of the National Historic Preservation Act. As details of the project, and particularly the final transmission alignment and site design, become available the Applicant will define an APE in consultation with local tribes and Tribal Historic Preservation Officers.

Qualified cultural resource consultants will work to identify locations requiring additional surveys. Results of surveys will be documented and reviewed with agency and tribal representatives. A Cultural Resources Management Plan will be prepared for the project that will identify appropriate measures of protection for identified cultural resource sites, including management and protection of Native American values.
6 Summary of Contacts

6.1 Contacts with Stakeholders

The Eagle Mountain Project developed an initial project mailing list based on the FERC initial consultation contact list for California and the mailing list for the Eagle Mountain Project #12509, both of which are available from FERC. The initial contact mailing list is in Table 6-1.

On September 17, 2007, the Eagle Mountain Project sent the following letter to each entity and person on the initial project mailing list:

September 17, 2007

To Whom It May Concern,

Eagle Crest Energy Company (ECE) holds a preliminary permit from the Federal Energy Regulatory Commission (FERC) to pursue development of the Eagle Mountain Pumped Storage Project (FERC Number 12509). ECE is moving forward with preparations for the FERC licensing process and ultimate Project development. The purpose of this letter is to initiate a dialogue with you or your organization with regard to this Project, and to solicit your assistance with gathering information on natural and cultural resources in the project area.

The project is the same hydroelectric pumped storage project for which the FERC previously granted ECE a preliminary permit, Project No. 11862 on June 15, 2001. ECE also submitted an original license application in 1994, as amended in 1998 and 1999. At that time the project was designated FERC Project No. 11080. A description of the project is attached.

In the coming six month period, ECE will initiate the formal FERC licensing process for the Project by preparing and filing a Notification of Intent and Pre-application Document (PAD). The contents of the PAD are specified by regulation (18 CFR 5.5 and 5.6). In general, the PAD contains these significant elements: a description of the project, a description of the existing environment (including geology and soils; water resources; fisheries (when applicable); botanical resources; wildlife resources; rare, threatened, and endangered species; recreation and land use; aesthetic resources; cultural resources; socio-economic resources; and Tribal resources), a preliminary list of issues and studies needed with respect to each resource, and a list of proposed protection, mitigation, and enhancement measures.
The purpose of the PAD is to provide the existing information relevant to the project proposal that is in the applicant’s possession, or that the applicant can obtain with the exercise of due diligence. This existing, relevant, and reasonably available information is distributed to the FERC and the agencies to enable them to identify issues and related information needs, develop study requests and study plans, and prepare documents analyzing any license application that may be filed. It is also a precursor to the environmental analysis section of the license application. The current schedule for finalizing the Pre-application Document is January 2008.

ECE is soliciting input from agencies and tribes on information to be included in the PAD. We are looking for data, reports, reviews, or analysis that cover any of the topics identified above for the geographic area of the Eagle Mountain Project. This information can be sent to ggillin@getconsultants.com, or by mail to this address, by October 26, 2007.

We may be following up with you by phone on this request in the near future so that we may answer your questions, and potentially schedule a meeting to discuss the project in further detail.

ECE plans to continue informal consultations with agencies and stakeholders throughout the coming months. In addition, there are opportunities for formal input later in the FERC licensing process.

Thank you for your attention to this request,

Sincerely yours,

GEI CONSULTANTS, INC.

Ginger G Gillin
Project Manager
Follow-up phone calls and meetings were held with representatives of the BLM, USFWS, the National Park Service, California Department of Fish and Game, the Agua Caliente Band of Cahuilla Indians, the City of Indio, Cathedral City, and Riverside County. In addition, we received comments from numerous other entities as displayed in Table 6-2.
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<td>Opti-solar is looking a T-line route to Julian Hines, then need upgrade of existing line from there</td>
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<tr>
<td>CA PUC</td>
<td>We should characterize what we are proposing as a Gen-Tie not a transmission line – since we are just trying to get the power to the grid. Probably not in PUC jurisdiction</td>
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<tr>
<td><strong>Land Use</strong></td>
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<tr>
<td>BLM</td>
<td>125,000 acres are under application for large scale solar facilities in Chuckwalla Valley/Blythe area. These projects are also in need of transmission and water.</td>
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<tr>
<td>BLM</td>
<td>Opti-solar – this solar plant will be 550 MW, adding 450 -500 MW later. EIS will start in next 60 days. Jack Piggett is contact.</td>
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<tr>
<td>BLM</td>
<td>Northeastern Colorado River Planning Area should be reviewed during preparation of the PAD.</td>
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<tr>
<td>BLM</td>
<td>Contact Tom Gey on realty issues</td>
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<tr>
<td>BLM</td>
<td>Project site is designated as an area of limited land use. Utility projects are allowed under this classification</td>
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</tr>
<tr>
<td>Agua Caliente Band</td>
<td>Planning and Development Office will handle conditional use permit for ROW for power lines. There is a Tribal environmental policy and a Public Utility Ordinance, which applies to all lands within reservation, including fee lands</td>
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<tr>
<td>Agua Caliente Band</td>
<td>BIA issues leases on allotted lands</td>
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<td>Agency/Person Commenting</td>
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</tbody>
</table>
| Cal Dept of Conservation, Office of Mine Reclamation | Surface mining is set up as a locally enforced reclamation plan. Riverside County is lead agency. We can also get files from Office of Mine Reclamation.  
Reclamation plan identifies the end use of the site as a landfill\(^3\). Riverside County will need to issue an amendment to the reclamation plan                                                                 |
| BLM                     | Paradise Valley is a new subdivision, 6 mi of housing, shops, schools, etc                                                                                                                                 |
| BLM                     | New wind energy proposal has been submitted on Eagle Mountain project site, on Kaiser lands to west of pumped storage                                                                                                                                           |
| Joshua Tree NP          | Concerns about use of the site for industrial purposes, balanced with need to conserve wilderness of park & preserving resource values for future generations                                                                                                           |
| BLM                     | Area land use designation was changed from “moderate” to “limited” due to desert tortoise concern                                                                                                         |
| Cathedral City          | Currently preparing a North City Specific Plan to guide development north of Route 10. Plans likely to be completed by Fall 2008.                                                                                |
| Indio                   | Currently has several subdivision plans in various stages that abut the existing transmission line corridor.                                                                                               |
| Riverside County        | Land Use Specific Plan - Approval process would include review with staff, plan commission approval, Brd of Supervisors approval. Need to certify an EIR, adopt plan amendment(s), changes in zoning, if needed, and an amendment to their General Plan. They amend the plan 4 times a year. |

**Visual**

<table>
<thead>
<tr>
<th>Agency/Person Commenting</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLM</td>
<td>T-lines need to be set back (\frac{3}{4}) mi from secondary roads and 1 mi from freeway due to visual constraints. Greg Hill is contact on visual</td>
</tr>
<tr>
<td>Joshua Tree NP</td>
<td>Light pollution from night lighting</td>
</tr>
</tbody>
</table>

\(^3\) Subsequent review of the mine reclamation plan indicates that the plan designated the end use of the site as open desert land.
<table>
<thead>
<tr>
<th>Agency/Person Commenting</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cultural Resources</strong></td>
<td></td>
</tr>
<tr>
<td>BLM</td>
<td>Serious problems with cultural resource inventories from landfill EIS. Anything not completely disturbed in project site will need inventory. Mine site will need survey for historic mine remnants</td>
</tr>
<tr>
<td>BLM</td>
<td>Desert SW cultural studies are current, quality is unknown. They also reviewed some routes from Blythe to Eagle Mtn – cultural and biological work done</td>
</tr>
<tr>
<td>BLM</td>
<td>DPV 2 cultural studies are adequate and recent. DPV 1 cultural studies well done even though they are old</td>
</tr>
<tr>
<td>BLM</td>
<td>In general, not much cultural resource work done north of Interstate 10</td>
</tr>
<tr>
<td>BLM</td>
<td>Historic resources at the Desert Training Center have been proposed for the National Register. The cultural work done for Marines (Desert Scimitar) not well done, do not use (it was east of our project area).</td>
</tr>
<tr>
<td>BLM</td>
<td>Archeological materials stored at the U. of Cal Riverside Eastern Information Center. Cal Dept of Parks and Rec website describes the process of accessing this data. Must have an archeologist on staff to look at materials, they need state permit and authorization from BLM.</td>
</tr>
<tr>
<td>Agua Caliente Band</td>
<td>Expecting gov’t to gov’t consultation. Would like to make a site visit</td>
</tr>
<tr>
<td>Agua Caliente Band</td>
<td>Cultural preservation issues along power line. There was a survey done along existing power line, but not sure how a wide a swath was covered</td>
</tr>
<tr>
<td>Agua Caliente Band</td>
<td>Traditional use areas, for hunting and gathering off-reservation. These areas overlap with other Tribes</td>
</tr>
<tr>
<td>Morongo Band</td>
<td>Tribe is culturally affiliated with project area, requests a copy of cultural resources report when it is ready</td>
</tr>
<tr>
<td><strong>Biology</strong></td>
<td></td>
</tr>
<tr>
<td>BLM</td>
<td>Coachella Valley Multi-species HCP still going through approval process for areas off of BLM lands. This does not cover the project site itself, but useful for areas west of project.</td>
</tr>
<tr>
<td>BLM</td>
<td>Bighorn sheep WHMA – described in NECO plan</td>
</tr>
<tr>
<td>BLM</td>
<td>Raven issue – ravens attracted to water, need raven monitoring and/or control</td>
</tr>
<tr>
<td>Agency/Person Commenting</td>
<td>Issue</td>
</tr>
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</tr>
<tr>
<td>USFWS</td>
<td>Need to address Coachella Valley Milk-vetch</td>
</tr>
<tr>
<td>BLM and Cal Fish &amp; Game</td>
<td>Undesirable to attract migrating birds if water quality is a problem. Selenium and arsenic of concern</td>
</tr>
<tr>
<td>USFWS</td>
<td>Night lighting attracts birds [and nocturnal predators], this is undesirable</td>
</tr>
<tr>
<td>BLM</td>
<td>T-line will need to be raven-proof</td>
</tr>
<tr>
<td>BLM</td>
<td>Tortoises will probably have to be fenced out and translocated</td>
</tr>
<tr>
<td>BLM</td>
<td>If water is contaminated, project will have to be fenced for bighorn</td>
</tr>
<tr>
<td>BLM</td>
<td>There is likely to be a per acre fee for habitat compensation for bighorn and desert tortoise; this will mostly apply to water pipelines and the transmission line, but may apply to the site also, depending on the current potential for use of the site.</td>
</tr>
<tr>
<td>Cal Fish &amp; Game</td>
<td>Consider impacts of O &amp; M as well as construction</td>
</tr>
</tbody>
</table>

**Recreation**

| BLM                      | There are some designated OHV routes, Marci Young in BLM has GIS layer for this                                                                                                                             |
| BLM                      | Power line roads can be a source of inappropriate OHV recreation                                                                                                                                            |
| BLM                      | Would not want to encourage recreation on the project site                                                                                                                                                  |
| Joshua Tree NP           | ORVs may access the park from the project area, this would be undesirable                                                                                                                                  |

**Geology**

| Joshua Tree NP           | Erosion control plan in the original license application was linked to erosion control plan for the landfill. Since the landfill might not be built, we need our own erosion control plan. |

**Water Resources**

| Cal Fish & Game          | Connection between springs & seeps in the desert and groundwater. Springs important for wildlife (a bio issue also). Even though there has been agriculture in the valley, which may have historically lowered the groundwater and affected springs, the current conditions will prevail when examining |
### Table 6-2 Comments Received from Stakeholders during Initial Public Contacts in October 2007

<table>
<thead>
<tr>
<th>Agency/Person Commenting</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>effects to wildlife.</td>
</tr>
<tr>
<td>Joshua Tree NP</td>
<td>Water withdrawals could effect groundwater levels in the Pinto Basin, within the Park</td>
</tr>
<tr>
<td>Cal Fish &amp; Game</td>
<td>Quagga mussels are in the CRA. Will have to consider that if we use the CRA as a water source</td>
</tr>
<tr>
<td>Bureau of Reclamation</td>
<td>Water pumped out of Chuckwalla Valley groundwater may be considered as part of California’s allocation of the Colorado River</td>
</tr>
<tr>
<td>Corps of Engineers</td>
<td>Project site may contain Waters of the US. More information needed</td>
</tr>
<tr>
<td>FEMA</td>
<td>Review flood insurance rate maps, build project within constraints of flood zone regulations</td>
</tr>
</tbody>
</table>

#### Permitting

<table>
<thead>
<tr>
<th>Agency/Person Commenting</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cal Fish &amp; Game</td>
<td>Who will be state lead agency for CEQA? Fish &amp; Game will be trustee agency, could be a responsible agency if permits needed. May need to submit an “initial study”</td>
</tr>
<tr>
<td>Cal Fish &amp; Game</td>
<td>Post-CEQA, will need a streambed alteration permit and a CESA permit</td>
</tr>
<tr>
<td>BLM</td>
<td>Cost recovery- project proponent has to reimburse BLM and USFWS for their time for project permitting reviews. Will need to set up 5101 cost recovery account. Will need an MOU, there will be no agency commitment to deadlines. Project proponent will pay for an independent consultant, agreed upon by project proponent and agency, if the agency is too undermanned to do permitting; the consultant will work for the agency.</td>
</tr>
</tbody>
</table>

### 6.2 Public Utility Regulatory Policies Act

The Eagle Mountain Project is not seeking benefits under Section 210 of the Public Utility Regulatory Policies Act of 1978 (PURPA).
7 References


California Natural Diversity Data Base. 2001. Data base records for the project area.


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Knecht, A. A. 1980. Soil Survey of Riverside County, California, Coachella Valley Area. USDA Soil Conservation Service with University of California, Agricultural Experiment Station. 89pp. [as referenced by EMEC, 1994].


Western Regional Climate Center, 2007. 2215 Raggio Parkway
Reno, NV 89512   http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?caea


8 Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AGFD</td>
<td>Arizona Game and Fish Department</td>
</tr>
<tr>
<td>APE</td>
<td>area of potential effect</td>
</tr>
<tr>
<td>BLM</td>
<td>United States Bureau of Land Management</td>
</tr>
<tr>
<td>BMP</td>
<td>best management practices</td>
</tr>
<tr>
<td>CDCA</td>
<td>California Desert Conservation Area</td>
</tr>
<tr>
<td>CDFG</td>
<td>California Department of Fish and Game</td>
</tr>
<tr>
<td>CDNPA</td>
<td>California Desert Native Plants Act</td>
</tr>
<tr>
<td>CEII</td>
<td>Critical Energy Infrastructure Information</td>
</tr>
<tr>
<td>CEQA</td>
<td>California Environmental Quality Act</td>
</tr>
<tr>
<td>CESA</td>
<td>California Endangered Species Act</td>
</tr>
<tr>
<td>cfs</td>
<td>cubic feet per second</td>
</tr>
<tr>
<td>CHU</td>
<td>critical habitat unit</td>
</tr>
<tr>
<td>CNPS</td>
<td>California Native Plant Society</td>
</tr>
<tr>
<td>Corps</td>
<td>United States Army Corps of Engineers</td>
</tr>
<tr>
<td>CRA</td>
<td>Colorado River Aqueduct</td>
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<tr>
<td>CRWQCB</td>
<td>California Regional Water Quality Control Board</td>
</tr>
<tr>
<td>CVAG</td>
<td>Coachella Valley Association of Governments</td>
</tr>
<tr>
<td>DSOD</td>
<td>California Division of Safety of Dams</td>
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<tr>
<td>DTC</td>
<td>Desert Training Center</td>
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<tr>
<td>DWMA</td>
<td>Desert Wildlife Management Areas</td>
</tr>
<tr>
<td>DWR</td>
<td>California Department of Water Resources</td>
</tr>
<tr>
<td>ECE</td>
<td>Eagle Crest Energy Company</td>
</tr>
<tr>
<td>El.</td>
<td>Elevation</td>
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<tr>
<td>FERC</td>
<td>Federal Energy Regulatory Commission</td>
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<tr>
<td>FESA</td>
<td>Federal Endangered Species Act</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>FOIA</td>
<td>Freedom of Information Act</td>
</tr>
<tr>
<td>GWh</td>
<td>gigawatt hour</td>
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<tr>
<td>I/O</td>
<td>Inlet/Outlet</td>
</tr>
<tr>
<td>ILP</td>
<td>Integrated Licensing Process</td>
</tr>
<tr>
<td>JOTR</td>
<td>Joshua Tree National Park</td>
</tr>
<tr>
<td>Kaiser</td>
<td>Kaiser Steel Corporation</td>
</tr>
<tr>
<td>MCE</td>
<td>maximum credible earthquake</td>
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<tr>
<td>MCL</td>
<td>maximum contaminant level</td>
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<tr>
<td>MGD</td>
<td>million gallons per day</td>
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<tr>
<td>msl</td>
<td>mean sea level</td>
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<td>MUC</td>
<td>multiple use class</td>
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<tr>
<td>MW</td>
<td>megawatt</td>
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<tr>
<td>MWD</td>
<td>Metropolitan Water District of Southern California</td>
</tr>
<tr>
<td>MWh</td>
<td>megawatt hour</td>
</tr>
<tr>
<td>NECO</td>
<td>Northern and Eastern Colorado Desert Coordinated Management</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
</tr>
<tr>
<td>NOI</td>
<td>Notice of Intent</td>
</tr>
<tr>
<td>NRCS</td>
<td>Natural Resources Conservation Service</td>
</tr>
<tr>
<td>OHV</td>
<td>off-highway vehicle</td>
</tr>
<tr>
<td>PAD</td>
<td>Pre-Application Document</td>
</tr>
<tr>
<td>PMF</td>
<td>probable maximum flood</td>
</tr>
<tr>
<td>PPM</td>
<td>parts per million</td>
</tr>
<tr>
<td>Project</td>
<td>Eagle Mountain Pumped Storage Project</td>
</tr>
<tr>
<td>PV-D</td>
<td>SCE Palo Verde-to-Devers</td>
</tr>
<tr>
<td>RCC</td>
<td>roller-compacted concrete</td>
</tr>
<tr>
<td>RO</td>
<td>reverse osmosis</td>
</tr>
<tr>
<td>SCE</td>
<td>Southern California Edison</td>
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©2008 Eagle Crest Energy
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>SMARA</td>
<td>California Surface Mining and Reclamation Act</td>
</tr>
<tr>
<td>SWRCB</td>
<td>State Water Resources Control Board</td>
</tr>
<tr>
<td>TBM</td>
<td>tunnel boring machine</td>
</tr>
<tr>
<td>TDS</td>
<td>total dissolved solids</td>
</tr>
<tr>
<td>TLP</td>
<td>Traditional Licensing Process</td>
</tr>
<tr>
<td>USFWS</td>
<td>United States Fish and Wildlife Service</td>
</tr>
<tr>
<td>WBWG</td>
<td>Western Bat Working Group</td>
</tr>
<tr>
<td>WHMA</td>
<td>Wildlife Habitat Management Area</td>
</tr>
<tr>
<td>WUS</td>
<td>Waters of the United States</td>
</tr>
<tr>
<td>ybp</td>
<td>years before present</td>
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