2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

The no-action alternative is license denial. Under the no-action alternative, the project would not be built, and the environmental resources in the project area would not be affected.

2.2 APPLICANT'S PROPOSAL

2.2.1 Project Facilities

The proposed pumped storage project would consist of an upper reservoir, upper water conveyance system, powerhouse, a lower reservoir, lower water conveyance system, transmission system, water supply system, water treatment system, and miscellaneous facilities. Figure 3 shows the project area and proposed layout.

The upper reservoir site would include: (1) a 191-acre reservoir (in the existing central mining pit) with a total storage capacity of 20,000 acre-feet and a useable storage of 17,700 acre-feet at an elevation of 2,485 feet; (2) one 1,300-foot-long, 120-foot-high saddle dam with a crest at elevation 2,490 feet on the south side of the reservoir and about 4,000 feet to the northwest, and another 1,100-foot-long, 60-foot-high saddle dam with a crest at elevation 2,490 feet on the western side of the reservoir; (3) a 100-foot-long spillway with a spillway crest at elevation 2,485 feet and a 100-foot-wide by 30-foot-long spillway stilling basin; (4) an upper reservoir spillway channel about 4,000 feet long; (5) a 14,000-foot-long section of Eagle Creek that would transport upper reservoir spillway flows to the lower reservoir; and (6) an upper reservoir inlet/outlet structure. The two saddle dams would be constructed of either roller-compacted-concrete, or a concrete faced with rock fill, although the final material would be selected during the final design process after onsite geology and soils testing has been performed.

The upper water conveyance system (figures 3 and 4) would include: (1) a 29-foot-diameter by 3,963-foot-long upper pressure tunnel; (2) a 33-foot-diameter by 1,348-foot-long vertical tunnel shaft; (3) a 90-foot-diameter by 165-foot-high underground surge tank attached to the vertical tunnel shaft; (4) a 29-foot-diameter by 1,560-foot-long lower tunnel; and (5) a manifold that transitions from the lower tunnel to four 15 foot-diameter by 500-foot-long penstock tunnels. The powerhouse facility would consist of: (1) a 72-foot-wide, 130-foot-high, and 360-foot-long underground powerhouse; (2) four reversible pump-turbine units rated at 325 MW each, for a total installed capacity of 1,300 MW; and (3) a separate 46-foot-wide, 40-foot-high, and a 431-foot-long transformer gallery.

The lower reservoir site would include: (1) a 163-acre reservoir (in the existing eastern mining pit) with a total storage capacity of 21,900 acre-feet and a useable storage of 17,700-acre-feet at elevation 1,092 feet; (2) a reservoir inlet/outlet structure; (3) a 15-foot-wide reservoir spillway with a spillway crest at elevation 1,094 feet; and (4) a

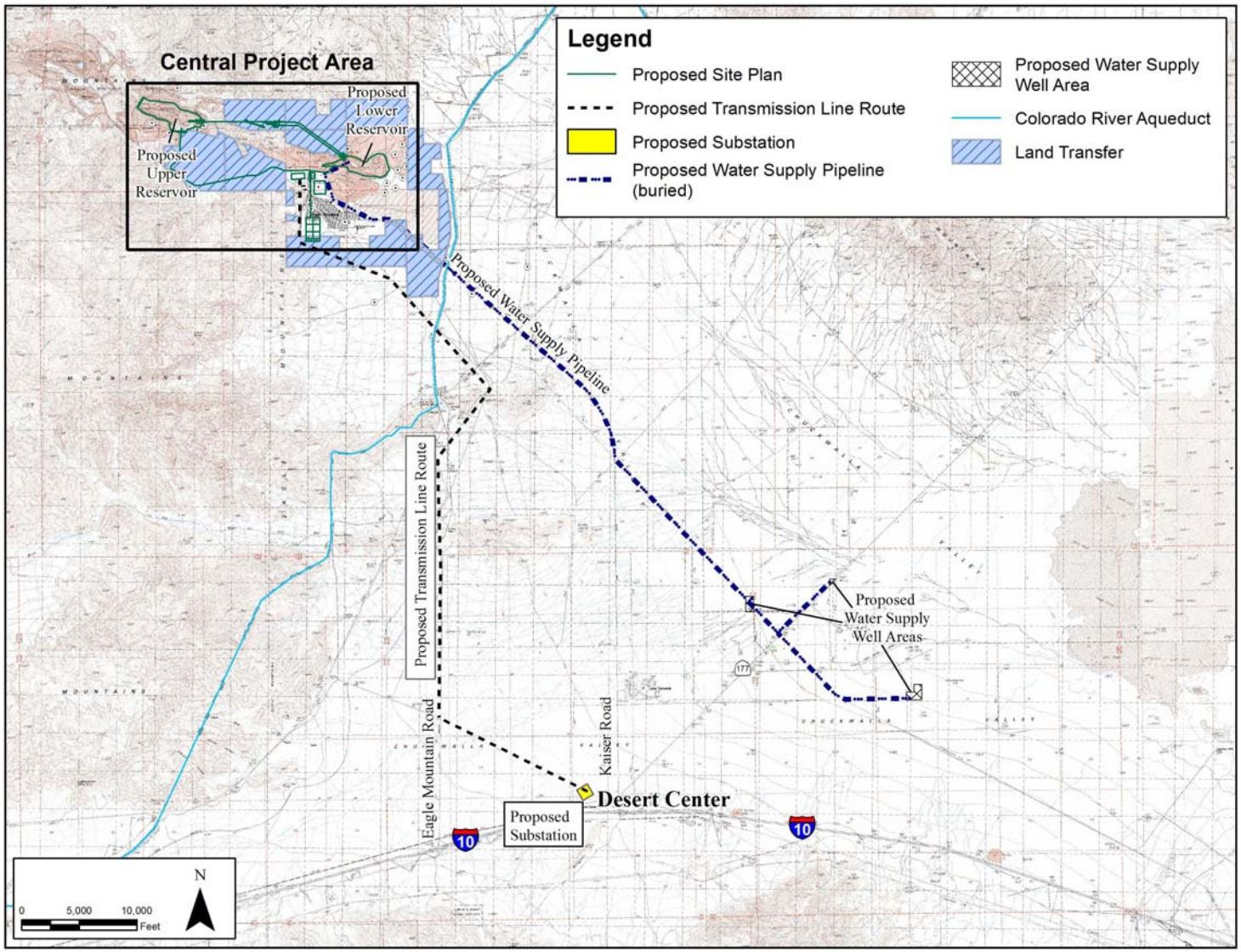

Figure 3. Proposed facilities and reservoirs and existing features of the Eagle Mountain Project (Source: Eagle Crest, 2009a, as modified by staff).

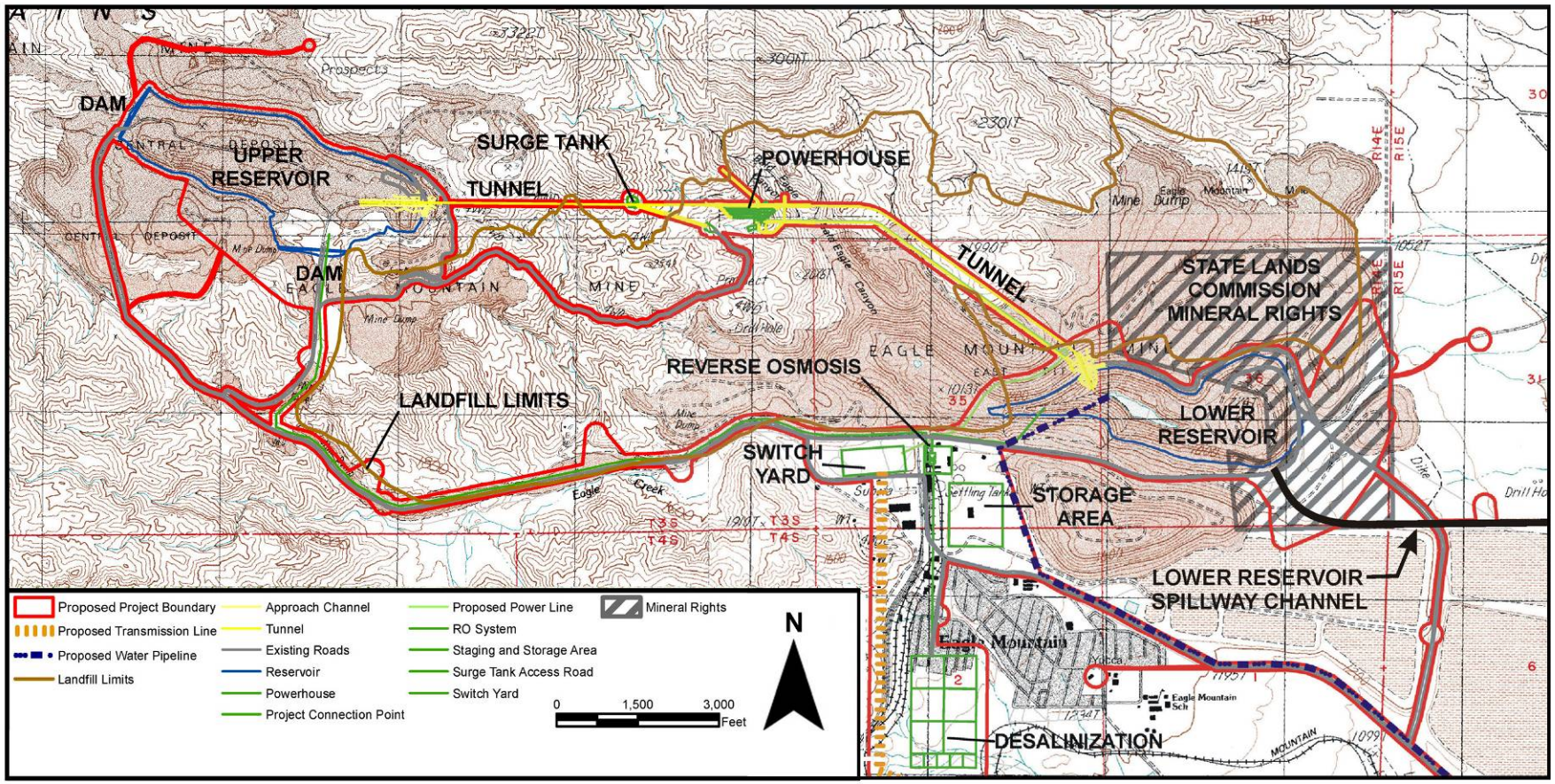

Figure 3. Proposed facilities and reservoirs and existing features of the Eagle Mountain Project (continued) (Source: Eagle Crest, 2009a, as modified by staff).

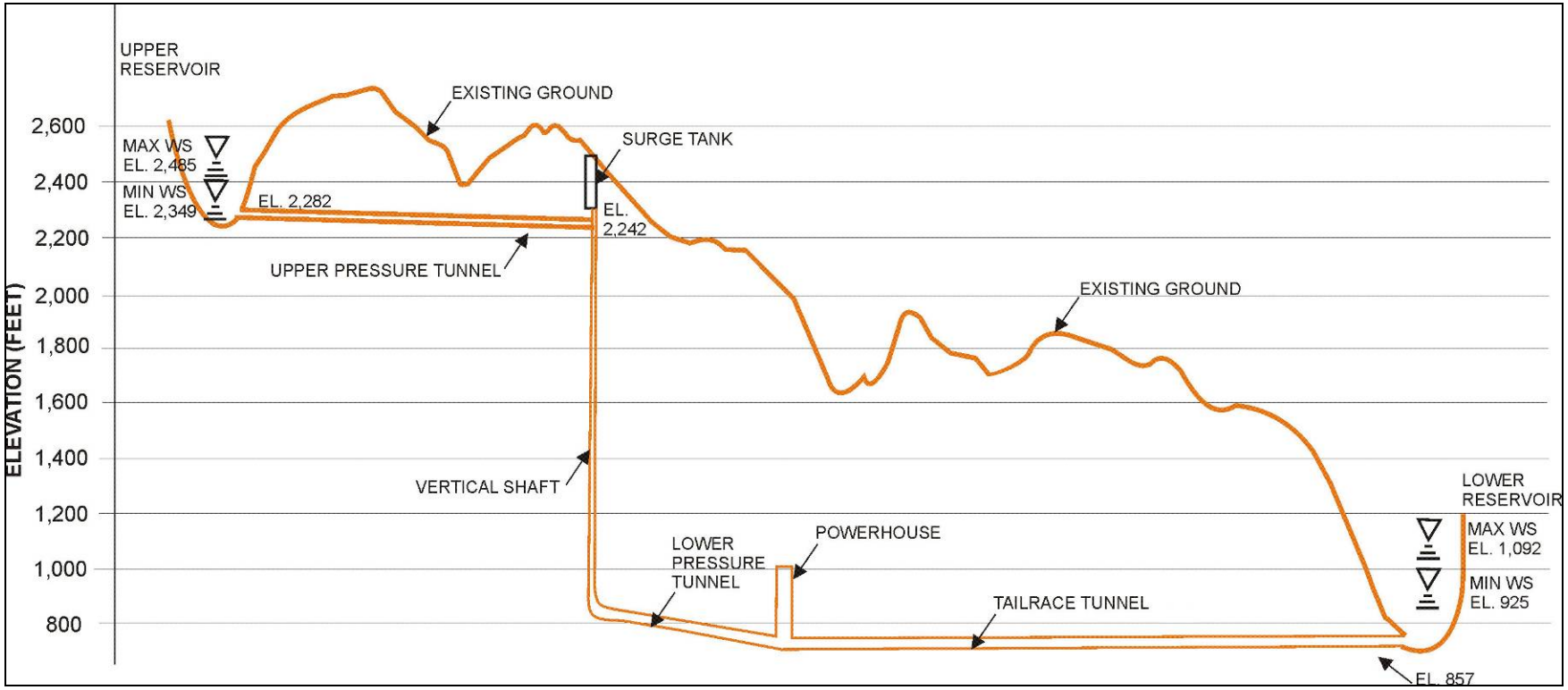

Figure 4. Profile of the proposed Eagle Mountain Pumped Storage Project underground facilities (Source: Eagle Crest, 2009a, as modified by staff).

reservoir spillway discharge channel extending 6,665 feet from the spillway to an alluvial fan in the Chuckwalla Valley.

The lower water conveyance system would include: (1) four 17-foot-diameter by 75-foot-long draft tube tunnels; (2) a manifold that transitions from the draft tube tunnels to the tailrace tunnel; and (3) a 33-foot-diameter by 6,835-foot-long tailrace tunnel.

The transmission system would include: (1) four 6,000-foot-long, 18-kV underground transmission cables that extend through the powerhouse access tunnel and a vertical transmission shaft to the ground surface and then 4,000 feet overhead to a switchyard; (3) a 500-foot-wide by 1,100-foot-long switchyard; (4) a 13.5-mile-long, double circuit 500-kV transmission line from the switchyard to a new interconnection collector substation; and (4) an interconnection collector substation located at the point of interconnection with SCE's planned Devers-Palo Verde No. 2 500-kV transmission line at Desert Center.

The water supply system would include: (1) three water supply wells with pumps; and (2) a underground water supply pipeline, ranging from 12- to 24-inches in diameter, totaling 15.3 miles, and extending from the wells to the lower reservoir.

The water treatment system would include: (1) a reverse osmosis system; (2) pipelines from the upper and lower reservoirs to the reverse osmosis facility; and (3) desalination facilities with piping from the reverse osmosis facilities.

The miscellaneous facilities would include: (1) a 28-foot-wide, 28-foot-high, by 6,625-foot-long access tunnel to the underground powerhouse (see figure 4); (2) about 6 miles of permanent construction and access roads; (3) staging, storage, and administration areas near the switchyard; and (4) appurtenant facilities.

2.2.2 Project Safety

As part of the licensing process, the Commission would review the adequacy of the proposed project facilities. Special articles would be included in any license issued, as appropriate. Commission staff would inspect the licensed project both during and after construction. Inspection during construction would concentrate on adherence to Commission-approved plans and specifications, special license articles relating to construction, and accepted engineering practices and procedures. Operational inspections would focus on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, any license issued would require an inspection and evaluation every 5 years by an independent consultant and submittal of the consultant's safety report for Commission review.

2.2.3 Project Operation

The proposed project, configured with the four reversible pump-turbine units and tunnels, would use off-peak energy to pump water from the lower reservoir to the upper

reservoir during periods of low electrical demand and generate peak energy by passing the water from the upper to the lower reservoir through the tunnels and generating units during periods of high electrical demand. The low demand periods are expected to be during weekday nights and throughout the weekend, and the high demand periods are expected to be in the daytime during week days, especially during the summer months. Eagle Crest hopes to use available power produced by existing and proposed wind and/or solar projects in the area to provide at least a portion of the pumping power to the project. The proposed project would also be able to provide ancillary services to the electric grid, including load following, system regulation through spinning and non-spinning reserve,[20] and immediately available standby generating capacity.

The proposed project would normally function as a closed system[21] once one reservoir is initially filled. The source of the water for initial filing and replacing water lost to evaporation is proposed to be from proposed groundwater wells located more than 10 miles away in the Chuckwalla Valley, which would be transported to the project via a buried pipeline. During normal operations, water would pass back and forth through the powerhouse between the two reservoirs. Emergency spillways at the reservoirs would be used only during very large and exceedingly rare rainfall events or during emergency circumstances.

The proposed energy storage volume would permit operation of the project at full capacity for up to 9 to 10 hours each weekday, with up to 12 to 14 hours of pumping each weekday night and additional pumping during the weekend to fully recharge the upper reservoir. The amount of daily fluctuation in the proposed upper and lower reservoir levels would be about 100 to 150 feet. The amount of active storage in the upper reservoir would be 17,700 acre-feet.

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[20] Spinning reserve is the online reserve capacity that is synchronized to the grid system and ready to meet electric demand within 10 minutes of a dispatch instruction by the California Independent System Operator (CAISO). Spinning Reserve is needed to maintain system frequency stability during emergency operating conditions and unforeseen load swings.

Non-spinning reserve is off-line generation capacity that can be ramped to capacity and synchronized to the grid within 10 minutes of a dispatch instruction by the CAISO and that is capable of maintaining that output for at least 2 hours. Non-spinning reserve is needed to maintain system frequency stability during emergency conditions.

[21] For the purposes of this project, the system is defined as closed because it would not have a surface water hydrological connection other than occasional stream flow from the ephemeral Eagle Creek.

2.2.4 Proposed Environmental Measures

Eagle Crest proposes the following mitigation, protection, and enhancement measures:

Geology and Soils

- Implement the Erosion and Sediment Control Plan filed July 7, 2010, that describes the erosion and sediment control practices to minimize soil erosion in construction areas and prevent sediment transport into stormwater discharges away from the construction site (Measure GEO-1).

Water Quality/Water Quantity

Measures for Drawdown Monitoring and Control

- Develop a groundwater level monitoring network (including existing and new monitoring wells [see figure 8]) to confirm that project pumping throughout the project operations would be maintained at levels that are in the range of historical pumping in the Chuckwalla Aquifer (Measure WS-1). Possibly extend monitoring from quarterly to bi-annually or annually, depending on findings and prepare annual reports for submittal to the Commission and State Water Board, confirming actual drawdown conditions (Measure WS-4).
- During the initial fill pumping period, monitor existing water supply wells on neighboring properties whose water production may be impaired by project groundwater pumping; if project pumping would adversely affect these wells, replace or lower the pumps, deepen the existing well, construct a new well, and/or compensate owner for increased pumping costs (Measure WS-3).

Measures for Seepage Monitoring and Control

- To confirm aquifer characteristics and adequate pumping rates in the reservoir seepage recovery wells, perform aquifer tests during final engineering design (prior to project operations) (Measure SR-1).
- To effectively control seepage from the upper reservoir, use a separate set of seepage recovery wells, employ a testing program for these seepage recovery wells and make drawdown observations in nearby observation wells to support final engineering design (Measure SR-2).
- Use the groundwater level monitoring network to confirm that seepage recovery well pumping would be effective at managing groundwater levels beneath the Colorado River Aqueduct and in the Eagle Creek Canyon portion of the proposed landfill and record groundwater levels, water quality, and production at the project seepage recovery wells (Measure SR-3).

- Maintain seepage from the upper reservoir at a groundwater level below the bottom of the elevation of the landfill liner and maintain seepage from the lower reservoir to prevent a significant rise in water levels beneath the Colorado River Aqueduct (Measure SR-4).
- Use the network of groundwater monitoring wells proposed under Measure WS-1 to monitor groundwater levels on a quarterly basis for the first 4 years of project pumping; extend monitoring from quarterly to bi-annually or annually, depending on findings (Measure SR-5). Unlike measure WS-4, this measure would focus on assessing seepage conditions in the vicinity of the proposed reservoirs, rather than drawdown conditions as a result of project pumping in the Desert Center area.
- Minimize drawdown in the vicinity of the Colorado River Aqueduct through management of reservoir seepage, pending the initial findings of measures SR-1 and SR-5, and as determined through consultation with the State Water Board (Measure SR-1A).

Measures for Water Quality Monitoring and Control

- Install and operate a reverse osmosis desalination facility and brine disposal ponds to remove salts and metals form reservoir water and maintain total dissolved solids concentrations at the level of the source water (Measure GQ-1).
- Monitor groundwater quality to assess and maintain groundwater effects at levels less than significant by sampling reservoirs, seepage recovery wells, and wells upgradient and downgradient of the reservoirs and brine disposal lagoon on a quarterly basis for the first 4 years (Measure GQ-2).

Other Water Resources Measures

- Replace four existing wells located within the site of the proposed reservoirs with wells located outside of the proposed reservoirs (Measure LF-1).
- Release excess water from the reservoirs during large rainfall events, such as the 100-year event and up to and including the probable maximum flood (PMF).
- Construct two extensometers—one in the upper Chuckwalla Valley near Observation Well 3 (OW-3) and the other in the Orocopia Valley near OW-15—to measure potential subsidence that could affect the operation of the Colorado River Aqueduct (Measure WS-2).

Terrestrial Resources

- Develop a comprehensive site-specific mitigation and monitoring program after consultation with BLM, FWS, California DFG (Measure BIO-1).
- Implement the WEAP filed October 27, 2009, to ensure that project construction and operation would be conducted within a framework of safeguarding environmentally sensitive resources (Measure BIO-3).
- File reports documenting project activities, mitigation implemented, and mitigation effectiveness and providing recommendations, as needed (Measure BIO-4).
- After consultation with BLM, FWS, and California DFG, prepare and file for Commission approval, a plan that details construction plans and limits of disturbance such that surface disturbance is restricted to the smallest area necessary to complete the construction; and new spur roads and improvements to existing roads are designed in a way that would preserve existing desert wash topography and flow patterns, and avoid disturbing or restricting flow to impoundments that could support Couch's spadefoot toad (Measures BIO-5 and BIO-10).
- Use pre-construction surveys to identify state special-status plant populations and species, and establish avoidance areas in construction zones for special plant resources. Where avoidance is not feasible, salvage and transplant any species that can be reasonably transplanted in an approved area (Measure BIO-6).
- For construction activities scheduled to occur between about February 15 and July 30 in vegetated habitat, survey all potential nesting sites for active bird nests. Active nests would be flagged and provided a buffer from construction activities (Measure BIO-11).
- Develop a plan to manage evaporation ponds to minimize their attractiveness and access to migratory birds and establish a monitoring program to identify bird usage of the evaporation ponds, effectiveness of bird deterrents, and water quality (Measure BIO-12).
- Conduct a pre-construction survey to further assess burrowing owl use of the project area and potential effects (Measure BIO-13). If burrowing owls are present, limit the construction to September 1 through February 1, to avoid disruption of breeding activities; avoid disruption of burrowing owl nesting activities; use a minimum of a 250-foot buffer to avoid active nests until fledging has occurred (Measure BIO-14).
- Determine through pre-construction surveys if construction activities would occur within 0.25 mile of active prairie falcon or golden eagle nests (Measure BIO-15).

- Conduct pre-construction surveys for all burrows that might host badger or kit fox, avoiding active burrows where possible, and mark the perimeters of all avoidance areas with 3-foot-high and no more than 10-foot-apart, wooden stakes. Where avoidance is infeasible, encourage occupants to leave their burrows (Measure BIO-16).
- Conduct pre-construction surveys to determine the existence, location, and condition of bat roosts and identify foraging habitat. Based on results of surveys, develop a mitigation plan to avoid roosting and foraging effects on resident bats, minimize disturbance, or, as an inescapable measure, evict bats (Measure BIO-17).
- Construct security fencing around project reservoirs, collection substation, and evaporation ponds to exclude larger terrestrial wildlife, including bighorn sheep, deer, coyotes, foxes, and badger, from entering project areas that pose hazards (Measure BIO-18).
- In areas without wildlife exclusion fencing or those areas that have not been cleared of tortoises, conduct construction activities only during daylight hours (Measure BIO-20).
- Close, temporarily fence, or cover pipeline trenches each day. Conduct inspections of any open trenches at first light, midday, and at the end of each day to ensure animal safety (Measure BIO-21).
- Design, install, and maintain facility lighting to prevent casting of light into adjacent native habitat (Measure BIO-22).
- Develop, after consultation with FWS, a transmission line design plan that considers adequate separation of energized conductors, ground wires, and other metal hardware, adequate insulation, and any other measures necessary to protect raptors from electrocution hazards and design and construct raptor-friendly transmission lines in strict accordance with the industry standard guidelines set forth in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006*, by Avian Power Line Interaction Committee, Edison Electric Institute, and Raptor Research Foundation.

Threatened and Endangered Species

- Implement the Desert Tortoise Clearance and Relocation/Translocation Plan, as filed on October 27, 2009, and modified by the Commission's Biological Assessment issued on April 21, 2011, to protect desert tortoise from potential effects related to construction activities.
- Following completion of final project design and interconnection plans, calculate projected-related effects on Category I and Category III desert tortoise habitat. Prepare and file for Commission approval a desert tortoise

habitat compensation plan that identifies acres of disturbance and acreage and location of proposed compensation lands.

- Implement the Predator Monitoring and Control Plan filed on March 11, 2011, and as modified by the Commission's Biological Assessment issued on April 21, 2011, to monitor for and control effects of increased predator activity on desert tortoise. The modified plan includes: (1) surveys for canine activity in the project area; (2) surveys for canine predation on desert tortoise; (3) a survey schedule that includes two annual pre-construction baseline surveys, two annual surveys during construction; and surveys in years 1–5, 7, and 10 to be commenced following the initiation of reservoir filling (4) agency consultation following surveys; (5) development of mitigation measures to be implemented if surveys indicate increases in desert tortoise predator activity and increases in desert tortoise predation; and (6) development of a survey schedule for the remainder of the license term if surveys indicate a need for mitigation measures.

Recreation Resources

- Coordinate construction schedules with BLM and provide posted notices of construction activity and any temporary road/access closure (Measure REC-1).

Land Use

- Provide construction access to and from the substation site from the Eagle Mountain Road exit and follow the Frontage Road east to the site (Measure LU-1).
- Two weeks prior to beginning construction, locally post notices stating hours of operation for construction near the Desert Center community and along State Route 177 (Measure LU-2).

Aesthetic Resources

- Incorporate directional lighting, light hoods, low pressure sodium bulbs or light-emitting diode (LED) lighting, and operational devices in final design to allow surface night-lighting in the central project area to be turned on as needed for safety. Also, a night sky monitoring plan during the post-licensing design period (to represent baseline conditions) and during construction and a trial operational period (Measure AES-1).
- Combine and organize staging areas and areas needed for equipment operation and material storage and assembly within construction lands to the extent feasible to minimize total footprint needed (Measure AES-2).
- For construction of the water pipeline, reduce, to the extent possible, side-cast soils to reduce color contrast with the surrounding landscape. Backfill the

pipeline disturbed zone and revegetate with native vegetation immediately following completion of pipeline construction (Measure AES-3).

- Employ visual mitigation in the design of the transmission line to minimize visual effects such as specifying materials with a dull finish and background appropriate colors (Measure AES-4).
- Use existing access roads and construction laydown areas to the extent feasible and revegetate with native vegetation (Measure AES-5).

Cultural Resources

- Implement the HPMP, filed March 4, 2011.

Air Quality

- Periodically water or apply suitable surfactant for short-term stabilization of disturbed surface areas and rock and soil storage piles (Measure AQ-1).
- Prevent project-related trackout onto paved surfaces by using a variety of construction management strategies (Measure AQ-2).
- Stabilize graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed by more than 30 days, except when precipitation dampens the disturbed surface (Measure AQ-3).
- Limit areas of active surface disturbance (such as grading) to no more than 15 acres per day (Measure AQ-4).
- Reduce non-essential earth-moving activities during windy conditions, and cease clearing, grading, earth-moving, or excavation activities if winds exceed 25 mph averaged over a 1-hour duration (Measure AQ-5).
- Promote ride sharing, shuttle transit and other measures for employees to reduce vehicle trips (Measure AQ-6).
- Strictly abide by the applicable state law requirements for diesel truck idling (Measure AQ-7).
- Use electrical drops in place of temporary electrical generators, and substitute low- and zero-emitting construction equipment and/or alternative fueled or catalyst-equipped diesel construction equipment wherever economically feasible (Measure AQ-8).
- Obtain proper South Coast Air Quality Management District (SCAQMD) permits for electrical generators (Measure AQ-9).
- Properly tune and maintain heavy-duty diesel trucks in accordance with manufacturers' specifications to ensure minimum emissions under normal operations (Measure AQ-10).

- Use 2002 model or newer construction equipment, where feasible (Measure AQ-11).
- Retrofit older off-road construction equipment with appropriate emission control devices prior to onsite use, where feasible (Measure AQ-12).
- After consultation with the Park Service, implement air quality monitoring for 2 years after initiation of project construction.

Noise

- Comply with the County of Riverside General Plan applicable noise ordinance codes during construction (Measure NOI-1).
- Equip construction machinery with properly operating and maintained noise mufflers and intake silencers (Measure NOI-2).

2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would include Eagle Crest's environmental measures and would be constructed and operated as proposed with our additional measures and modifications to proposed measures. Our modifications to proposed measures are shown below in italicized text:

Project Facilities

- Construct the project transmission line along the State Water Board's preferred alternative transmission line route. This route would diverge from the applicant's proposed route after crossing the Colorado River Aqueduct and would then parallel the existing 160-kV SCE transmission line for about 10.5 miles going southeast to a point just north of the proposed substation, then it would travel south about 2 miles to the State Water Board's preferred substation location, SCE's Red Bluff substation.

Geology and Soils

- Implement the Erosion and Sediment Control Plan filed July 7, 2010, that describes the erosion and sediment control practices to minimize soil erosion in construction areas and prevent sediment transport into stormwater discharges away from the construction site (Measure GEO-1).

Water Quality/Water Quantity

<u>Measures for Drawdown Monitoring and Control</u>

- Develop a groundwater level monitoring network (including existing and new monitoring wells [see figure 8]) to confirm that project pumping throughout the project operations would be maintained at levels that are in the range of

historical pumping in the Chuckwalla Aquifer (Measure WS-1). Possibly extend monitoring from quarterly to bi-annually or annually, depending on findings and prepare annual reports for submittal to the Commission and State Water Board, confirming actual drawdown conditions (Measure WS-4). *Include the adaptive management plan to reduce initial reservoir filling rates should it be found that drawdown exceeds the Maximum Allowable Changes thresholds in groundwater levels in select monitoring wells located throughout the groundwater basin. Additionally, as part of a comprehensive groundwater monitoring program, these measures should include the coordinated quarterly measurement and annual reporting of groundwater pumping production, water quality, and groundwater levels in the project water supply wells.*

- During the initial fill pumping period, monitor existing water supply wells on neighboring properties whose water production may be impaired by project groundwater pumping; if project pumping would adversely affect these wells, replace or lower the pumps, deepen the existing well, construct a new well, and/or compensate owner for increased pumping costs (Measure WS-3). *Continue monitoring beyond the initial fill period (estimated 4 to 7 years, as estimated by Eagle Crest); the length of additional monitoring should be determined through consultation with the State Water Board and filed for Commission approval.*

Measures for Seepage Monitoring and Control

- To confirm aquifer characteristics and adequate pumping rates in the reservoir seepage recovery wells, perform aquifer tests during final engineering design (prior to project operations) (Measure SR-1). *Include a performance pumping test of the final seepage recovery system (both lower and upper reservoir seepage recovery wells) prior to reservoir filling to ensure that hydraulic control of the local groundwater can be achieved. Submit the results of this test to the Commission and the State Water Board.*
- To effectively control seepage from the upper reservoir, use a separate set of seepage recovery wells, employ a testing program for these seepage recovery wells, and make drawdown observations in nearby observation wells to support final engineering design (Measure SR-2).
- Use the groundwater level monitoring network to confirm that seepage recovery well pumping would be effective at managing groundwater levels beneath the Colorado River Aqueduct and in the Eagle Creek Canyon portion of the proposed landfill, and record groundwater levels, water quality, and production at the project seepage recovery wells (Measure SR-3). *Manage artificially raised water levels to ensure that they are at least 5 feet below the bottom of the landfill liners.*

- Maintain seepage from the upper reservoir at a groundwater level below the bottom of the elevation of the landfill liner and maintain seepage from the lower reservoir to prevent a significant rise in water levels beneath the Colorado River Aqueduct (Measure SR-4). *Manage artificially raised water levels to ensure that they are at least 5 feet below the bottom of the landfill liners.*
- Use the network of groundwater monitoring wells proposed under Measure WS-1 to monitor groundwater levels on a quarterly basis for the first 4 years of project pumping; extend monitoring from quarterly to bi-annually or annually, depending on findings (Measure SR-5). Unlike measure WS-4, this measure would focus on assessing seepage conditions in the vicinity of the proposed reservoirs, rather than drawdown conditions as a result of project pumping in the Desert Center area.
- Minimize drawdown in the vicinity of the Colorado River Aqueduct through management of reservoir seepage, pending the initial findings of measures SR-1 and SR-5, and as determined through consultation with the State Water Board (Measure SR-1A).

Measures for Water Quality Monitoring and Control

- Install and operate a reverse osmosis desalination facility and brine disposal ponds to remove salts and metals form reservoir water and maintain total dissolved solids concentrations at the level of the source water (Measure GQ-1). *Implement as part of a comprehensive water level and water quality monitoring plan for the reservoirs, seepage wells, monitoring wells, brine ponds, and water supply wells and include steps to be taken in the event of water quality degradation.*
- Monitor groundwater quality to assess and maintain groundwater effects at levels less than significant by sampling reservoirs, seepage recovery wells, and wells upgradient and downgradient of the reservoirs and brine disposal lagoon on a quarterly basis for the first 4 years (Measure GQ-2). *Implement as part of a comprehensive water level and water quality monitoring plan for the reservoirs, seepage wells, monitoring wells, brine ponds, and water supply wells, and include steps to be taken in the event of water quality degradation.*

Other Water Resources Measures

- Replace four existing wells located within the site of the proposed reservoirs with wells located outside of the proposed reservoirs (Measure LF-1).
- Release excess water from the reservoirs during large rainfall events, such as the 100-year event and up to and including the PMF.

- Construct *and operate* two extensometers[22]—one in the upper Chuckwalla Valley near Observation Well 3 (OW-3) and the other in the Orocopia Valley near OW-15—to measure potential subsidence that could affect the operation of the Colorado River Aqueduct (Measure WS-2). *File a plan for Commission approval to reduce initial reservoir filling rates should it be found that subsidence exceeds the Maximum Allowable Changes threshold of 0.125 foot as measured by the extensometers.*
- During project construction, perform channel modifications and other measures, such as rip rap protection, to contain flows associated with the PMF to the Eagle Creek channel and direct these flows into the proposed lower reservoir and file a report with the Commission when measures are completed.
- Develop a reservoir-level monitoring plan to ensure that the water levels are managed properly within operational restraints to ensure protection of terrestrial resources and file for Commission approval.
- Develop a brine pond-level monitoring plan to ensure that the ponds are managed properly and help limit leakage through the lining of the ponds and file for Commission approval.
- Develop a comprehensive monitoring well placement plan including partially horizontal monitoring wells and monitoring program around the proposed brine and solidification ponds to allow for the earlier detection of leaks in the lining of the ponds and file for Commission approval.
- The applicant proposes groundwater monitoring under seven different measures—WS-1, WS-3, WS-4, GQ1, GQ-2, SR-3, and SR-5—that each have specific purposes. Coordinate the implementation of these separate measures as part of a comprehensive groundwater monitoring program to ensure that information collected as part of each measure is reported simultaneously for the purpose of better evaluating the project effects on the groundwater quality and levels in the Chuckwalla Aquifer. Use the comprehensive groundwater monitoring program results to develop a groundwater hydrologic budget and annually file the associated reports for review by the Commission along with any comments from the State Water Board.

Terrestrial Resources

- Develop a comprehensive site-specific mitigation and monitoring program after consultation with BLM, FWS, California DFG (Measure BIO-1) *to protect state sensitive, BLM sensitive, and federally listed plant and wildlife species and file for Commission approval*.

[22] An extensometer is a device that measures soil subsidence.

- Implement the WEAP filed October 27, 2009, to ensure that project construction and operation would be conducted within a framework of safeguarding environmentally sensitive resources (Measure BIO-3). *Include information on Coachella Valley milkvetch in the training program.*
- File *quarterly* reports with *BLM, FWS, California DFG, and the Commission*, documenting project activities, mitigation implemented, and mitigation effectiveness, and providing recommendations, as needed (Measure BIO-4).
- *Prior to construction in native habitats, conduct surveys for spadefoot toads in any areas of construction not previously surveyed. After consultation with BLM, FWS, and California DFG, prepare and file for Commission approval, a plan that details construction plans and limits of disturbance such that surface disturbance is restricted to the smallest area necessary to complete the construction*, *ensures* new spur roads and improvements to existing roads are designed in a way that would preserve existing desert wash topography and flow patterns, and avoid disturbing or restricting flow to impoundments that could support Couch's spadefoot toad. If avoidance is not possible, construct a new pool as close as is feasible to replicate and replace each lost pool. If new pools are created, move all larvae from the disturbed pool to the new pool (Measures BIO-5 and BIO-10).
- Use pre-construction surveys to identify state special-status *and federally listed* plant populations and species, and establish avoidance areas in construction zones for special plant resources. Where avoidance is not feasible, salvage and transplant any species that can be reasonably transplanted in an approved area (Measure BIO-6). *Include location of sensitive plant resources, construction avoidance areas, and transplant locations on any construction plans filed with the Commission. Submit the plans to BLM, FWS, and California DFG for review and comment and file the plans with the Commission for approval.*
- After consultation with BLM, FWS, and California DFG, submit a revised final version of the Revegetation Plan, filed October 27, 2009, to the Commission for approval prior to any ground-disturbing activities in native vegetation. The final plan would include total acres of proposed disturbance, as identified in the final construction plan; the stipulation that any hay, straw, or topsoil brought to the site be certified weed-free; and success criteria. The plan should also include provisions for monthly irrigation of transplants for a 2-year period.
- Modify the proposed Invasive Species Monitoring and Control Plan, filed October 27, 2009, and file for Commission approval, to include criteria for success and the development of environmental measures to be implemented if initial efforts do not prove successful. Include measures to mitigate for disturbance to soils that occur during project operation and maintenance, any

seepages areas, and any areas adjacent to project-related surfaces. Extend the monitoring period to 5 years for areas where disturbance or water additions are temporary, and annually in areas where disturbance or water additions occur during normal project operations.

- For construction activities scheduled to occur between about *January* 15 and July 30 in vegetated habitat, survey all potential nesting sites for active bird nests. Active nests would be flagged and provided a buffer from construction activities (Measure BIO-11). *After consultation with FWS and California DFG identify appropriate buffer distances for nesting migratory birds in the project area. Include evidence of consultation and final determination of buffer distances in a quarterly report submitted for Commission approval prior to any ground-disturbing activities.*
- Develop a plan to manage evaporation ponds to minimize their attractiveness and access to migratory birds and establish a monitoring program to identify bird usage of the evaporation ponds, effectiveness of bird deterrents, and water quality (Measure BIO-12). *Include in the plan provisions to: (1) minimize attractiveness and access to migratory birds; (2) establish a monitoring program to identify bird usage of the evaporation ponds, effectiveness of bird deterrents, and water quality; (3) develop measures for more intensive hazing measures and ultimately exclusionary pond covers, if warranted; (4) develop proposed hazing and habitat modification techniques; (5) develop methods for measuring success, and thresholds for implementing exclusionary pond covering, if needed; and (6) develop an emergency response plan to address a potential breach in the pond berms or liners. Prepare the plan in consultation with FWS, BLM, and California DFG and file for Commission approval*.
- Conduct a pre-construction survey to further assess burrowing owl use of the project area and potential effects. *Incorporate survey results and mitigation measures into the comprehensive mitigation and monitoring program* (Measure BIO-13). If burrowing owls are present, limit the construction to September 1 through February 1, to avoid disruption of breeding activities; avoid disruption of burrowing owl nesting activities; use a minimum of a 250-foot buffer to avoid active nests until fledging has occurred (Measure BIO-14). *Additionally, if burrowing owls are present, after consultation with FWS and California DFG, develop a burrowing owl relocation plan that includes construction of replacement burrows for any active burrows requiring collapse and file the plan for Commission approval. file for Commission approval.*
- Determine through pre-construction surveys if construction activities would occur within *1 mile* of active prairie falcon or golden eagle nests. *Provide survey results to FWS, BLM, and California DFG. Following consultation with the agencies, identify any necessary protection buffers, file them for*

Commission approval, and avoid construction activities in these areas during the nesting season (Measure BIO-15).

- Conduct pre-construction surveys for all burrows that might host badger or kit fox, avoiding active burrows, where possible, and mark the perimeters of all avoidance areas with 3-foot-high and no more than 10-foot-apart, wooden stakes. Where avoidance is infeasible, encourage occupants to leave their burrows (Measure BIO-16).
- Conduct pre-construction surveys to determine the existence, location, and condition of bat roosts and identify foraging habitat. Based on results of surveys, develop a mitigation plan to avoid roosting and foraging effects on resident bats, minimize disturbance, or, as an inescapable measure, evict bats (Measure BIO-17). *Prepare the bat mitigation plan after consultation with FWS and California DFG and file for Commission approval. The plan should include: (1) baseline surveys during summer and winter; (2) measures to protect onsite bat roosting habitat; (3) measures for onsite replacement of roosting habitat removed by project development; (4) annual summer and winter bat surveys in years 1–5, 7, and 10 following initiation of reservoir filling; (5) criteria for success, and (6) measures for additional construction and/or protection of bat habitat to be implemented if success criteria are not met.*
- Construct security fencing around project reservoirs, collection substation, and evaporation ponds to exclude larger terrestrial wildlife, including bighorn sheep, deer, coyotes, foxes, and badger, from entering project areas that pose hazards. *In addition, install a smooth metal, or similar barrier, along the bottom of the fence to prevent access to all terrestrial species. Monitor fences for digging activity and repair damaged fences sections within 24 hours. Monitor drinking areas to ensure desert bighorn sheep are using these areas. If such monitoring indicates desert bighorn sheep are not accessing these locations, Eagle Crest should consult with FWS, BLM, the Park Service, and California DFG to identify alternative measures that provide similar benefit to this species.* (Measure BIO-18).
- Remove woody riparian vegetation from around project reservoirs annually.
- In areas without wildlife exclusion fencing or those areas that have not been cleared of tortoises, conduct construction activities only during daylight hours (Measure BIO-20).
- Close, temporarily fence, or cover pipeline trenches each day. Conduct inspections of any open trenches at first light, midday, and at the end of each day to ensure animal safety (Measure BIO-21).
- Design, install, and maintain facility lighting to prevent casting of light into adjacent native habitat (Measure BIO-22).

- Develop, after consultation with FWS *and file for Commission approval,* a transmission line design plan that considers adequate separation of energized conductors, ground wires, and other metal hardware, adequate insulation, *a 1-mile buffer from golden eagle nests*, and any other measures necessary to protect raptors from electrocution hazards and design and construct raptor-friendly transmission lines in strict accordance with the industry standard guidelines set forth in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006, by Avian Power Line Interaction Committee, Edison Electric Institute, and Raptor Research Foundation. *The plan should also include measures for reducing potential for avian collision injuries, methods for surveying and reporting project-related avian mortality, provisions for a worker education plan pertaining to avian and power line interactions, and procedures for managing nesting on power line structures.*

Threatened and Endangered Species

- Implement the Desert Tortoise Clearance and Relocation/Translocation Plan, as filed on October 27, 2009, *and modified by the Commission's Biological Assessment issued on April 21, 2011*, to protect desert tortoise from potential effects related to construction activities.
- Following completion of final project design and interconnection plans, calculate projected-related effects on Category I and Category III desert tortoise habitat. Prepare and file for Commission approval a desert tortoise habitat compensation plan that identifies acres of disturbance and acreage and location of proposed compensation lands.
- Implement the Predator Monitoring and Control Plan filed on March 11, 2011, *and as modified by the Commission's Biological Assessment issued on April 21, 2011*, to monitor for and control effects of increased predator activity on desert tortoise.[23] *The modified plan includes: (1) surveys for canine activity in the project area; (2) surveys for canine predation on desert tortoise; (3) a survey schedule that includes two annual pre-construction baseline surveys, two annual surveys during construction; and surveys in years 1–5, 7, and 10 to be commenced following the initiation of reservoir filling (4) agency consultation following surveys; (5) development of mitigation measures to be implemented if surveys indicate increases in desert tortoise predator activity and increases in desert tortoise predation; and (6) development of a survey schedule for the remainder of the license term if surveys indicate a need for mitigation measures.*

[23] Implementation of the Raven Monitoring and Control Plan replaces Measure DT-5 as presented in the final license application.

Recreation Resources

- Coordinate construction schedules with BLM and provide posted notices of construction activity and any temporary road/access closure (Measure REC-1).

Land Use

- Provide construction access to and from the substation site from the Eagle Mountain Road exit and follow the Frontage Road east to the site (Measure LU-1).
- Two weeks prior to beginning construction, locally post notices stating hours of operation for construction near the Desert Center community and along State Route 177 (Measure LU-2).
- Consult with agencies and file for Commission approval truck trip plans and traffic controls related to the removal of salts from the proposed desalination facilities.
- Consult with resource agencies and file for Commission approval a construction plan for construction activities on or next to private properties. The plan should include measures to:
  - limit the hours during which noisier construction activities (such as drilling or boring) would occur within 250 feet of residences;
  - notify landowners prior to construction on their properties;
  - maintain access to the properties;
  - secure open ditches when there are no active construction activities taking place;
  - wait until the pipe is ready for installation before excavating the trench where residences would be within 25 feet of the construction right-of-way (ROW);
  - install safety fencing along the edge of the construction ROW that would extend at least 100 feet on either side of any residence;
  - preserve mature trees and landscaping where possible where they would not interfere with safe operation of equipment;
  - complete final grading and installation of permanent erosion controls;
  - restore all areas and landscaping within 10 days of backfilling the trench; and
  - discuss with landowners to locate the pipeline in the most desirable location for the landowner, to the extent possible.

- Develop and implement an environmental complaint resolution procedure for residents whose property would be affected by transmission line and water pipeline construction. The procedure would include simple, clear directions for identifying and resolving environmental mitigation problems/concerns during construction of the project and restoration of the ROW. Prior to construction, Eagle Crest would mail the complaint procedures to each landowner whose property would be crossed by the project. In its letter to affected landowners, Eagle Crest would:
  - provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;
  - instruct the landowners that if they are not satisfied with the response, they should call Eagle Crest's Hotlines; the letter should indicate how soon to expect a response;
  - instruct the landowners that if they are still not satisfied with the response from Eagle Crest's Hotlines, they should contact the Commission's Enforcement Hotline at (888) 889-8030, or at hotline@ferc.gov; and
  - prepare and file with the Commission a monthly status report that includes a table with the following information for each problem/concern: (i) the date of the call; (ii) the identification number from the certificated alignment sheets of the affected property and approximate location; (iii) the description of the problem/concern; and (iv) an explanation of how and when the problem was resolved will be resolved, or why it has not been resolved.

Aesthetic Resources

- Incorporate directional lighting, light hoods, low pressure sodium bulbs or LED lighting, and operational devices in final design to allow surface night-lighting in the central site to be turned on as needed for safety. Also, *develop, after consultation with the Park Service,* a night sky monitoring plan during the post-licensing design period (to represent baseline conditions) and during construction and a trial operational period (Measure AES-1). *File the plan for Commission approval.*
- Combine and organize staging areas and areas needed for equipment operation and material storage and assembly within construction lands to the extent feasible to minimize total footprint needed (Measure AES-2).
- For construction of the water pipeline, reduce, to the extent possible, side-cast soils to reduce color contrast with the surrounding landscape. Backfill the pipeline disturbed zone and revegetate with native vegetation immediately following completion of pipeline construction (Measure AES-3).

- Employ visual mitigation in the design of the transmission line to minimize visual effects such as specifying materials with a dull finish and background appropriate colors (Measure AES-4).
- Use existing access roads and construction laydown areas to the extent feasible and revegetate with native vegetation *within 3 months following completion of construction of the respective component* (Measure AES-5).

Cultural Resources

- Implement the HPMP, filed March 4, 2011.
- Implement the measures contained in section 3.3 of the HPMP, filed March 4, 2011, if Interior's preferred alternative transmission line route is selected for construction.

Air Quality

- Periodically water or apply suitable surfactant for short-term stabilization of disturbed surface areas and rock and soil storage piles (Measure AQ-1).
- Prevent project-related trackout onto paved surfaces by using a variety of construction management strategies (Measure AQ-2).
- Stabilize graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed by more than 30 days, except when precipitation dampens the disturbed surface (Measure AQ-3).
- Limit areas of active surface disturbance (such as grading) to no more than 15 acres per day (Measure AQ-4).
- Reduce non-essential earth-moving activities during windy conditions, and cease clearing, grading, earth-moving, or excavation activities if winds exceed 25 mph averaged over a 1-hour duration (Measure AQ-5).
- Promote ride sharing, shuttle transit and other measures for employees to reduce vehicle trips (Measure AQ-6).
- Use electrical drops in place of temporary electrical generators, and substitute low- and zero emitting construction equipment and/or alternative fueled or catalyst equipped diesel construction equipment wherever economically feasible *or if necessary to meet California Air Resources Board (CARB) or other applicable air quality standards* (Measure AQ-8).
- Properly tune and maintain heavy-duty diesel trucks in accordance with manufacturers' specifications to ensure minimum emissions under normal operations (Measure AQ-10).

- Use 2002 model or newer construction equipment, where feasible *or if necessary to meet CARB or other applicable air quality standards* (Measure AQ-11).
- Retrofit older off-road construction equipment with appropriate emission control devices prior to onsite use, where feasible *or if necessary to meet CARB or other applicable air quality standards* (Measure AQ-12).
- After consultation with the Park Service, implement air quality monitoring for 2 years after initiation of project construction *to ensure project meets CARB or other applicable or other applicable air quality standards.*

Noise

- Equip construction machinery with properly operating and maintained noise mufflers and intake silencers (Measure NOI-2).

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

2.4.1 Eagle Crest Energy Company

Eagle Crest chose the proposed project location based on several factors. The proximity of the two largely inactive mining pits would greatly decrease the cost of dam construction, and the elevation difference (about 1,500 feet) between the pits is essential for a pumped storage facility. Furthermore, the proposed project site is only about 13 miles from a major transmission line and is in proximity to existing and proposed renewable energy generation facilities and the Chuckwalla aquifer, the proposed source for water.

Before choosing its proposed reverse osmosis system, Eagle Crest considered several other water treatment alternatives, including thermal processes, conventional demineralization using IX resin, and electrical demineralization. These other measures were determined to be much more costly and impractical for the project.

Eagle Crest also considered several other transmission alignments, but they were determined to be impractical. These alternatives include the following:

- A connection at the Devers substation near Palm Springs that would require a route of 83 miles and was determined to be very expensive. This transmission alignment also would have had ROW issues and likely would have had substantial effects on the natural and human environment, including the Aqua Caliente Band of Cahuilla Indians.
- A connection to SCE's proposed midpoint substation with a route that would have been slightly longer than 50 miles and would have crossed both the Chuckwalla Valley dune thicket, an area of critical environmental concern and

also Interstate 10. The length of the route and issues associated with crossing these two areas made this route impractical.

- The addition of the proposed double circuit 500-kV line to the existing transmission towers owned by Metropolitan Water District was determined to be infeasible due to the size and weight of the proposed lines on the existing infrastructure.
- A location of a possible substation near the intersection of Eagle Mountain Road and Interstate 10 was determined to be infeasible due to cultural resources concerns and the location of an existing high pressure gas line.

Eagle Crest considered the possibility of using the Colorado River Aqueduct for its water supply, rather than the Chuckwalla aquifer. However, Eagle Crest determined that this option was infeasible because of the need to purchase replacement water (for the Colorado River Aqueduct water that Eagle Crest would use) from the San Joaquin Valley (which also supplies Los Angeles), so water from the heavily regulated and vital Colorado River Aqueduct could be used. This option would have been especially impracticable during drought years, and Metropolitan Water District stated that it would not agree to this proposal. Finally, quagga mussels are found in the Colorado River Aqueduct, and these organisms would be problematic for the proposed project.

2.4.2 Kaiser Eagle Mountain, LLC

In the comment letter filed on February 28, 2011, Kaiser Eagle Mountain, LLC, and Mine Reclamation, LLC, recommended investigation of the use of another largely inactive mining pit (Black Eagle mine) for the proposed project. Black Eagle mine, is located about 1.5 miles northwest of the proposed upper reservoir associated with the proposed Eagle Mountain Project. Based on our analysis, the potential use of Black Eagle mine as one of the project reservoirs is negated by a couple of key factors. First, the mining pit is at a lower elevation at roughly halfway between the elevations of the upper and lower mining pits proposed for use by Eagle Crest. The deepest point of the Black Eagle mining pit is about 1,640 feet above mean sea level, and our calculations indicate that the smaller elevation difference would decrease the generation capacity of the project from 1,300 MW to about 600 MW. Second, Black Eagle mine is located on the same side of the Eagle Mountains as is the majority of the Joshua Tree National Park and wilderness area (JTNP), including the highly visited locations of the park, and its location is much closer to the park's boundary; consequently, the effects of the proposed project with the Black Eagle mine as one of the reservoirs would be greater on the JTNP. Based on these key issues and since the Eagle Mountain mine area is already highly disturbed, we conclude that Kaiser's alternative location does not possess the combination of attributes needed for a successful pumped storage project and, therefore, we will not analyze it further.