# FINAL APPLICATION FOR LICENSE OF MAJOR UNCONSTRUCTED PROJECT

# EXHIBIT E ENVIRONMENTAL REPORT

**Section 2 – Hydrology and Water Quality**

# LAKE ELSINORE ADVANCED PUMPED STORAGE PROJECT FEDERAL ENERGY REGULATORY COMMISSION PROJECT NUMBER 14227

Applicant:

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# Exhibit E – Section 2

## Report on Water use and Quality

As required under 18 CFR 4.41(f)(2), the Applicant must discuss water quality and flows and contain baseline data sufficient to determine the normal and seasonal variability, the impacts expected during construction and operation, and any mitigative, enhancement, and protective measures proposed by the applicant. The report must be prepared in consultation with the State and Federal agencies with responsibility for management of water quality and quantity in the affected stream or other body of water. The report must include:

(i) A description of existing instream flow uses of streams in the project area that would be affected by construction and operation; estimated quantities of water discharged from the proposed project for power production; and any existing and proposed uses of project waters for irrigation, domestic water supply, industrial and other purposes;

(ii) A description of the seasonal variation of existing water quality for any stream, lake, or reservoir that would be affected by the proposed project, including (as appropriate) measurements of: significant ions, chlorophyll a, nutrients, specific conductance, pH, total dissolved solids, total alkalinity, total hardness, dissolved oxygen, bacteria, temperature, suspended sediments, turbidity and vertical illumination;

(iii) A description of any existing lake or reservoir and any of the proposed project reservoirs including surface area, volume, maximum depth, mean depth, flushing rate, shoreline length, substrate classification, and gradient for streams directly affected by the proposed project;

(iv) A quantification of the anticipated impacts of the proposed construction and operation of project facilities on water quality and downstream flows, such as temperature, turbidity and nutrients;

(v) A description of measures recommended by Federal and State agencies and the applicant for the purpose of protecting or improving water quality and stream flows during project construction and operation; an explanation of why the applicant has rejected any measures recommended by an agency; and a description of the applicant's alternative measures to protect or improve water quality stream flow;

(vi) A description of groundwater in the vicinity of the proposed project, including water table and artesian conditions, the hydraulic gradient, the degree to which groundwater and surface water are hydraulically connected, aquifers and their use as water supply, and the location of springs, wells, artesian flows and disappearing streams; a description of anticipated impacts on groundwater and measures proposed by the applicant and others for the mitigation of impacts on groundwater.

# 2.0. HYDROLOGY AND WATER QUALITY

In response to issues raised by resource agencies and others, the Applicant contacted Professor Michael Anderson of the University of California, Riverside and requested that he review and provide comments on this section of the Application.[1] Dr. Anderson noted that numerous studies have been conducted since the original total maximum daily load (TMDL) for Lake Elsinore was developed about 15 years ago (as described herein) as part of compliance and other efforts, and that a revision to the TMDL is presently underway by third parties

Dr. Anderson further advised that what has been brought into sharper focus recently is the tremendous range of lake level, salinity and impacts of droughts. As an example, please see his technical memo (Surface Elevation and Salinity in Lake Elsinore: 1916-2014) contained in Volume 11 of this Application which should be viewed as just as an example of recent work addressing longer-term variability in lake level and salinity. New insights have also been gained about the presence of toxin-forming algae in Lake Elsinore and concentrations of algal toxins that can approach advisory levels.

Dr. Anderson was not aware of new information about the upper watershed, San Juan and San Mateo Creeks, groundwater, etc. although deferred to others who may be more familiar with recent studies there.

However, and in general, he does not expect the potential impacts of the operation of the LEAPS generation facilities to be substantially different based upon work conducted since the original application to FERC was developed.

Finally, Dr. Anderson noted, as the Applicant is well aware, that the water budget/availability issue is arguably the most acute issue facing the Lake. Droughts can be more extensive than had been really appreciated, conservation has altered water use patterns, and recycled water is increasingly highly valued, so identifying a reliable source of water for Lake Elsinore during periods of drought and maintenance of stable operating conditions are critical for the success of the project.

As a result of Dr. Anderson's comments, the Applicant intends to:

1. Focus on developing and securing supplemental water to maintain lake levels and help assure water quality and recreation benefits for Lake Elsinore, and
2. Track progress on the ongoing efforts to update TMDL for the Lake and incorporate its findings into this analysis when it is released by third parties

## 2.1. Introduction to the Topic

The Project area contains several distinct regional physiographic features, including the eastern slopes of the Santa Ana and Elsinore Mountains, the Perris Uplands, and the Elsinore-Temecula Trough. The Project area consists of gently rolling hills at the lower elevations and steeper slopes

[1]/ Dr. Anderson is a Professor of environmental chemistry, specializing in applied limnology and lake/reservoir management, surface water quality and modeling, fate of contaminants in soils, sediments and waters and environmental chemistry. He is a noted authority on Lake Elsinore.

at upper elevations, ranging in elevation from 1200 to 3400-feet above msl. The proposed alignment of the primary transmission lines crosses the northeast-facing slopes of the Santa Ana Mountains. The proposed Santa Rosa Substation, LEAPS Powerhouse, and most of the northern primary transmission line occurs within the Elsinore-Temecula Trough, which runs along the northeast toe of the Santa Ana Mountains. Portions of the primary transmission lines also occur within the Perris upland area.

Climate in the Lake Elsinore area is semi-arid, with warm, dry summers and mild winters. Summer temperatures can exceed 100 degrees Fahrenheit but nights are generally cool. Annual precipitation averages 8-12 inches and annual evapotranspiration (ET) averages about 55 inches. A summary of monthly temperature and precipitation for the Lake Elsinore area, based on data spanning 57 years (1948-2005), is shown in Table E. 2-1: City of Lake Elsinore Climate Summary.

**Table E. 2-1: City of Lake Elsinore Climate Summary**
**Temperatures and Precipitation**

| Month | **Temperature** (°F) | | | **Precipitation** (inches) | | |
|---|---|---|---|---|---|---|
| | **Mean** | **Avg Max** | **Avg Min** | **Avg** | **Max** | **Min** |
| January | 51.0 | 65.3 | 36.8 | 2.68 | 13.94 | 0.00 |
| February | 53.4 | 67.7 | 39.0 | 2.46 | 11.94 | 0.00 |
| March | 56.3 | 71/1 | 41.5 | 1.79 | 0.83 | 0.00 |
| April | 60.7 | 76.4 | 44.8 | 0.67 | 4.27 | 0.00 |
| May | 66.2 | 82.0 | 50.3 | 0.18 | 2.02 | 0.00 |
| June | 72.7 | 90.5 | 54.7 | 0.02 | 0.32 | 0.00 |
| July | 78.9 | 98.0 | 59.7 | 0.07 | 1.67 | 0.00 |
| August | 79.5 | 98.4 | 60.7 | 0.10 | 3.13 | 0.00 |
| September | 75.2 | 93.6 | 56.9 | 0.24 | 4.26 | 0.00 |
| October | 66.8 | 83.9 | 49.7 | 0.42 | 7.66 | 0.00 |
| November | 57.3 | 73.1 | 41.6 | 1.07 | 7.33 | 0.00 |
| December | 51.4 | 66.3 | 36.4 | 1.65 | 8.67 | 0.00 |
| Annual | 64.1 | 80.5 | 47.7 | 11.35 | 23.02 | 2.71 |

Source: National Weather Service Cooperative Station 42805 – Elsinore, 1948-2005

## 2.2. Hydrology and Water Quality Regulatory Setting

The following general discussion is presented of certain Federal, State, and local statutes and regulations that may be most applicable to an understanding of the Project's regulatory setting.

- Federal Clean Water Act. The Federal Water Pollution Control Act of 1972 (33 U.S.C. 1251 et seq.), known as the Federal; Clean Water Act (CWA), established a national policy designed to "restore and maintain the chemical, physical and biological integrity of the Nation's waters." The CWA requires states to develop water quality standards consisting of a detailed description of the hydrologic descriptions of the waterbodies, the beneficial uses which apply to each waterbody, and the water quality criteria (objectives) which will protect those uses. As specified, "[e]ach state must specify appropriate water uses to be achieved and protected. The classification of the waters of the state must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish, and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation (40 CFR 131.11[a]).

The CWA requires states to adopt (and the USEPA to approve) water quality standards for water bodies.[1] Water quality standards consist of designated beneficial uses for a particular water body, along with water quality criteria necessary to support those uses. Water quality criteria are prescribed concentrations or levels of constituents or narrative statements that represent the quality of water that supports a particular use. Because California has not established a complete list of acceptable water quality criteria, the USEPA established numeric water quality criteria for certain toxic constituents in the form of the California Toxics Rule (CTR) (40 CFR 131.38). Water bodies not meeting water quality standards are deemed "impaired" and, under Section 303(d) of the CWA, are placed on a list of impaired waters for which a TMDL must be developed for the impairing pollutant(s). A TMDL is an estimate of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a "factor of safety" included). Once established, the TMDL is allocated among current and future pollutant sources to the water body. TMDL is a number that represents the assimilative capacity of water for a particular pollutant or the amount of a particular pollutant that water can receive without impact to its beneficial uses.

The CWA effectively prohibits discharges of storm water from most construction sites unless the discharge is in compliance with a NPDES permit. The SWRCB is the permitting authority in California and has adopted a "General Permit for Stormwater Discharges Associated with Construction Activities" (General Permit)[2] governing storm water and authorized non-storm water flows from all construction sites one acre and larger throughout California. The General Permit requires construction-site operators to develop and implement a storm water pollution prevention plan (SWPPP) and an associated monitoring program and, for projects discharging directly into waters impaired due to sedimentation or involving potential discharge of non-visible contaminants that may exceed water quality objectives, a storm water sampling and analysis strategy (SWSAS) to meet CWA technology standards and to prevent construction sites from contributing to excursions of water quality standards.

- National Flood Insurance Reform Act. The Federal Emergency Management Agency (FEMA), a part of the Department of Homeland Security, prepares flood insurance rate maps (FIRM)

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[1]/ In California, the USEPA has delegated responsibility for implementation of portions of the CWA to the State Water Resources Control Board (SWRCB) and its nine regional water quality control boards. The Regional Water Quality Control Board, Santa Ana Region (SARWCB) and the California Regional Water Quality Control Board, San Diego Region (SDRWQCB) are the local boards with jurisdiction over the Project sites.

[2]/ State Water Resources Control Board, National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity, SWRCB Order No. 99-08-DWQ, NPDES No. CAS000002.

in order to identify those areas that are located within the 100-year floodplain boundary,[3] termed "Special Flood Hazard Areas" (SFHAs). A 100-year flood does not refer to a flood that occurs once every 100 years but refers to a flood level with a one percent chance of being equaled or exceeded in any given year.[4] The SFHAs are subdivided into insurance risk rate zones. Areas between the 100 and 500-year flood boundaries are termed "moderate flood hazard areas." Areas located outside the 500-year flood boundary, are termed "minimal flood hazard areas."

- Executive Order 11988 – Floodplain Management. Executive Order (EO) 11988 directs all Federal agencies to seek to avoid, to the extent practicable and feasible, all short- and long-term adverse impacts associated with floodplain modifications and to avoid direct and indirect support of development within 100-year floodplains whenever there is a reasonable alternative available.
- Cobey-Alquist Flood Plain Management Act. The Cobey-Alquist Flood Plain Management Act, codified in Sections 8400-8415 of the CWC, states that a large portion of land resources of the State are subject to recurrent flooding. The public interest necessitates sound development of land use, as land is a limited, valuable, and irreplaceable resource, and the floodplains of the State are a land resource to be developed in a manner that, in conjunction with economically justified structural measures for flood control, will result in prevention of loss of life and of economic loss caused by excessive flooding.

  The primary responsibility for planning, adoption, and enforcement of land-use regulations to accomplish floodplain management rests with local levels of government. It is the State's policy to encourage local government to plan land-use regulations to accomplish floodplain management and to provide State assistance and guidance.
- California Water Code. The Porter-Cologne Water Quality Control Act (Division 1, Chapter 2, Article 3, Section 13000 et seq., CWC) (Porter-Cologne) constitutes a comprehensive plan for protecting the quality and maximizing the beneficial use of the State's waters.

  As specified therein, the State "Legislature finds and declares that. . . the quality of all the waters of the State shall be protected for use and enjoyment by the people of the state... activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable."[5] Under Porter-Cologne, the State's RWQCBs were required to: (1) formulate and adopt water quality control plans

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[3]/ As defined in the Standard Flood Insurance Policy (SFIP), "flood" is defined as "[a] general and temporary condition of partial or complete inundation of normally dry land areas from overflow of inland or tidal waters or from the unusual and rapid accumulation or runoff of surface waters from any source."

[4]/ Modern hydrologists define floods in terms of probability, as expressed in percentage rather than in terms of return period (recurrence interval). Return period (the N-year flood) and probability (p) are reciprocals, that is, p = 1/N. A flood having a 50-year return frequency ($Q_{50}$) is commonly expressed as a flood with the probability of recurrence of 0.02 (2 percent chance of being exceeded) in any given year.

[5]/ Section 13000, California Water Code.

for all areas within the region[6]; (2) establish water quality objectives that "will ensure the reasonable protection of beneficial uses"[7] of State's waters; and (3) prescribe waste discharge requirements governing discharges to land and waters within the regions. Porter-Cologne establishes the principal California program for water quality control. Under Porter-Cologne, the SWRCB is mandated to implement the provisions of the CWA, which delegation is authorized by that Federal act.

To implement and enforce the provisions of Porter-Cologne and the CWA, Porter-Cologne divides the State into nine regional boards that, under the guidance and review of the SWRCB, implement and enforce the provisions of both the State and Federal statutes. The Project is located within Region 8 (Santa Ana) and Region 9 (San Diego) and falls under the jurisdiction of the SARWQCB and SDRWQCB.

As further indicated in the CWC, Section 100 declares that it is policy of the State that "the water resources of the state be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such water is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare." Under Section 13000, the Legislature declared that the people of the State have a primary interest in the conservation, control, and utilization of the water resources, and that the "quality of all the waters of the State shall be protected for use and enjoyment by the people of the state. The Legislature further finds and declares that activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible."

As specified in Section 13751, every person who digs, bores, or drills a water well, cathodic protection well, ground water monitoring well, or geothermal heat exchange well, abandons or destroys such a well, or deepens or reperforates such a well shall file with the California Department of Water Resources (Department) a report of completion within sixty days from the date that construction, alteration, abandonment, or destruction is complete. Section 13800.5(a)(1) further specifies that the Department shall develop recommended standards for construction, maintenance, abandonment, or destruction. Those standards are contained in the Department's "California Well Standards, Bulletin 74-90 (Supplement to Bulletin 74-81)."

- California Code of Regulations. The California Department of Health Services (DHS) is responsible for establishing uniform Statewide reclamation criteria to ensure that the use of recycled water is not detrimental to public health and protects beneficial uses. The existing DHS criteria include treatment requirements for recycled water used to create or augment recreational impoundments. In Title 22, Division 4, Chapter 3 (Water Recycling

[6]/ Section 13240, California Water Code.

[7]/ Section 13241, California Water Code.

Criteria), the DHS sets forth water quality criteria, treatment process requirements, and treatment reliability criteria for reclamation operations. Section 60305 specifies that recycled water used as a source supply for non-restricted recreational impoundment shall be disinfected tertiary recycled water subjected to conventional treatment. Disinfected tertiary recycled water that has not received conventional treatment may be used for non-restricted recreational impoundment provided that the recycled water is monitored for the presence of pathogenic organisms in accordance with certain conditions. The degree of treatment specified represents an approximately 5-log reduction in the virus content of the water. The DHS has determined that this degree of virus removal is necessary to protect the health of people using the impoundments for water contact recreation. The DHS has developed wastewater disinfection guidelines[8] for discharges of wastewater to surface waters where water contact recreation (REC1) is a beneficial use. The guidelines recommend the same treatment requirements for wastewater discharges to REC1 waters as those stipulated in Title 22 for supply of recycled water to non-restricted recreational impoundments.

Pursuant to Section 8589.5 of the CGC, inundation maps showing the areas of potential flooding in the event of sudden or total failure of any dam, the partial or total failure of which the Office of Emergency Services (OES) determines, after consultation with the California Department of Water Resources, would result in death or personal injury, shall be prepared and submitted to the OES. Sections 2575-2578.3 in Title 19 (Dam Inundation Mapping Procedures) establish State regulations in compliance therewith.

- California Fish and Game Code. The CF&GC contain several provisions that regulate nonpoint source discharges. As specified under Section 5650 of the CFGC, except as authorized by a State or Federal permit, “it is unlawful to deposit in, permit to pass into, or place where it can pass into the waters of this State” any “petroleum or residuary product of petroleum, or carbonaceous material or substance,” any “sawdust, shavings, slabs, edgings,” and any “substance or material deleterious to fish, plant life, or bird life.”
- California Antidegradation Policy. California’s Antidegradation Policy, formally known as the Statement of Policy with Respect to Maintaining High Quality Waters in California (SWRCB Resolution No. 68-16), restricts degradation of surface and ground waters. In particular, this policy protects waterbodies where existing quality is higher than necessary for the protection of beneficial uses. Under the Antidegradation Policy, any actions that can adversely affect water quality in all surface and groundwaters must: (1) be consistent with maximum benefit to the people of the State; (2) not unreasonably affect present and anticipated beneficial use of the water; and (3) not result in water quality less than that prescribed in water quality plans and policies. Any actions that can adversely affect surface waters are also subject to the Federal Antidegradation Policy (40 CFR 131.12) developed under the CWA.

[8]/ California Department of Health Services, Wastewater Disinfection for Health Protection, 1987.

## 2.3. Surface Water

The proposed alignment of the primary transmission lines crosses over an estimated 60 USGS-depicted blue-line (jurisdictional) drainages. Most of these drainages are considered ephemeral. The route of the northern primary line crosses Temescal Wash in the vicinity of the I-15 Freeway and Indian Truck Trail. This watercourse contains consistent flowing water during the winter and spring seasons. In addition, the proposed southern primary transmission alignment crosses Los Alamos Creek, a tributary of San Mateo Creek. Los Alamos Creek has consistent flowing water during the winter and spring seasons but flows are intermittent during the summer months depending on the amount of rainfall received in the area.

With respect to surface water hydrology, the environmental setting is further described below.

### 2.3.1. Lake Elsinore

Lake Elsinore is a natural lake and is about 5 miles long and 2 miles wide. The primary source of water to the lake is the San Jacinto River with a drainage area of about 723 square miles, which is the largest part of the 782 square mile drainage area to Lake Elsinore. The remaining watershed consists of smaller tributaries which flow directly into Lake Elsinore and direct rainfall on the lake surface. Canyon Lake (Railroad Canyon Reservoir), which has a storage capacity of about 12,000 acre-feet (AF) and a surface area of 525 acres is located along the San Jacinto River, about 3 miles upstream from Lake Elsinore. The Elsinore Valley Municipal Water District (EVMWD) operates the reservoir for water supply and storage of water purchased from the Colorado River. Spill from the Canyon Lake Dam into Temescal Creek is relatively rare due to the EVMWD's withdrawals and small inflow values. Spill events typically occur only during high runoff from winter storm events in extremely wet years.

Table E. 2-2: Daily Discharge Statistics for San Jacinto River provides flow data for USGS Gage No. 11070500 located about 2 miles downstream from the Canyon Lake Dam. Natural inflow to Lake Elsinore average 14,788 acre-feet per year (AFY).

**Table E. 2-2: Daily Discharge Statistics for San Jacinto River At Elsinore, California USGS Gage No. 11070500**
(Water Years 1975 to 2016) (cfs)

| Month | Mean | Maximum | Minimum | P10 | P90 |
|---|---|---|---|---|---|
| Annual | 20.40 | - | 8,080.00 | | |
| January | 43.71 | 0.15 | 4,490.00 | 0.56 | 36.74 |
| February | 101.10 | 0.17 | 8,080.00 | 0.68 | 146.95 |
| March | 68.35 | - | 5,350.00 | 0.72 | 191.68 |
| April | 13.40 | 0.01 | 365.00 | 0.40 | 57.87 |
| May | 6.13 | - | 490.00 | 0.16 | 14.72 |
| June | 0.83 | - | 17.00 | 0.00 | 2.37 |
| July | 0.31 | - | 3.37 | - | 1.02 |
| August | 0.23 | - | 3.62 | - | 0.65 |
| September | 0.25 | - | 3.13 | - | 0.70 |
| October | 2.17 | - | 1,010.00 | 0.03 | 1.02 |
| November | 1.18 | - | 305.00 | 0.17 | 1.43 |
| December | 7.07 | - | 3,040.00 | 0.46 | 2.88 |

Source: United States Geological Survey

Historically, the lake elevation was highly variable and has completely dried out including years 1850, 1880, 1954, and 1959 through 1963. As shown in Figure E. 2-1: Lake Elsinore Elevations , Lake Elsinore was very low or completely dry throughout most of the 1950's and 1960's. Conversely, Lake Elsinore spills into Temescal Creek only during extremely wet years (1919, 1981, 1983, 1993, and 1995) and has caused extensive flooding in the City during such periods.

Adjacent and located to the southeast of Lake Elsinore are three other water bodies: Back Basin, Lake Alpha, and Lake Beta. Back Basin is normally dry and is separated from Lake Elsinore by a 2.5-mile-long earthen berm constructed as part of the Lake Elsinore Management Project under the auspices of the U.S. Army Corps of Engineers (Corps), U.S. Bureau of Land Management (BLM), and Riverside County Flood Control District. This project was completed in the early 1990s to reduce evaporation losses from Lake Elsinore and provide additional flood storage, while improving water quality, habitat, and recreational opportunities associated with Lake Elsinore. The Back Basin berm has an overflow weir at elevation 1,262 feet msl at which point flow from Lake Elsinore enters Back Basin. Lake Alpha and Lake Beta are connected to Lake Elsinore by a 48-inch gated conduit in the levee. These two lakes form a wetland area and are effectively the low spots in the Back Basin.

An unfinished element of the Lake Elsinore Management Project is the establishment of a long-term supplemental water supply for the lake. Planners have determined that recycled water would be a preferred source over using scarce potable water for lake level stabilization.

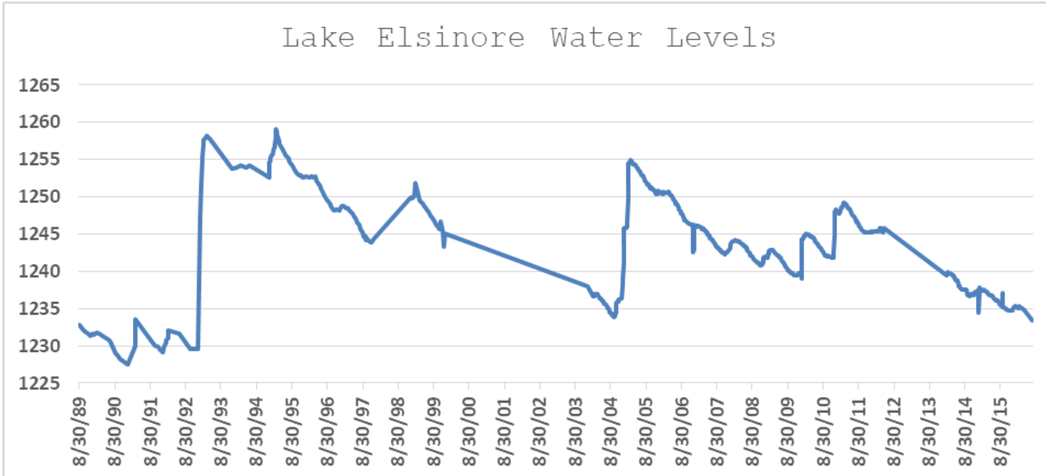


**Figure E. 2-1: Lake Elsinore Elevations**
Source: Santa Ana Watershed Project Authority

To address this issue, the EVMWD and the City of Lake Elsinore formed a Recycled Water Task Force charged with determining public opinion on the use of recycled water to supplement Lake Elsinore that identified the desired actions and outcomes for the use of recycled water, and prepared a white paper on the topic. The task force published its findings in 1997 and concluded that recycled water may be acceptable for supplementing the water in Lake Elsinore provided that standards for disinfected tertiary treatment approved uses are met, nutrient removal to within the lowest natural background levels can be integrated into the next treatment plant upgrade, and a lake water quality monitoring program is implemented. Subsequently, the EVMWD implemented a feasibility study toward applying for a National Pollution Discharge Elimination System (NPDES) permit and, along with the Eastern Municipal Water District (EMWD), began a pilot discharge project in June 2002. With discharge permits to add 4,480 AF of recycled water and up to 5,000 AF of groundwater (from the Island Wells) each year for two years, the pilot discharge project was intended to increase and stabilize lake levels and to test the effects of recycled water discharge on water quality and beneficial uses of the lake.

In July 2001, the Joint Watershed Authority filed a Notice of Intent to prepare a Programmatic Environmental Impact Report for the Lake Elsinore Stabilization and Enhancement Project. The stated objectives of this project are the following: (1) stabilization of water level of Lake Elsinore, by maintaining the lake elevation within a desirable operating range (minimum of 1240-feet to a maximum of 1247-feet above msl); (2) improvement of lake water quality (i.e., reduce algae blooms, increase water clarity, increase DO concentrations throughout the water column, and reduce or eliminate fish kills); and (3) enhancement of Lake Elsinore as a regional aesthetic and recreational resource. The Joint Watershed Authority approved the Lake Elsinore Stabilization and Enhancement Project in September 2005.

The primary source for make-up water is EVMWD's Regional Reclamation Plant[9] adjacent to Lake Elsinore. EVMWD relies on Water Rights Permit No. 30520 for an exclusive right to all water discharged from the reclamation plant. EVMWD also can supplement make-up water with water from its Island Wells. EVMWD and the Nevada Hydro Company (2005) determined that no water acquisition rights would be needed to purchase reclaimed water.

Substantial human actions in the watershed and Lake Elsinore itself affect the lake's inflow, elevation, and discharge. Water can flow out of Lake Elsinore through an outlet channel and into Warm Springs Creek and subsequently to Temescal Wash whenever the lake level exceeds 1255-feet above msl. This only occurs under torrential rainfall conditions or when an extended wet period results in abnormally high lake elevations. The bottom elevation of Lake Elsinore is 1,223 feet msl. At an elevation of 1240-feet above msl, Elsinore Lake has a surface area of 3,074 acres and stores 38,519 AF.

Historically, the lake elevation was highly variable and has completely dried out in certain years, including years 1850, 1880, 1954, and 1959 through 1963 (Dunbar, 1990, as cited in Joint Watershed Authority, 2005). Evaporation losses from Lake Elsinore are substantial, estimated at 56.2 inches per year, and are much larger than the average annual precipitation of 11.6 inches, which contributes to very unstable lake levels. Such evaporation losses translate to 15,500 AF per year, assuming a nominal elevation of 1245-feet above msl, which is an elevation that corresponds to a lake area of 3,319 acres.

Below Lake Elsinore, Temescal Wash flows about 28 miles in a northwesterly direction to its confluence with the Santa Ana River, just upstream of Prado dam (Joint Watershed Authority, 2005). Following the construction of the Back Basin berm and other improvements as part of the Lake Elsinore Management Project, Lake Elsinore has a 100-year flood elevation of 1263.3-feet above msl and a combined storage of about 150,000 AF, which includes the Back Basin (Joint Watershed Authority, 2005). Prior to this construction, in February 1980, a series of storms caused Lake Elsinore to rise to elevation 1265.7-feet above msl, causing substantial spill into Temescal Creek (personal communication, letter from R. Koplin, Chief, Engineering Division, S.C. Thomas, Senior Civil Engineer, Riverside County Flood Control District, dated August 15, 2003; USACE, 2003). After the flood control improvements were made, the highest peak flow recorded at USGS gage no. 11072100, Temescal Creek near the City of Corona, about 15 miles downstream from Lake Elsinore, was 4,030 cubic feet per second (cfs) on June 9, 2006 (USGS, 2005).

Under normal conditions when Lake Elsinore is not spilling, Temescal Wash receives discharges of highly treated (tertiary) effluent from the EVMWD Regional Plant and excess recycled water from the EMWD Temescal Valley Water Reclamation Facility (MWH, 2005).

### 2.3.2. Decker Canyon Reservoir

The proposed Decker Canyon Reservoir site would be located on the west side of the Elsinore Mountains within the upper drainage of San Juan Creek which does not drain to Lake Elsinore.

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[9]/ EVMWD's Regional Wastewater Treatment Plant provides tertiary treatment to wastewater such that it can be reused in a variety of applications and is suitable for contact recreation.

The Decker Canyon site is located at the headwaters of its drainage basin and would drain only about 90 acres (0.14 square mile). Below the Decker Canyon Reservoir site, San Juan Creek flows generally towards the west and has a 176 square mile drainage area at its point of discharge into the Pacific Ocean at Doheny State Park near Dana Point and Capistrano Beach in Orange County. Stream flows in the Decker Canyon site are seasonal and intermittent. San Juan Creek becomes perennial near the mouth of the basin, owing largely to development and urban runoff (about 35 percent of the watershed is urbanized), possibly due to effluent from waste water treatment plants and similar inflows during the dry season.

Streamflow in San Juan Creek since 1986 has been measured at USGS Gage No. 11046530, La Novia Street Bridge near San Juan Capistrano, which has a drainage area of 109 square miles. Table E. 2-3: Daily discharge (cfs) statistics for USGS Gage No. 11046530 - San Juan Creek at La Novia Street Bridge near San Juan Capistrano shows the annual stream flow data for this gage.

**Table E. 2-3: Daily discharge (cfs) statistics**
For USGS Gage No. 11046530 San Juan Creek at La Novia Street Bridge near San Juan Capistrano (Water Years 1987 to 2016) (cfs)

| Mean | Maximum | Minimum | P10 | P90 |
|---|---|---|---|---|
| 18.63 | 8120 | 0 | 0 | 9.6 |

Source: United States Geological Survey

## 2.4. Groundwater

The Project area is located within the South Coast Hydrologic Region. The South Coast Hydrologic Region has 56 delineated groundwater basins, eight basins of which are located in Subregion 8 (Santa Ana) and 27 basins are located in Subregion 9 (San Diego).

For the proposed northern primary transmission line, the area of the proposed Lake Switchyard is located within the Temescal Groundwater Subbasin (Basin No. 8.209). The subbasin underlies the southwest part of the upper Santa Ana valley. The Elsinore fault zone lies along the western boundary and the Chino fault zone crosses the northwestern tip of the subbasin. These fault zones are possible groundwater barriers. Dominant recharge is from percolation of precipitation on the valley floor and infiltration of stream flow within tributaries exiting the surrounding mountains and foothills.[10]

A portion of the proposed 230-kV transmission line upgrade traverses the San Luis Rey Valley Groundwater Basin (Basin No. 9.7). That groundwater basin underlies an east-west trending alluvium-filled valley in San Diego County. The major hydrologic feature is the San Luis Rey River which drains the valley overlying the basin. The basin is recharged by imported irrigation water applied on upland areas and by storm-flow in the San Luis Rey River and its tributaries. Movement of groundwater in the alluvial aquifer is westward towards the Pacific Ocean.[11]

The groundwater setting with respect to the pumped storage facility is described below.

[10] / *Id*., Upper Santa Ana Valley Groundwater Basin, Temescal Subbasin, updated January 20, 2006.

[11] / *Id*., San Luis Rey Groundwater Basin, updated February 27, 2004.

### 2.4.1. Elsinore Groundwater Basin.

Lake Elsinore is located in the Elsinore Groundwater Basin (Basin No. 8-4). The basin underlies the Elsinore Valley in western Riverside County, and extends under a surface area of 40.2 square miles in Elsinore Valley. The basin is bounded on the southwest by the Santa Ana and Elsinore Mountains along the Willard fault, a play of the active Elsinore fault zone. The basin adjoins the Temecula Valley Groundwater Basin on the southeast at a low surface drainage divide. The basin is bounded on the northwest by the Temescal Sub-basin of the Upper Santa Ana River Valley Groundwater Basin at a constriction in Temescal Wash. The basin is bounded on the northeast by non-water-bearing rocks of the Peninsular Ranges along the Glen Ivy fault.

Lake Elsinore lies in a closed basin formed between strands of the active Elsinore fault zone. The principal recharge of the basin is from infiltration of stream flow through alluvial fan deposits near the edges of the basin and through gravel deposits along the course of the San Jacinto River. Other contributing sources include infiltration from unlined channels, underflow from saturated alluvium and fractures within the surrounding bedrock mountains, and spreading of water in recharge basins.[12] Additional information concerning the Elsinore Groundwater Basin is contained in the EVMWD's "Elsinore Basin Groundwater Management Plan."

Lake Elsinore is underlain by layers of clay, which greatly impedes the downward movement of groundwater because clay acts as an impervious barrier. Due to the geological layout and the surrounding faults, the Elsinore groundwater basin is essentially a closed groundwater basin. The groundwater level in the basin has dropped considerably, with estimates of at least a 100-foot drop having occurred in the first half of the twentieth century alone (Joint Watershed Authority, 2005). Until recently, in addition to groundwater withdrawal for irrigation and other needs, groundwater has been pumped from the EVMWD Island Wells, near Lake Elsinore to provide an additional source of water for Lake Elsinore under the pilot discharge project in an attempt to increase and stabilize lake levels. As indicated in Table E. 2-4: Estimated Groundwater Basin Budget for the Elsinore Groundwater Basin, an ongoing deficit of about 1,800 AF per year is estimated.

[12] /*Id*., Elsinore Groundwater Basin, updated January 20, 2006.

**Table E. 2-4: Estimated Groundwater Basin Budget for the Elsinore Groundwater Basin**

| Location | Average Location (1990–2000) (acre-feet per year) |
|---|---|
| **Inflows** | |
| Precipitation infiltration from rural areas | 2,000 |
| Precipitation infiltration from urban areas | 800 |
| Recharge from San Jacinto River | 1,700 |
| Recharge from Lake Elsinore | 0 |
| Return flows from applied water | 600 |
| Return flows from septic systems | 1,000 |
| Return flows via subsurface inflow | 0 |
| Total inflows | 6,100 |
| **Outflows** | |
| Groundwater pumping | 7,900 |
| Surface outflow | 0 |
| Subsurface outflow | 0 |
| Total outflows | 7,900 |
| Net Deficit | 1,800 |

Source: MWH, 2003, as cited in Joint Watershed Authority, 2005

EVMWD developed a draft groundwater management plan for the Elsinore Basin, which was approved by its Board of Directors on March 24, 2005. The objective of the plan is to reverse the ongoing decline in groundwater levels and provide a long-term sustainable groundwater supply by recharging the basin with injection wells that would be located in the Lake Elsinore Back Basin and on the northwest side of the lake.

### 2.4.2. San Juan Creek Groundwater Basin.

The San Juan groundwater basin is a shallow basin that is essentially an underground flowing stream with limited storage capabilities. It is located under the San Juan Creek Watershed and tributary valleys in the southern part of Orange County, and is bounded to the west by the Pacific Ocean. Projects supporting groundwater recovery in the San Juan Creek groundwater basin have been initiated (Orange County, 2005).

The part of the groundwater basin near the area of the proposed Decker Canyon Reservoir site contains canyon bottomlands that are covered by alluvium and underlain by granitic bedrock. Evaporation amounts for the higher elevations associated with Decker Canyon Reservoir are estimated to be 38.2 inches per year, slightly lower than the 56.2 inches per year at Lake Elsinore.

With regard to San Juan Creek, the Corps notes that groundwater exists in a generally narrow, shallow alluvial valley fill that has been deposited in the San Juan Canyon area and its tributaries. Groundwater in these alluvial fill areas is unconfined. Groundwater studies indicate the alluvial fill ranges from reported depths of 200 feet at the coast to zero at the end of the small alluvial fingers tributary to the main canyons. The main structural feature influencing groundwater movement is the Cristianitos fault, which traverses the area in a north-south direction and crosses San Juan Canyon at a narrows, about 3.5 miles upstream from the confluence of San Juan and Trabuco Creeks. This fault and the narrows separate the groundwater alluvium into an upper and lower area.[13]

## 2.5. Water Quality

The proposed alignment of the primary transmission lines cross an estimated 60 USGS-depicted blue-line (jurisdictional) drainages. Most of these drainages are considered ephemeral. The route, however, crosses two major watercourses that contained flowing water during the Project's general biological surveys (Los Alamos Creek and Temescal Wash). The Applicant is not aware of any available water quality data from those drainages that are proposed to be intersected by the primary transmission lines. With respect to the proposed generation facilities, water quality information is described below relative to existing water bodies and water quality constituents.

### 2.5.1. Lake Elsinore.

Lake Elsinore's morphology and location in a rapidly urbanizing area and upstream land use activities contribute to the quality of storm-water runoff that affects the water quality in the San Jacinto River and, ultimately, Lake Elsinore (Joint Watershed Authority, 2005). Consequently, the overall water quality of Lake Elsinore typically does not meet applicable water quality standards, and the California Regional Water Quality Control Board, Santa Ana Region (SARWQCB) has listed Lake Elsinore as impaired under Section 303(d)[14] of the Clean Water Act (CWA) for nutrients, organic enrichment/low dissolved oxygen (DO), sedimentation/siltation, and unknown toxicity.

Lake Elsinore water quality objectives are set by the SARWQCB and published in the "Santa Ana Basin Plan". According to the "Santa Ana Basin Plan," the existing beneficial uses within Lake Elsinore[15] include contact recreation (REC1), non-contact recreation (REC2), warm freshwater habitat (WARM), and wildlife habitat (WILD).

Table E. 2-5: Beneficial Use Designation Definitions shows the beneficial use designation definitions. Table E. 2-6: Applicable Water Quality Objectives presents objectives for algae, temperature, turbidity, DO, pH, and total inorganic nitrogen.

Lake Elsinore is a large, shallow lake marking the terminus for flows in the San Jacinto River. Development throughout the watershed has led to stream diversions and groundwater withdrawals preventing surface flows from reaching Lake Elsinore in all but the wettest years. Its

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13/ *Id.*, San Juan Creek Watershed Management Study, Orange County, California, Feasibility Phase, Hydrology Appendix, p. 82.

14/ Under Section 303(d) of the Clean Water Act, states are required to submit a list of waters for which effluent limits will not be sufficient to meet all state water quality standards. The 303(d) listing process includes waters impaired from point and non-point sources of pollutants. States must also establish a priority ranking for the listed waters, taking into account the severity of pollution and uses.

15/ In 1988, the SWRCB adopted the Sources of Drinking Water Policy (Resolution No. 88-63) that directed the SARWQCB and the SDRWQCB to add the Municipal and Domestic Supply (MUN) Beneficial Use for all waterbodies not already so designated, unless they met certain exception criteria. Lake Elsinore is excepted under this provision.

high evaporation rate (56.2 inches annual average) coupled with its low annual precipitation (11.6 inches annual average) and relatively small watershed area results in a shallow lake for most of the year (Joint Watershed Authority, 2005). Annual precipitation and runoff vary widely, and so do lake levels along with the amount of exposed shoreline. Throughout its history, Lake Elsinore has been subject to periods of extreme flooding or drying due to the semi-arid climate of the area and varying runoff amounts.

The quality of the lake is also a function of lake levels. As lake levels fall because of low inflow or high evaporative losses, lake constituents such as nutrients and salinity become concentrated, and DO falls as the temperature of the shallower water rises in the summer (Joint Watershed Authority, 2004). These conditions are accompanied by algal blooms that exacerbate DO depletion, odors, and fish kills.

### 2.5.2. San Juan and San Mateo Creeks.

Surface water in the upper San Juan Creek Watershed in proximity to the proposed Decker Canyon upper reservoir site is intermittent and directly related to precipitation. Because of the natural setting, surface flows originating from the upper watershed are of good quality during the brief times there is runoff, which is typically during winter rainy season. This contrasts with conditions in the lower watershed near the coast as creek water (limited groundwater mixed with urban nuisance flows) is strongly influenced by the expansive urban development surrounding the lower reaches and is consequently considered impaired under Section 303(d) for pathogens (specifically coliform bacteria). The San Mateo Creek Watershed (south of San Juan Creek Watershed where the proposed southern primary transmission line would be located) is similar to San Juan Creek in that the upper, mountainous creek beds are often void of running water. The lower portion of the San Mateo Creek, which typically has some water, flows through Camp Pendleton, and it has been compromised by the U.S. Marine Corps' (USMC) on-base activities, although not significantly enough to require listing under Section 303(d).

Both the San Juan Creek and San Mateo Creek watersheds are under the jurisdiction of the California Regional Water Quality Control Board, San Diego Region (SDRWQCB) and subject to provisions of the "San Diego Basin Plan". The designated beneficial uses of San Juan Creek include agricultural and industrial process supply, contact and non-contact recreation, warm and cold fresh water habitat, and wildlife habitat. The designated beneficial uses of San Mateo Creek include REC1, REC2, WARM, COLD, WILD, RARE, and SPWN. Table E. 2-6: Applicable Water Quality Objectives for Waters Potentially Affected by the Proposed Project) presents objectives for algae, temperature, turbidity, DO, pH, and total inorganic nitrogen.

**Table E. 2-5: Beneficial Use Designation Definitions**

| Beneficial Use | Definition |
|---|---|
| AGR | Agricultural Supply waters are used for farming, horticulture, or ranching. These uses may include, but are not limited to, irrigation, stock watering, and support of vegetation for range grazing. |
| COLD | Cold Freshwater Habitat waters support coldwater ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates. |

| Beneficial Use | Definition |
|---|---|
| IND | Industrial Service Supply waters are used for industrial activities that do not depend primarily on water quality. These uses may include, but are not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well re-pressurization. |
| RARE | Rare, Threatened or Endangered Species waters support habitats necessary for the survival and successful maintenance of plant or animal species designated under state or Federal law as rare, threatened or endangered. |
| REC1 | Water Contact Recreation waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs. |
| REC2 | Non-contact Water Recreation waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities. |
| SPWN | Spawning, Reproduction, and Development waters support high-quality aquatic habitats necessary for reproduction and early development of fish and wildlife. |
| WARM | Warm Freshwater Habitat waters support warmwater ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates. |
| WILD | Wildlife Habitat waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife. |

Source: California Regional Water Quality Control Board, Santa Ana Region; California Regional Water Quality Control Board, San Diego Region

## Table E. 2-6: Applicable Water Quality Objectives For Waters Potentially Affected by the Proposed Project

| Parameter | Santa Ana Basin Plan Objective | San Diego Basin Plan Objective |
|---|---|---|
| Algae | Waste discharges shall not contribute to excessive algal growth in inland surface receiving waters. | Does not exist. |
| Temperature | The temperature of waters designated WARM shall not be raised above 90°F June through October or above 78°F during the rest of the year as a result of controllable water quality factors. Lake temperatures shall not be raised more than 4°F above established normal values as a result of controllable water quality factors. | Natural water temperatures of basin waters shall not be altered unless it can be demonstrated to the satisfaction of the San Diego Water Board that such alteration does not affect beneficial uses. |
| Turbidity | Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits: 0–50 NTUs not to exceed 20%, 50–100 NTU increases not to exceed 10 NTU, greater than 100 NTUs not to exceed 10%. | Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Inland surface waters shall not contain turbidity in excess of 20 NTUs more than 10% of the time during any 1-year period. |
| Dissolved Oxygen | Depressed below 5 mg/l for waters designated WARM, as a result of controllable water quality factors. In addition, waste discharges shall not cause the median DO concentration to fall below 85% of saturation or the 95th percentile concentration to fall below 75% of saturation within a 30-day period. | DO concentrations shall not be less than 5.0 mg/l in inland surface waters with designated MAR or WARM beneficial uses or less than 6.0 mg/l in waters designated COLD beneficial uses. The annual mean DO concentration shall not be less than 7 mg/l more than 10% of the time. |
| pH | The pH of inland surface waters shall not be raised above 8.5 or depressed below 6.5 as a result of controllable water quality factors. | The pH value shall not be changed at any time more than 0.2 pH units from that which occurs naturally. |
| Total Inorganic Nitrogen | 1.5 mg/l | Does not exist. |

| Parameter | Santa Ana Basin Plan Objective | San Diego Basin Plan Objective |
|---|---|---|
| Notes:<br>mg/l – milligrams per liter;<br>NTUs – Nephelometric turbidity units | | |

Source: Santa Ana Water Board, 1995; San Diego Water Board, 1994

- **Water temperature**. The SARWQCB and others have been involved in water quality monitoring since June 2002 as part of improvement projects as discussed in Section 3.2 (Cumulatively Affected Resources). Since 2002, vertical lake sample profiles were conducted at over 10 positions located throughout Lake Elsinore. Vertical profiles taken at sampling site 9 (the deepest sampling site located in the central part of the lake) show strong seasonal differences in temperature, with daytime surface summer water temperatures reaching 29 to 30° Celsius (C), while the lower water column was typically 25 to 27°C. A transition to cooler temperatures begins in the fall, with the surface temperatures cooling to approximately 20°C in October. Water column temperatures then cool further, with temperatures ranging from 12 to 14°C from November to March. The lake generally begins warming in April, with modest stratification present during this time, while strong heating and stratification were observed in late May to early June.

  Water temperature data for waters in Decker Canyon in the upper San Juan Creek Watershed we provided in docket P–11858, and reported temperatures between 13.3 and 17.0°C (4 field measurements taken April 28, 2005, after a precipitation event). No water temperature data were collected for waters in San Mateo Creek in the upper San Mateo Creek Watershed. Decker Canyon only experiences surface flows during precipitation events, and therefore temperature data could not be collected for Decker Canyon surface flows. Sampling to date has not isolated the difference between storm water and seepage. San Mateo Creek only experiences surface flows during storm events, and temperature data do not exist for this watershed.

- **Dissolved oxygen**. The SARWQCB has listed Lake Elsinore as impaired for failing to meet numerous Santa Ana Basin Plan objectives, including DO objectives. Measurements that are below state objectives are continually recorded throughout the water column for the majority of the year. Low DO levels in the lake result from aerobic decomposition of algae and other organic material in the bottom waters, nighttime respiration of phytoplankton, plankton blooms, and higher water temperature (warm water contains less oxygen than cold water) during summer months. The SARWQCB has developed and implemented measures from the draft Total Maximum Daily Load (TMDL) for nutrients to improve water quality and reverse the presently compromised conditions.

  DO levels within Lake Elsinore exhibit spatial and temporal trends that vary with lake temperature and depth, which are dynamic throughout the year. In August 2002, oxygen was substantially depleted across the lake, resulting in a fish kill (levels recorded below 1 milligram per liter (mg/l) in the lower third of the water column). As the lake began to mix in October and November 2002, the lake generally exhibited higher concentrations but still reduced DO levels (5 mg/l) near the sediments relative to the surface (8 to 10 mg/l). This period of mixing was followed by a sharp decline in DO throughout the water column in early December 2002. Conversely, Lake Elsinore was generally well oxygenated during the winter of 2003. Historically, DO levels have been observed between 0.1 and 16 mg/l and vary greatly with season, temperature, and depth.

The Applicant collected a single DO measurement of 8.9 mg/l from a sample collected from Decker Canyon in April 28, 2005. No DO data exist for waters in the upper San Mateo Creek Watershed. San Mateo Creek Watershed, due to its relative similarity (intermittent, upper-watershed setting in the same southern California mountain range) to Decker Canyon is assumed to exhibit similar water quality traits. As such, water (when present) within these upper watersheds is likely to be well oxygenated.

- **Nutrients.** The SARWQCB recognizes that the narrative water quality objectives set to protect the beneficial uses of Lake Elsinore are not being met as a result of high nutrient concentrations stimulating excessive algae growth and compromising DO levels. As such, Lake Elsinore is listed as impaired under Section 303(d) for nutrients, and this impairment requires the establishment of a TMDL for the pollutants causing the impairment (nitrogen and phosphorus).

  Lake Elsinore is technically eutrophic in that it exhibits the following characteristics: (1) large algae blooms (chlorophyll-a >50 micrograms per liter [µg/l]) and common presence of blue-green algae (cyanobacteria), specifically Microcystis; (2) large seasonal and daily swings in concentrations of DO; anoxic values that have been recorded in deeper waters during most summers; (3) low water clarity; Secchi disc values less than 1 meter; (4) high concentrations of inorganic nitrogen; and (5) high concentrations of total phosphorus. These observations substantiate the pilot "Lake Elsinore Recycled Water Project," an effort that enables EVMWD to discharge treated wastewater into Lake Elsinore to maintain higher lake levels to minimize effects from high evaporative losses and low inflow rates. This effort is designed to help restore the water quality of Lake Elsinore to meet state objectives.

  Sampling results show that the total phosphorus concentration in Lake Elsinore has generally been increasing between 2002 and 2004. Total phosphorus concentrations vary with the season but were generally observed at approximately 0.3 mg/l throughout the second half of 2002 and rising to approximately 0.5 mg/l in early 2004.

  Total nitrogen concentrations were variable between 2000 and 2004. Average summer concentrations were approximately 3.0 mg/l in 2000 and 2001 rising to approximately 5.0 mg/l in 2002 and 2003. Winter total nitrogen concentrations for all sampled sites from 2003 to 2004 averaged 11.8 mg/l; however, data presented by the Applicant exhibit considerable variability between days and pronounced swings seasonally and annually.

  Sampling information provided in Docket P–11858 indicated that the total nitrogen: total phosphorus ratio was variable since sampling began in summer 2000. From summer 2000 through summer 2002, there were periods of strong phosphorus limitation (ratios up to 50:1), interrupted with periods during the winter of co-limitation (~15:1) and brief periods of nitrogen limitation (~5:1). The general trend has been moving toward nitrogen limitation.

  Field sampling was conducted by the Applicant to characterize the waters of Decker Canyon following a precipitation event. The total nitrogen concentration below the Decker Canyon upper reservoir site was reported at 1.4 mg/l. All other samples were below the reporting limit.

- **Algae** (Chlorophyll and Transparency). According to the SARWQCB, hyper-eutrophication (over enrichment of nutrients) of nitrogen and phosphorus is the most severe water quality problem in Lake Elsinore (SARWQCB, 2001). These elevated nutrient concentrations cause algae blooms that also result in low DO levels, which further result in fish kills. The presence of unsightly amounts of algae conflicts with the beneficial uses of Lake Elsinore, specifically WARM, REC-1, and REC-2, and is directly linked to the implementation of the nutrients TMDL. Chlorophyll concentrations show a slight seasonal trend with peaks in the late spring-summer. The SARWQCB recorded a maximum concentration of about 400 µg/l in fall 2002; however, 200 µg/l is a more typical concentration observed since 2003. Algae blooms are known to occur in the lake and result in floating mats of algae. These blooms typically occur in the summer to fall season but could potentially occur at anytime during the year when there are sufficient nutrients and ample sunlight. Secchi depths, an indicator of the lake's transparency, have been relatively stable at approximately 0.2 meter.

  Samples from the San Juan Creek and San Mateo Creek watersheds are not available to include in this discussion. Given the remote nature and the intermittent nature of the waters potentially affected by the Project and the low nutrient concentrations observed in field samples, it is unlikely that large amounts of algae as a result of nutrient enrichment would compromise the waters.

- **pH**. The SARWQCB sampling program has observed that the pH of Lake Elsinore has averaged slightly greater than 9 between April 2002 and June 2004, although the pH profiles show some vertical and temporal trends. The range of pH values recorded during this time period is 8.7 to 9.5. High pH values are often the result of the respiration of aquatic organisms (e.g., algae). The build-up of carbon dioxide in the water leads to a chain of chemical reactions that ultimately increase the alkalinity of the water (increased pH). The Applicant reported pH values between 7.42 and 7.65 from samples taken in Decker Canyon in December 2004 and April 2005 shortly after rain events. Information about the water quality of upper San Mateo Watershed is not available, but is likely to be similar to the waters in the upper San Juan Watershed.

  The groundwater in the San Juan Creek watershed is typically high dissolved solids and salts. Table E. 2-7: San Juan Basin Water Quality Data (mg/l) provides general groundwater quality data for 1987.[16] In general, groundwater quality problems in the San Juan Creek watershed are related to high dissolved solids content, rather than bacteriological, toxins, or heavy metal concentrations.[17]

[16] / *Id*., p. 84.

[17] / *Id*., San Juan Creek Watershed Management Plan, p. III-7.

Table E. 2-7: San Juan Basin Water Quality Data (mg/l)

| Subbasin | TDS | SO3 | Iron | Mn |
|---|---|---|---|---|
| Lower San Juan | 1500-2000 | 500-750 | >2.0 | 0.5-1.5 |
| Middle San Juan | 500-1000 | 250-500 | 0.3-2.0 | 0.5-1.5 |
| Upper San Juan | 0-500 | 0-250 | 0-0.3 | 0-0.05 |

Source: Capistrano Valley Water District

## 2.6. Potential Impacts on Water Resources

Impacts on water resources attributable to the LEAPS generation facilities are discussed in Section 2.6.1. Impacts on water resources associated with the primary transmission connection are presented in Section 2.6.2. Potential cumulative impacts on water resources relating to the Project (inclusive of both transmission and generation) are presented in Section 2.6.3.

### 2.6.1. Potential Impacts of LEAPS Generation Facilities

Lake Elsinore is a natural lake which is about five miles long and about two miles wide. It is a terminal lake and a natural low point in the San Jacinto River Basin; it does not connect with the Santa Ana River under normal rainfall conditions. In high precipitation and runoff years, the San Jacinto River flows through Lake Elsinore to the Santa Ana River via Temescal Wash, a natural drainage system that extends about 28 miles from Lake Elsinore to the Santa Ana River, which eventually drains to the Pacific Ocean. Lake Elsinore has overflowed to the northwest through Walker Canyon very rarely, only three times in the 20th Century and 20 times since 1769 based on Mission diaries. Each overflow event was short-lived demonstrating that Lake Elsinore is essentially a closed-basin lake system (FERC, 2007).

Lake Elsinore is an ephemeral lake, and water surface elevations have historically experienced significant fluctuations due to periods of flooding followed by prolonged dry periods. Lake Elsinore has dried completely on four occasions since 1769 (TNHC, 2007). Lake Elsinore has a relatively small drainage basin (<1,240 square kilometers) from which the San Jacinto River flows (semi-annually) into and terminates within the lake's basin. Lake Elsinore is a shallow lake (average depth of 24.7 feet) with a large surface area: (approximately 3,074 acres at elevation 1240-feet above msl). The main natural sources of water flowing into Lake Elsinore are direct natural runoff from the surrounding mountains and drainage from the San Jacinto River.

Annual average precipitation in the Lake Elsinore watershed is about 11.6 inches and the average annual evaporative loss is 56.2 inches. This excessive evaporative loss, when compared to the low natural inflow, results in unstable lake levels.

The primary source for make-up water is the EVMWD's Regional Water Reclamation Facility (RWRF), located adjacent to Lake Elsinore. The EVMWD relies on Water Rights Permit No. 30520 for an exclusive right to all water discharged from the reclamation plant. The EVMWD also can supplement make-up water with water from its island wells. The Applicant is also in discussions with the Eastern Municipal Water District (EMWD) as a potential supplier of tertiary treatment water that could be secured for discharge into Lake Elsinore. Water from those or other sources could be secured by the Applicant for LEAPS operations.

Lake Elsinore has a long history of water quality problems, the most severe of which is hypereutrophication or the over-enrichment of the lake with the nutrients phosphorus and nitrogen. Elevated nutrient levels result in high algal productivity, leading to algal blooms that block sunlight to the water column and reduce photosynthesis of aquatic plants, creating low dissolved oxygen (DO) levels that result in periodic fish kills. The majority of oxygen produced by algal respiration is lost to the atmosphere rather than being dissolved in lake water. The decay of floating mats of algae is a chemical process that further removes DO from the water column, exacerbating low oxygen levels experienced by the turbid water. The shallow lake depths and large surface area of Lake Elsinore allows water temperatures to increase dramatically during the summer months and high water temperatures support lower levels of DO. These complex processes result in excessive oxygen depletion that adversely affects aquatic biota, including fish.

Nutrient levels are elevated in Lake Elsinore from a combination of natural and anthropogenic causes. Nutrients tend to build up in terminal lake bottoms. Lake Elsinore is essentially the endpoint of a closed hydrologic system. Nutrient runoff from surrounding urban development, faulty septic systems, and dairy and agricultural operations contributes to the nutrient loading problem in Lake Elsinore. In addition, nutrient-rich sediment at the lake bottom is stirred up by the burrowing and bottom foraging behavior of introduced carp. Under conditions of low DO, phosphorus trapped in suspended sediment becomes bio-available to algae.

Lake Elsinore is listed by the State as “impaired” per Section 303(d) of the Clean Water Act (CWA) for failing to meet applicable water quality objectives, including DO levels. Measurements that are below State water quality objectives are continually recorded throughout the water column in Lake Elsinore for the majority of the year. The Lake Elsinore and San Jacinto Watershed Authority (LESJWA) installed a “lake mixing system” (axial flow pump aeration system) in 2004 and has initiated an environmental review process for an “aeration project” (diffused air in-lake aeration system) designed to increase oxygen levels in Lake Elsinore.

Pumped-storage electrical generation operations would involve the cycling of water between Lake Elsinore and a new upper reservoir, generating power with releases from the upper reservoir to Lake Elsinore and returning water to the upper reservoir for storage. This closed-loop cycling operation would be accompanied by upper reservoir water-level fluctuations of about 40 feet on a daily basis and about 75 feet during the course of a full-week cycle. In Lake Elsinore, the daily water-level fluctuation would be about one foot, with the lake level fluctuating about 1.7 feet during the course of a weekly cycle.

Significant hydraulic modification has already occurred in Lake Elsinore. However, potential effects during construction will include greater-than-normal lake-level draw downs to facilitate construction and initial filing. This would be a short-term impact and the drawdown elevation would largely be dictated by the hydrologic conditions present at that time. About 5,500 acre-feet (AF) of water would be needed for the initial filling of the upper reservoir. Since the Applicant proposes to obtain this water from recycled water sources available to the EVMWD and/or EMWD, effects on local potable water supplies would be negligible. Water use during construction is also a short-term impact and the Applicant would purchase the water needed from the EVMWD, the EMWD, or from other sources.

Construction of the intake/outlet structure would require work to be performed in Lake Elsinore. This work would be conducted within the confines of a cofferdam, which would limit the interface between the construction activities and lake water. Installation of the intake/outflow structure would require the removal of lake bed material which would be replaced with a steel and concrete structure. The structure would be backfilled and secured prior to removal of the cofferdam. Once the cofferdam is removed, the lake bed would be re-submerged. Based on the findings of technical studies conducted by the SARWQBC, construction activities are not anticipated to significantly disturb or re-suspend lakebed sediments (Anderson, 2006, 2007a, 2007b).

Table E. 2-8: LEAPS – Water Resource Impacts summarizes the potential water resource impacts of LEAPS.

**Table E. 2-8: LEAPS – Water Resource Impacts**

| Impact | Description |
|---|---|
| H-3 | Excavation could degrade groundwater quality in areas of shallow groundwater. |
| H-6 | Accidental releases of contaminants from project facilities could degrade water quality. |
| H-7 | Project construction or operation would potentially impact local water supply. |
| H-8 | Project construction would deliver sediment resulting in increased turbidity. |
| H-9 | Project reservoir would capture runoff. |
| H-10 | Project operations could impact the quantity and quality of groundwater recharge. |
| H-11 | Project operations could change water quality parameters. |
| H-12 | Project operations could degrade water quality in San Juan Creek. |

Source: The Nevada Hydro Company, Inc.

Applicable PMEs which serve to mitigate potential hydrology and water quality impacts attributable to the Proposed Project are presented in Table E. 2-11: PME's – Hydrology and Water Quality Impacts.

***Impact H-3: Excavation could degrade groundwater quality in areas of shallow groundwater.***

Construction of the LEAPS Powerhouse, subsurface penstocks, and other associated electrical and water conduits (e.g., power shafts, power tunnels, penstocks, tailrace tunnels, and inlet/outlet structures) could intercept groundwater and daylight water now stored in underground aquifers. If substantial quantities of groundwater were to be encountered, both upslope and downslope areas can realize a decline in groundwater levels. A number of rural residents located within the Congressional boundaries of the CNF rely upon groundwater wells as their sole water source. Any loss of or disruption to groundwater supplying those wells could substantially affect those residents. This impact is potentially significant but would be mitigable to a less-than-significant level with the implementation of PME's H-3b and H-3c located in Table E. 2-11: PME's – Hydrology and Water Quality Impacts

***Impact H-6: Accidental releases of contaminants from project facilities could degrade water quality.***

Construction activities, including the construction of the new Decker Canyon Reservoir and an intake/outlet structure in Lake Elsinore, would require the placement, consumption, and storage of fuels, oils, lubricants, and other petroleum products and hazardous materials near existing water resources. The release or spill of petroleum products and/or hazardous substances into surface waters or streams located proximal to construction, operation, or maintenance activities could have negative effects on water quality, including corresponding impact on terrestrial and aquatic resources.

Lake Elsinore is a hypereutrophic lake and listed by the State as "impaired" under Section 303(d) of the CWA for failing to meet applicable water quality objectives for nutrients, organic enrichment/low DO, sedimentation/siltation, and unknown toxicity. The release of additional hazardous substances could exacerbate this condition. This impact is potentially significant but would be mitigable to a less-than-significant level through the development, implementation, and enforcement of a hazardous substances spill prevention and control plan, environmental safety plan, and hazardous substances response plan (PME H-7). In addition, implementation of PMEs H-2a, H-2b, H-2c will provide controls over the transport, use, storage, and disposal of hazardous materials and petroleum products associated with LEAPS construction, operation, and maintenance activities.

***Impact H-7: Project construction or operation would potentially impact local water supply.***

Extensive tunneling will be required to construct the penstocks connecting the new Decker Canyon reservoir and the LEAPS Powerhouse. Excavation activities associated with that tunneling could encounter and destabilize artesian groundwater systems. In addition, excavation for reservoir construction and the placement of a seepage collection system could destabilize localized artesian groundwater. Groundwater extent, including the depth to any underlying aquifer and hydrostatic pressures, will be determined through subsequent hydrogeologic investigations conducted by the Applicant prior to the start of construction (FERC, 2007).

Dewatering (groundwater pumping for construction) would likely be necessary for construction of the penstocks, tailrace tunnels, and intake/outlet structure; however, the effect is likely to be localized and for a short duration until a shaft casing could be installed. Long-term effects on the local and regional groundwater, such as the lowering of the piezometric surface, are not anticipated for the construction, operation, or maintenance of the proposed powerhouse, penstocks, tailrace, and intake/outlet structures. Additional groundwater level monitoring and geotechnical investigations will be conducted by the Applicant prior to the start of construction (FERC, 2007).

There are approximately 600 residents living downstream near the Ortega Highway–San Juan Creek crossing. The water source of these residents is dominated by groundwater supplies (FERC, 2007). Any disruption of the groundwater that serves those residents or any interruption to existing groundwater seeps discharging groundwater to the surface would be a potentially significant impact but would be mitigated to a less-than-significant level through compliance with

FERC/USDA Forest Service requirements and implementation of PMEs H-3b and H-3c located in Table E. 2-11: PME's – Hydrology and Water Quality Impacts

***Impact H-8: Project construction would deliver sediment resulting in increased turbidity.***

Construction could increase turbidity in area streams and in Lake Elsinore through two primary pathways: (1) increased surface erosion; and (2) in-water construction activities. Construction activities could affect temperature, DO, and nutrient cycling and would likely contribute to continued and overall poor water quality in Lake Elsinore. Construction of the proposed Decker Canyon Reservoir would necessitate the removal of existing vegetation covering an approximately 150-acre area, exposing soils to increased erosion. Increased sediment loading in Decker Canyon would discharge to San Juan Creek. These impacts are significant but would be mitigable to a less-than-significant level through compliance with FERC/USDA Forest Service requirements and the implementation of PME H-1d, H-1e, and H-1f located in Table E. 2-11: PME's – Hydrology and Water Quality Impacts

***Impact H-9: Project reservoir would capture runoff.***

The San Juan Creek watershed encompasses a drainage area of 176 square miles (113,000 acres) extending from the CNF to the Pacific Ocean at Doheny State Beach, near Dana Point Harbor. The proposed approximately 100-acre Decker Canyon Reservoir is located in that watershed and captures a surface area representing less than 0.1 percent of that drainage basin.

Through the inclusion of a double-liner system (low-permeability liner material and a geomembrane) and collection system, the proposed Decker Canyon Reservoir is designed to preclude water retained in the reservoir (water imported from Lake Elsinore) from discharging to the San Juan Creek watershed. As a result, rainwater falling into the reservoir will also be contained therein.

The presence of the reservoir would preclude this captured water from flowing downstream into the San Juan Creek watershed. Interception of rainfall by the uncovered reservoir would be expected to be minimal on a watershed level. It is estimated that precipitation over the Decker Canyon Reservoir could contribute as much as 135 acre-feet per year (AFY) during an average year to the San Juan Creek watershed. This amounts to about one percent of the average runoff as measured at the La Novia Street Bridge Gage, approximately 17 miles downstream.

This resulting impact is less than significant and no mitigation is required.

***Impact H-10: Project operations could impact the quantity and quality of groundwater recharge.***

Operational waters used to generate at the proposed LEAPS Powerhouse will be pumped from Lake Elsinore (Santa Ana Basin) into the proposed Decker Canyon Reservoir. The installation of a double-liner (low-permeability liner material and a geomembrane) and collection system and the maintenance of adequate freeboard at the proposed upper reservoir will maintain separation between the water within the reservoir and the surface and groundwater of the San Diego Basin, thus preventing any chemical constituent and biological transference between those basins. Experience with liners of the type proposed shows that leakage or failure would be unlikely.

However, if the liner and collection system were to leak or otherwise fail, there could be a release of water originating from Lake Elsinore (Santa Ana Basin) into the surface waters of San Juan Creek (San Diego Basin), which could then infiltrate into groundwater supplies.

No planned releases of water from the Decker Canyon Reservoir to San Juan Creek are proposed. Unplanned releases, as may be associated with a failure of the retention and/or collection systems, would temporarily affect surface water quantity and could potentially affect surface and groundwater quality in the San Juan Creek watershed.

The proposed high-pressure water conduit (penstock) system would be aligned through the east side of the Santa Ana (Elsinore) Mountains. Construction will occur through a combination of tunnel boring machine (TBM) technology and conventional hard-rock mining techniques. Groundwater inflows into tunnel excavation can adversely affect groundwater, including contributing to groundwater withdrawal or depletion, as well as create additional issues (dewatering) with regards to the discharge of waters generated by construction operations.

If the native groundwater pressures exceed the tunnel pressures, native groundwater could seep into the tunnels and lower the groundwater level if the water table lies above the tunnel. Conversely, if pressure is greater inside the tunnel, water may seep into the native groundwater table and possibly raise the surrounding groundwater elevation. Because portions of the tunnels would be concrete lined, it is not anticipated that operation of the tunnels would result in any water diversion or otherwise adversely affect groundwater.

Operation of the underground LEAPS Powerhouse could have localized effects on groundwater flow patterns. Groundwater may need to be pumped out of the powerhouse cavity and could potentially be redirected to Lake Elsinore at the surface.

***Impact H-11: Project operations could change water quality parameters.***

Operation of LEAPS (the cycling of water between the upper reservoir and Lake Elsinore, the fluctuating shoreline, and the maintenance of facilities and the primary transmission lines) could potentially affect multiple water quality parameters within Lake Elsinore (SARWQCB) and San Juan and San Mateo Creeks (SDRWQCB). Changing water levels could potentially cause shoreline soils to expand and contract, asserting a stress that eventually causes the soil structure to break down to the point of failure and resulting in erosion and sedimentation. As Lake Elsinore is already a heavily turbid lake, this unanticipated effect would not cause an adverse effect (Anderson, 2007a) and no mitigation is required.

Operation of LEAPS could affect the temperature, DO, and nutrient cycling occurring in Lake Elsinore. Water transferred and stored at the upper reservoir during nighttime hours, and passing through the turbine during the day, could raise or lower water temperatures beyond current observed trends in Lake Elsinore. The pumping of water and operation of the turbines could aerate the water above existing levels and benefit water quality, while discharges could disturb bottom sediments and increase turbidity and alter the nutrient cycling in the reservoir. Changing lake level elevations could also stir up sediments, increasing turbidity and affecting nutrient cycling. Depending on other factors at the time of release, a large nutrient release could stimulate additional algal growth in Lake Elsinore. Each of these issues have been addressed through technical studies undertaken by the SARWQCB (Anderson, 2006, 2007a, and 2007b).

Transferring water from Lake Elsinore at night and returning it during daylight hours would have minimal impacts on water temperature (Anderson, 2006). Anderson surmises that the friction associated with moving the water through the generating units could slightly raise the temperature of the water while storage at higher elevation and transfer timing (at night) could result in slight decreases to the temperature. Given that the conduits would be underground where temperatures would be much cooler than the summer time air temperatures at the lake, any gains in temperatures due to friction would likely be negated by the surrounding conditions. These impacts would be less than significant and no mitigation is required.

Although impacts may be localized in the area of the outlet, operation of LEAPS could increase the concentration of DO in waters returning to Lake Elsinore. The activity of transferring the water through the conduit, penstock pipes, and turbines in conjunction with a greater surface area to volume ratio within the upper reservoir would allow for a greater amount of oxygen to become dissolved in the existing stream waters than under current conditions. Maintaining oxygenated water throughout the water column prevents the nutrients stored within the sediments from being released into the water column, which reduces the amount available for use by algae thus improving water quality. Over time, as additional nutrients settle they become stored in the sediments as long as oxygenated conditions persist. Beneficial impacts to water quality are expected to be incremental.

LEAPS operations would involve the cycling of water between Lake Elsinore and the proposed Decker Canyon reservoir. Although impacts may be localized in the area of the outlet, there is an expected beneficial increase in DO as a result of this daily water cycling. It is expected that, over time, LEAPS operations should provide a measurable benefit to the annual mean water quality by using temperature and oxygen concentration differences between the upper and lower reservoirs to promote mixing of the water column and control internal nutrient loading within Lake Elsinore; however, LEAPS alone is not expected to improve water quality to the point where water quality objectives could be met. This water quality effect would be incremental relative to the effects outlined in the Lake Elsinore and San Jacinto Watershed Authority's (LESJWA) "Lake Elsinore Stabilization and Enhancement Project," which includes the installation of a mechanical aeration system to improve water quality and the importation of recycled wastewater to Lake Elsinore to stabilize lake levels. According to the Joint Watershed Authority (2005), dry lake conditions would be eliminated entirely, whereas, under current conditions, lake levels will be below 1225-feet above msl (close to empty) 20 percent of the time.

Because lake level stabilization is necessary for the operation of LEAPS, a long-term water purchase agreement, or similar document, will be negotiated and executed with the EVMWD and/or other water providers in order to ensure the long-term availability of water in Lake Elsinore at elevations above 1240-feet above msl. Such an agreement (as a PME) will enhance water quality parameters in Lake Elsinore.

### *Impact H-12: Project operations could degrade water quality in San Juan Creek (Class II).*

The storage of Lake Elsinore water in the upper reservoir within the San Juan Creek watershed could negatively affect water quality in the San Juan Creek drainage. Spills or releases of water stored in the proposed Decker Canyon reservoir or leaks in the reservoir liner or collection system, membrane system, water conveyance system, or subterranean diversion structure that would allow the water from the proposed Decker Canyon reservoir to reach the San Juan Creek drainage could potentially degrade the water quality in the San Juan Creek watershed.

### *Impact H-13: Project operations could result in dam breach and a consequent loss of human life.*

Proposed development plans have been modified to reduce the height of the reservoir and better conform to the existing topography. As now proposed, the dike has been eliminated and the water elevation of the stored water lowered. The following analysis addresses the conceptual design presented in this application

Because the proposed upper reservoir site is located near the headwaters of San Juan Creek, roughly coincident with the drainage divide between that watershed and that of Lake Elsinore, a dam failure could discharge water into San Juan Creek, and a failure could discharge water toward Lake Elsinore. Mode of failure in the Applicant's dam breach analyses were via a hypothetical piping failure; the hypothetical failure modes for the dike breach analyses included overtopping of the dike crest and internal erosion (piping) through the dike embankment materials.

FERC's Division of Dam Safety and Inspection's San Francisco Regional Office performed a Pre-License inspection and issued a report, dated January 6, 2005, during the Project No. 11858 proceeding. Paragraph A of the Pre-license Inspection Report discusses the downstream hazard potential of the project. The report notes that based on the dam break analyses included in the federal hydropower license application, a dam breach at the Decker Canyon Reservoir site would generate a flood wave that would cause overbank flow along San Juan Creek for about 15 miles to the Pacific Ocean. The areas subject to flooding include campgrounds, residential and commercial buildings, and Ortega Highway (State Route 74) stream crossings. The study estimates that depths could be as high as 39 feet in the narrow canyon areas. A similar study was performed to estimate inundation toward Lake Elsinore should an upper elevation dike fail. A dike breach could result in flooding, however, with less release of water. Structures and possibly residences in the City of Lake Elsinore would be inundated by up to six feet. The report notes that observations made during the inspection confirm that the Decker Canyon Reservoir would be classified as having a high downstream hazard potential. In accordance with the "Federal Guidelines for Dam Safety–Hazard Potential Classification Systems for Dams" (October 1998), dams assigned the high hazard potential are those for which failure or disoperation would probably cause loss of human life.

Inundation studies are conducted as a routine part of reservoir construction. The proposed reservoir's design must conform to both FERC and California Department of Water Resources, Division of Safety of Dams' (DSOD) dam safety requirements. In accordance therewith, substantial safety standards are required in order to minimize, to the maximum extent feasible, the potential for dam failure. Similarly, because electronic and visual monitoring of the reservoir will be required, evidence of potential safety considerations will be identified at the earliest possible time. If public safety conditions are identified, water in the upper reservoir can be released to Lake Elsinore and any remedial measures undertaken.

This impact could be potentially significant but would be reduced to a less-than-significant level through compliance with applicable federal and State design standards, including maintenance and monitoring requirements, and the implementation of the Applicant's proposed protection, mitigation, and enhancement measures (PME-H-1b and PME H-12) located in Table E. 2-11: PME's – Hydrology and Water Quality Impacts

### 2.6.2. Potential Impacts of LEAPS Primary Transmission Lines

The California Department of Water Resources (DWR) subdivides the State into regions for planning purposes. California is divided into ten Hydrologic Regions (HR). Of those, the primary transmission lines are located in the South Coast Region. Each HR is further subdivided into six smaller, nested levels comprising Hydrologic Units (HUs), Hydrologic Areas (HAs), Hydrologic Sub-Areas (HSAs), Super Planning Watersheds (SPWSs), and Planning Watersheds (PWS).

Table E. 2-9: Hydrologic Units, Areas, and Subareas, lists the different hydrologic units, areas, and hydrologic sub-areas which are traversed by the primary transmission lines in Riverside, Orange, and San Diego Counties.

The primary transmission lines span a number of watersheds, including portions of the 765-square mile San Jacinto River and 2,650-square mile Santa Ana River basins north and west of Lake Elsinore. Both watersheds are administered by the Regional Water Quality Control Board, Santa Ana Region (SARWQCB). In addition, the primary transmission line spans the 176-square mile San Juan Creek and 132-square mile San Mateo Creek basins south and east of Lake Elsinore. These watersheds are administered by the Regional Water Quality Control Board, San Diego Region (SDRWQCB).

**Table E. 2-9: Hydrologic Units, Areas, and Subareas**

| Hydrologic Unit | Hydrologic Area | Hydrologic Subarea |
|---|---|---|
| Santa Ana (801.00) | Lake Mathews (801.33) | Lee Lake (801.24) |
| San Jacinto (802.00) | Elsinore Valley (802.31) | - |
| San Juan (901.00) | Mission Viejo (901.20) | Upper San Juan Creek (901.25) |
| | San Mateo Canyon (901.40) | - |
| | San Onofre (901.50) | San Onofre Valley (901.51) |
| Santa Margarita (902.00) | DeLuz Creek (902.20) | DeLuz Creek (902.21) |
| San Luis Rey (903.00) | Lower San Luis (903.10) | Bonsall (903.12); Moosa (903.13) |
| | Monserate (903.20) | Pala (903.21) |
| Carlsbad (904.00) | Escondido Creek (904.60) | Escondido (904.62) |

Source: The Nevada Hydro Company, Inc.

The proposed northern primary transmission line is located in the Santa Ana Basin. The major river systems within this basin include the San Jacinto and the Santa Ana Rivers. The San Jacinto

River watershed originates in the San Jacinto Mountains, drains westerly into Canyon Lake and terminates in Lake Elsinore. Urban areas within this watershed include Gilman Hot Springs, Hemet, Lake Elsinore, Menifee, Moreno Valley, Perris, San Jacinto, Sun City, and Winchester. The San Jacinto River system is also included within the Santa Ana River watershed. Under normal rainfall conditions, the San Jacinto River ends at Lake Elsinore and does not connect with the Santa Ana River. However, during years with high precipitation and runoff, the San Jacinto River flows through to the Santa Ana River.

The proposed southern primary transmission line is located within the San Diego Basin whose northern boundary is formed by a hydrologic divide starting near Laguna Beach and extending inland through El Toro and easterly along the ridge of the Elsinore Mountains into the CNF. The eastern boundary is formed by the Laguna Mountains and the mountains located in the CNF. The United States and Mexico border forms the southern boundary. Within this basin, watersheds traversed by the southern primary transmission line include San Juan Creek, San Mateo Creek, and San Onofre Creek. The San Mateo Creek watershed is located in the southern portion of Orange County, the northern portion of San Diego County, and the western portion of Riverside County. Portions of the creek and marsh are managed by the California Department of Parks and Recreation and are located on Camp Pendleton. San Mateo Creek is bounded on the north and west by the San Juan Creek watershed, to the south by the San Onofre Creek watershed, and to the northeast by the San Jacinto River watershed. The San Onofre Creek watershed is located partly within Camp Pendleton. Case Springs, an 8.2-acre spring-fed pond, is found in the upper part of the watershed.

Table E. 2-10: Primary Connection and Upgrades – Water Resource Impacts summarizes the potential water resource impacts of the primary transmission lines.

**Table E. 2-10: Primary Connection and Upgrades – Water Resource Impacts**

| Impact | Description |
|---|---|
| H-1 | Construction activity could degrade water quality due to erosion and sedimentation. |
| H-2 | Construction activity could degrade water quality through spills of potentially harmful materials. |
| H-3 | Excavation could degrade groundwater quality in areas of shallow groundwater. |
| H-4 | Creation of new impervious areas could cause increased runoff resulting in flooding or increased erosion downstream. |
| H-5 | Transmission towers or other aboveground project features located in a floodplain or watercourse could result in flooding, flood diversions, or erosion. |

Source: The Nevada Hydro Company, Inc.

Because the new towers for the primary transmission lines would be sited to avoid floodplain areas and thus minimize the potential for affecting watercourses (FERC, 2002), transmission towers will have no impact on floodplain areas.

***Impact H-1: Construction activity could degrade water quality due to erosion and sedimentation.***

Disturbed soils are susceptible to erosive processes and may be transported into downstream waters, compromising water quality. Construction of the new transmission alignment may, therefore, affect the rates of erosion and sedimentation, resulting in degraded water quality.

Because of the inherent nature of overhead transmission systems (lines suspended above the ground surface), the construction of the majority of the proposed primary transmission lines is anticipated to produce relatively little effect on erosion and sedimentation. Transmission towers would be sited to avoid floodplain areas and thus minimize the potential for affecting watercourses. Trenching or tunneling for the underground segment and construction of maintenance roads, however, are expected to increase the potential for erosion and sedimentation, potentially affecting water quality.

The primary transmission lines will span about 22 streams along the proposed approximately 32-mile transmission alignment would be affected during construction. New temporary or permanent access roads will be constructed in the National Forest to provide access to new transmission towers. Some of those roads might involve stream crossings and could include culverts, bridges, or low-water crossings. Effects may include temporary diversion during access road construction. Open streams may also be channeled through culverts over the course of construction. Construction of these roads and stream crossing could cause or contribute to erosion. These impacts are potentially significant but would be mitigable to a less-than-significant level with the implementation of PMEs H-1a through H-1f, in combination with PME H-3, H-5.

***Impact H-2: Construction activity could degrade water quality through spills of potentially harmful materials.***

Construction of the proposed primary transmission lines would require the use of a variety of motorized heavy equipment including, but not limited to, 4x4 pickups, fuel trucks, cranes, dozers, forklifts, concrete trucks, backhoes, air compressors, graders, conductor pullers, shield tensioners, and drill rigs. Much of this equipment would require job-site replenishment of petroleum products and other hazardous materials, including oils, grease, coolants, lubricants, and other fluids. The accidental spill of these products, or similar construction-related materials, could lead to the discharge of contaminants onto the soil or into existing surface waters crossed by the proposed transmission line or at the site of the substations and switchyard.

Conveyance of contaminants could take place directly at the time of the spill or could be retained in place (such as soil contaminants) until a runoff event delivered them to a watercourse later or could infiltrate into the soil and/or groundwater below. A chemical spill affecting a water body, stream channel, wetland area, or groundwater is a potentially significant impact but would be mitigable to a level-that-significant level with the implementation of PMEs H-2a, H-2b, and H-2c, in combination with PME H-7.

In addition, the development, implementation, and enforcement of the hazardous substances spill prevention and control plan and hazardous substances response plan (PME H-7) would help to minimize the amount of hazardous materials and petroleum products that would enter surface and/or groundwater in the event of a spill.

***Impact H-3: Excavation could degrade groundwater quality in areas of shallow groundwater.***

Construction of the proposed transmission facilities, including the placement of the overhead towers and the construction of the new substations and switchyard has only minimal potential to affect groundwater. However, construction of both the underground segment of the transmission line and construction of temporary and permanent access and spur roads could intercept, daylight, and/or destabilize shallow groundwater resources and may exist in the area of those construction activities.

The main effect of excavation and interception of groundwater and the daylighting of a slope is the draining of the groundwater that had been held in place by the removed soil. In topographic draws and creek valleys, such interception of groundwater can substantially dry up the area down slope, thus cutting off the supply of shallow groundwater and creating new surface drainage and/or flooding conditions. Upslope and downslope areas can realize a decline in groundwater levels. In arid environments, such effects could be profound for vegetation and the species that depend upon existing hydrologic conditions. Similarly, a number of rural residents located within the boundaries of the CNF rely upon groundwater wells as their sole water source. Any loss of or disruption to groundwater supplying those wells could substantially affect those residents. This impact is potentially significant but would be mitigable to a less-than-significant level with the implementation of PMEs H-3a and H-3b.

***Impact H-4: Creation of new impervious areas could cause increased runoff resulting in flooding or increased erosion downstream.***

Construction of the primary transmission lines could result in an increase in runoff due to construction vehicles compacting pervious area, installation of concrete pads required for the new transmission towers, and the introduction of impervious surfaces at the new substations and switchyard. It is assumed that each new tower will convert approximately 100 square feet of pervious surface to impervious, a total of only about 0.4 acres of new impervious surfaces will be introduced (spanning multiple watersheds) from the construction of transmission tower foundations and footings.

Similarly, the construction of new substations and switchyard will result in a decrease in permeable surface areas as portions of each site is replaced with concrete pads, asphalt paving, buildings, and other impervious surfaces. Although the extent of that coverage remains subject to final design plans, any change in the volume of surface water discharged from each site would not be expected to be significant based on the limited extent of each change in the context of the size of each affected watershed. PME H-4 will ensure that site-specific drainage can be safely conveyed from the proposed substations.

#### 2.6.2.1. Talega-Escondido 230/69-kV Transmission and Substations Upgrades

Several intermittent and ephemeral creeks are crossed by the existing Talega-Escondido 230-kV line, including Moosa Canyon Stream, Govez Creek, San Luis Rey River, Keys Creek, Rainbow Creek, Santa Margarita River, DeLuz Creek, Roblar Creek, and Christianitos Creek. The Pala-Lilac 69-kV corridor is drained by the San Luis Rey River, Pala Creek, and Gomez Creek. These rivers and creeks, plus a number of smaller creeks, including Maggie Creek, Trujilla Creek, Rice Canyon Creek, and Keys Creek, are also located along the transmission corridor (Dudek, 2002).

The Talega-Escondido transmission line corridor crosses a 100-year floodplain just west of Rainbow and south of Pala Substation. With the exception of ephemeral streams, no known water supply features occur within the Talega-Escondido transmission right-of-way. The right-of-way is not located within an area of potential inundation in the event of a dam failure. Surface water within the study area and vicinity includes perennial flow in a number of larger drainages, intermittent storm runoff, and runoff from agricultural and landscape irrigation. These types of flow may be subject to wide variations in water quality from factors such as runoff volumes, adjacent land uses, and chemical applications.

The Talega-Escondido upgrades will entail, in part, the installation of a second 230-kV circuit (Talega-Escondido No. 2) on the vacant position of SDG&E's Talega-Escondido transmission line, installing new 69-kV steel poles along an approximately 7.8-mile section extending between the Pala and Lilac Substations, and making improvements and upgrades within the existing fence-line of the existing Talega and Escondido Substations. With the exception of the rebuilt and relocated Pala-Lilac subtransmission line, minimal effects to hydrology or water quality would occur as a result of these improvements and modifications as no new structures external to existing development footprints are proposed. Potential hydrology and water quality impacts would, therefore, relate primarily to the new structures associated with the placement of new 69-kV steel poles.

***Impact H-1: Construction activity could degrade water quality due to erosion and sedimentation.***

Construction associated with the installation of a second 230-kV circuit (Talega-Escondido No. 2) on existing transmission structures and construction associated with the placement of new steel poles and 69-kV subtransmission line along an approximately 7.8-mile long alignment would require only minimal site clearance and grading activities. Those activities could, nonetheless, contribute to erosion and increase sediment loading to surface waters. The transmission corridor crosses several intermittent and ephemeral streams which could be impacted by sediment loading.

The potential for construction-related sediment and excavated spoils to enter surface waters represents a potentially significant water quality impact but would be mitigable to a less-than-significant level (Class II) with the implementation of PMEs H-1a through H-1f, in combination with PMEs H-3, H-5.

***Impact H-2: Construction activity could degrade water quality through spills of potentially harmful materials.***

Construction of the proposed rebuilt 69-kV subtransmission line segment would require the use of a variety of motorized heavy equipment including, but not limited to 4 x 4 pickups, fuel trucks, cranes, dozers, forklifts, concrete trucks, backhoes, air compressors, graders, conductor pullers, shield tensioners, and drill rigs. Much of this equipment requires job-site replenishment of petroleum products and other hazardous materials, including oils, grease, coolants, lubricants, and other fluids. The accidental spill of these, or other construction-related materials, could lead to the discharge of contaminants onto the soil or into existing surface waters crossed by the subtransmission line.

Conveyance of contaminants could take place directly at the time of the spill or could be retained in place (such as soil contaminants) until a runoff event delivered them to a watercourse later or could infiltrate into the soil and/or groundwater below. A chemical spill affecting a water body, stream channel, wetland area, or groundwater is a potentially significant impact but would be mitigable to a level-that-significant level (Class II) with the implementation of PMEs H-2a, H-2b, and H-2c, in combination with PME H-7.

In addition, the development, implementation, and enforcement of the hazardous substances spill prevention and control plan and hazardous substances response plan (PME H-7) would help to minimize the amount of hazardous materials and petroleum products that would enter surface and/or groundwater in the event of a spill.

***Impact H-3: Excavation could degrade groundwater in areas of shallow groundwater***

Construction of the proposed transmission facilities has only minimal potential to affect groundwater. Excavation activities will be limited to the placement of footing for equipment and the augering of holes for the erection of new 69-kV steel and/or wood subtransmission poles. Impacts to groundwater would be less than significant.

***Impact H-4: Creation of new impervious areas could cause increased runoff resulting in flooding or increased erosion downstream.***

Construction of this segment could result in an increase in runoff due to construction vehicles compacting pervious area and from construction of footings required for the installation of the addition approximately 7.8 miles of rebuilt 69-kV subtransmission line. Facility construction and access road building activities will cross stream and may alter the existing surface runoff patterns, such that more surface flow will be concentrated at particular crossings. In comparison to the overall size of affected watershed area, this impact comprises a small potential increase in the quantity of impervious cover, resulting in small and less-than-significant potential increase in surface runoff.

***Impact H-5: Transmission towers or other aboveground project features located in a floodplain or watercourse could result in flooding, flood diversions, or erosio.***

Existing flooding could be increased if facility construction, operation, or maintenance were to obstruct, impound, or otherwise alter the normal flow of surface waters in the vicinity of the Talega-Escondido upgrades. Construction impacts, including the construction of new access roads and the placement of material, equipment, and facilities within a 100-year floodplain, could alter the direction of surface flows, divert or modify stream channels or riverbed crossing, and/or redirect flows around introduced obstruction. Flooding or inundation of the construction area by active low-flows could interfere with construction activities and affect the quality of surface flow and/or groundwater.

The 69-kV subtransmission line upgrade crosses a 100- and 500-year floodplain directly south of the Pala Substation and a few minor flooding areas exist to the north of the Lilac Substation. Where structures can be spaced far enough apart to span a FEMA-designated floodplain, no impact would result. However, where structures are located in designated 100-year floodplains, flooding impacts could be potentially significant because floods could erode or undermine structural support (Dudek, 2002). This impact could be reduced to a less-than-significant level with the implementation of PME H-5.

### 2.6.3. Potential Impacts of the Project

Cumulative impacts to water resources from the Project primary transmission lines and generation) would be similar to those presented in those two preceding sections.

**Table E. 2-11: PME's – Hydrology and Water Quality Impacts**

| Measure | Description |
|---|---|
| H-1a | **Identify and mark sensitive areas for avoidance**. Specific sites as identified by authorized agencies (e.g., fragile watersheds) where construction equipment and vehicles are not allowed shall be clearly marked on-site before construction or surface disturbing activities begins. Construction personnel shall be trained to recognize these markers and understand applicable equipment movement restrictions. |
| H-1b | **Develop and implement construction Best Management Practices**. (1) A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared and implemented. (2) Storm Water Best Management Practices (BMPs) for construction shall be implemented per the requirements of the project's SWPPP. (3) Silt fencing, straw mulch, straw bale check dams shall be installed, as appropriate to contain sediment within construction work areas and staging areas. Where soils and slopes exhibit high erosion potential, erosion control blankets, matting, and other fabrics and/or other erosion control measures shall be installed, as appropriate to contain sediment within construction work areas and staging areas. (4) The potential for increased sediment loading shall be minimized by limiting road improvements to those necessary for project construction, operation, and maintenance. (5) Upland pull sites shall be selected to minimize, to the extent feasible, impacts to surface waters, riparian areas, wetlands, and floodplains. |
| H-1c | **Stream crossings at low-flow periods**. Stream crossing shall be constructed at low-flow periods and, if necessary, a site-specific mitigation and restoration plan shall be developed. |
| H-1d | **Compliance with NPDES regulations**. The Applicant shall: (1) secure any required General Permit for Storm Water Discharges Associated with Construction Activities (NPDES permit) authorization from the RWQCB and/or SWRCB as required to conduct construction-related activities; and (2) establish and implement a SWPPP during construction to minimize hydrologic impacts. |
| H-1e | **Construction routes to avoid and minimize disturbance to stream channels**. To the extent feasible, where the construction of access roads would disturb sensitive features such as streambeds, the route of the access road shall be adjusted to avoid or minimize such impacts. Whenever practical, construction and maintenance traffic shall use existing roads or cross-county access routes (including the ROW) which avoid impacts to sensitive features. To minimize ground disturbance, construction traffic routes will be clearly marked with temporary markers, such as easily visible flagging. Construction routes, or other means of avoidance, must be approved by the appropriate agency or landowner before use.<br>Where it is not feasible for access roads to avoid streambed crossings, such crossings shall be built at right angles to the streambeds, whenever feasible. Where such crossings cannot be made at right angles, where feasible, the Applicant shall limit roads constructed parallel to streambeds to a maximum length of 500 feet at any one transmission crossing location. Such parallel roads would be constructed in such a manner that minimizes potential adverse impacts on waters of the U.S. or waters of the State. Streambed crossings or roads constructed parallel to streambeds shall require review and approval of necessary permits from the USCOE, CDFG, RWQCB, and SWRCB. |

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| H-1f | **Construction on USDA Forest Service land to be subject to an approved, site-specific SWPPP and Sediment Control Plan**. A site-specific sediment control plan and SWPPP shall be prepared for construction within the National Forest. These plans shall identify and characterize potentially affected water resources and provide post-construction remediation and monitoring details. The sediment control plan shall include construction in the dry periods (but not preclude construction in the wet periods), as well as construction by helicopter in areas where terrain is steep and the potential consequences of sedimentation severe. These plans shall be submitted to the USDA Forest Service (on NFS lands) for review and approval prior to the commencement of construction. |
| H-2a | **Groundwater testing and treatment before disposal**. (1) In no case shall groundwater removed during construction be discharged to surface waters or storm drains without first obtaining any required discharge permits. (2) If dewatering is necessary, the water will be contained and sampled to determine if contaminants requiring special disposal procedures are present. (3) If the water tests sufficiently clean and land application is determined feasible per applicable SWRCB and RWQCB requirements, the water may be directed to relatively flat upland areas for evaporation and infiltration back to the water table, used for dust control, or used as makeup for a construction process (e.g., concrete production). (4) Water determined to be unsuitable for land application or construction use shall be disposed of in another manner, such as treatment and discharge to a sanitary sewer system in accordance with applicable permit requirements or hauled off the site to an appropriate disposal facility. |
| H-2b | **No storage of fuels and hazardous materials near sensitive water resources**. Storage of fuels and hazardous materials will be prohibited within 200 feet of groundwater supply wells and within 400 feet of community or municipal wells. |
| H-2c | **Proper disposal and clean-up of hazardous materials**. Hazardous materials will not be disposed of onto the ground, the underlying groundwater, or any surface water. Totally enclosed containment will be provided for trash. Petroleum products and other potentially hazardous materials shall be removed to a hazardous waste facility permitted or otherwise authorized to treat, store, or dispose of such materials. In the event of a release of hazardous materials to the ground, it will be promptly cleaned up in accordance with applicable regulations. |
| H-3a | **Minimize impacts from road construction**. To the extent possible, BMPs and sound road design practices cognizant of road construction effects shall be carried out to minimize the inherent effects of road construction on groundwater. In certain situations, there is no cost-effective alternative or mitigation for the adverse effects of hillslope road cuts on local groundwater. Unless authorized by the USDA Forest Service(on NFS lands), transmission towers shall be installed via helicopter in areas with slopes greater than 15 percent to minimize the potential effects of road cuts on groundwater. |
| H-3b | **Compensate affected water supply**. Should destabilization of artesian groundwater serving as water supply occur, the Applicant shall compensate delivery of additional water supply where a direct linkage between the Applicant's actions and a diminution of water supplies can be firmly affixed. |
| H-3c | **Isolate underground powerhouse from groundwater flows**. The Applicant shall use a combination of sealing and water control sumps to isolate the LEAPS powerhouse from underground flows. The Applicant shall ensure that groundwater flow patterns at the proposed powerhouse site and penstock alignment are not adversely affected. |
| H-4 | **Install substation runoff control**. The pad for new substations shall be constructed with a pervious and/or high-roughness surface where possible to ensure maximum percolation of rainfall after construction. If required, detention/retention basins shall be installed to reduce local increases in runoff, particularly on frequent runoff events. Downstream drainage discharge points shall be provided with erosion protection and designed such that flow hydraulics exiting the site mimics the natural condition as much as possible. A drainage design hydrologic and hydraulic analysis shall be provided at least 60 days prior to the initiation of construction. |

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| H-6 | **Scour protection to include avoidance of bank erosion and effects adjacent property**. A determination of towers requiring scour protection shall be made during the design phase by a registered professional engineer with expertise in river mechanics. All towers within the project RPW shall be reviewed by the river mechanics engineer and the foundations of those towers determined to be subject to scour or lateral movement of a stream channel shall be protected by burial beneath the 100-year scour depth, setback from the channel bank, or bank protection provided as determined by the river mechanics engineer. An evaluation shall also be made regarding the potential for the tower and associated structures to induce erosion onto adjacent property. Should the potential for such erosion occur, the tower location shall be moved to avoid this erosion or erosion protection (such as rip rap) provided for affected properties. |
| H-7 | **Develop Hazardous Substances Response Plan for project operation**. The Applicant shall prepare and implement a Hazardous Substance Control and Emergency Response Plan for project operation and a copy shall be kept on the site at substations. This plan shall include definition of an emergency response program to ensure quick and safe cleanup of accidental spills, including prescriptions for hazardous-material handling to reduce the potential for a spill during construction. The plan will identify areas where refueling and vehicle-maintenance activities and storage of hazardous materials, if any, will be permitted. |
| H-12 | **Develop and implement a water spill, release, and/or leak prevention plan**. Unless otherwise addressed in any permit issued by the Federal Energy Regulatory Commission (FERC), the USDA Forest Service, and/or the California Division of Safety of Dams, at least 60 days prior to the commencement of construction of the upper reservoir, the Applicant shall file with the SWRCB a plan for protection of the San Juan Creek Watershed from any water spill, release, and/or leak. At a minimum, the plan shall require the Applicant to (1) maintain the project area appropriately sealed off from the San Juan Creek Watershed during construction and operation of the project; (2) to periodically test the upper reservoir for any leaks, releases, and/or spills; (3) to inform the SWRCB immediately of the nature, time, date, location, and action taken for any spill affecting the San Juan Creek Watershed; and (4) establish a protocol, to be approved by the SWRCB, for cleanup and monitoring any spill, release, and or leak. |