

## 4.6 Hydrology and Water Quality

### 4.6.1 Introduction/Methodology

This section describes the existing hydrology and water quality conditions that could be affected by implementation of the Project. It outlines the methodology used to conduct the analysis, describes the existing hydrology and water quality resources in the PSA, identifies the regulations and standards that could apply to these resources, and provides the references. This section was prepared using data obtained from the State of California Watershed Portal (State of California 2006). The source places the location of the PSA in the South Coast Region, which is a large area extending from Ventura, California in the north, to the United States/Mexico border in the south. The San Diego Regional Water Quality Control Board's (SDRWQCB) region is located within the South Coast Region. This section will use SDRWQCB terminology when describing the area.

### 4.6.2 Environmental Setting

This section discusses existing surface water drainage, flooding, water quality, and groundwater resources in the PSA. Baseline hydrological conditions in the PSA were collected from published and unpublished maps, aerial photos, and other relevant documents covering the PSA and the surrounding area as available.

#### 4.6.2.1 Surface Water

Based on the information provided by the California State Water Resources Control Board (California RWQCB 2006), the Sunrise Project crosses the South Coast and the Colorado River hydrologic regions (**Figure 4.6-1**). Each hydrologic region is subdivided into subregions and further divided into basins and sub-basins. Basins crossed by the project within the South Coast Hydrologic Region include the San Diego, San Luis Rey, San Dieguito, and Penasquitos basins; those within the Colorado River Hydrologic Region include the Imperial and Anza-Borrego basins.

The Peninsular Mountain Range forms the divide between the Colorado River Basin, which drains generally east toward the Salton Sea and the Colorado River, and the South Coast Basin, which drains west toward the Pacific Ocean.

The hydrologic conditions along the Project alignments vary from rugged terrain with steep valleys, ravines, and dissected desert plains to highly urbanized areas in the San Diego area. The local hydrology and drainage patterns have been significantly altered in the urban areas.

The Project alignments are located in two primary Hydrologic Regions: the Colorado River Hydrologic Region governed by the Colorado River Regional Water Quality Control Board (Colorado RWQCB) and the San Diego Hydrologic Region governed by the SDRWQCB. These boards are charged with implementing programs that preserve and enhance water quality and protect the beneficial uses of their regional water. The Project alignments would fall within planning areas governed by the two boards. The Desert Link alignment would fall within the Colorado RWQCB planning areas for the ABDSP and Imperial Valley (Colorado RWQCB 2005). The Central Link would fall within both the Colorado RWQCB Anza-Borrego planning area and the San Diego RWQCB planning area. The alignments proposed for the Inland Valley and Coastal links would fall within the SDRWQCB planning area.

**Figures 4.6-2A through 4.6-2D** illustrate and **Table 4.6-1** lists the principal named perennial, intermittent, and ephemeral streams (surface waters) within 0.5 miles of the Project. The data depict the

generalized location where each stream crosses the Project alignments. The Project would cross 42 named water bodies (streams, lakes, and reservoirs) several times.

**Table 4.6-1** presents the surface water resources and includes a column that identifies the impaired waters as defined by Section 303(d) of the 1972 Clean Water Act (CWA). Under Section 303(d), states, territories, and authorized tribes are required to develop a list of water quality limited segments. The waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for water on the lists and that they develop action plans, called Total Maximum Daily Loads (TMDL), to improve water quality.

#### 4.6.2.1.1 Colorado River Hydrologic Region

The PSA traverses the following hydrologic units in the Colorado River Hydrologic Region:

**Anza-Borrego Basin:** The PSA encompasses 1,000 square miles in the southwest corner of the Colorado River Hydrologic Region and drains to the Salton Sea, with the exception of two small areas of internal drainage in Clark and Borrego valleys to the northwest (Colorado RWQCB 2005). The annual precipitation in the PSA ranges from less than 3 inches along the eastern boundary near Imperial Valley to 25 inches in the mountain divide between the Salton Sea and Pacific Ocean drainages. Runoff occurs from winter precipitation, especially in the higher elevations and from summer thunderstorms. The Colorado RWQCB adopted an updated CWA 303(d) list, which in part identifies the quality of the waters of the Salton Sea as impaired by discharge of wastes from non-point sources, primarily of agricultural origin. Non-point source pollution in this region also originates from sources other than agriculture including abandoned mines, storm water runoff, boating activities, alterations to land (e.g., urban development), and animal production activities (Colorado RWQCB 2005). The PSA also crosses waters that drain into the Salton Sea.

**Imperial Valley Basin:** The Imperial Valley Basin drains toward the Salton Sea. Two surface waters, the New and Alamo rivers, convey agricultural irrigation drainage from farmlands in the Imperial Valley, surface runoff, and lesser amounts of treated municipal and industrial waste waters from the Imperial Valley. Average annual precipitation ranges from less than 3 inches over most of the basin to about 8 inches in the Coyote Mountains on the western border of the basin. The Colorado RWQCB adopted an updated CWA 303(d) list, which in part identifies the quality of the waters of the Salton Sea, Alamo River, New River, and Imperial Valley agricultural drains as impaired by discharges of wastes from non-point sources, primarily of agricultural origin. The Alamo River and New River are the two largest drains in this region that are significantly impaired by agricultural pollution. Non-point source pollution in this region also originates from sources other than agriculture including abandoned mines, storm water runoff, boating activities, alterations to land (e.g., urban development), and animal production activities (Colorado RWQCB 2005). The Project crosses waters that drain into the Salton Sea, the New River, and the Imperial Valley agricultural drains.

#### 4.6.2.1.2 San Diego Hydrologic Region

The PSA traverses the following Hydrologic Units in the San Diego Hydrologic Region:

**San Luis Rey Basin:** The San Luis Rey Basin is a rectangular area of about 565 square miles (San Diego RWQCB 1994). The major stream system is the San Luis Rey River which is interrupted by Lake Henshaw, one of the largest water storage areas in the San Diego Region. Annual precipitation ranges from less than 12 inches near the ocean to 45 inches near Palomar Mountain. The Sunrise Project would

pass near the southern shores of Lake Henshaw and intersect with Carrizo Creek, which is a major tributary to Lake Henshaw.

**San Dieguito Basin:** The San Dieguito Basin is a rectangular area of about 350 square miles and includes the San Dieguito River and its tributaries, along with Santa Ysabel and Santa Maria creeks (San Diego RWQCB 1994). The Project would cross Bloomdale Creek, Scholder Creek, Witch Creek, and Santa Ysabel Creek. Based on the information in the current 303(d) list, there are no 303(d)-listed impaired streams or waterbodies that would be crossed in this basin.

**San Diego Basin:** The San Diego Basin is a long, triangular area of about 440 square miles drained by the San Diego River and its tributaries (San Diego RWQCB 1994). Within this basin, the Project would cross Dye Canyon, Swartz Canyon, San Vicente Creek, Daney Canyon, Foster Canyon, the West Branch of San Vicente Canyon, Sycamore Canyon, and the West Branch of Sycamore Canyon. There are no 303(d)-listed impaired streams or waterbodies that would be crossed in this basin.

**Penasquitos Basin:** The Penasquitos Basin is a triangular area of about 170 square miles (San Diego RWQCB 1994). There are no major creeks within this unit. However, the Sunrise Project would cross tributaries to Beeler Canyon, Los Penasquitos Canyon, Chicarita Creek, Deer Canyon, and McGonigle Canyon. There are no 303(d)-listed impaired streams or waterbodies that would be crossed in this basin.

#### 4.6.2.2 Groundwater

The State of California has established designated groundwater basins throughout the state as described in Groundwater Bulletin 118 (State of California 2003). The PSA crosses through the Colorado River Hydrologic Region (CRHR) and the South Coast Hydrologic Region (SCHR). Due to the size and complexity of the SCHR, it has been divided into subregions, one of which is the San Diego Subregion. These subregions are further divided into groundwater basins. The Colorado Hydrologic Region is not divided into subregions, but into groundwater basins. Therefore, the following discussion of the groundwater resources will address the resources in the Colorado River Hydrological Region and the San Diego Hydrologic Subregion. Proposed Project and Alternative Alignments cross some of the designated groundwater basins or surface waters that are known to be sources of recharge for these groundwater basins. The groundwater basins that are crossed by the Proposed Project and each alternative are presented in **Tables 4.6-2 and 4.6-3** and are discussed in detail in the following subsections.

##### 4.6.2.2.1 Colorado River Hydrologic Region

The Colorado River Hydrologic Region covers 13 million acres of southeastern California and is bounded by the states of Nevada and Arizona to the east; the Republic of Mexico to the south; the Laguna, San Jacinto, and San Bernardino mountains to the west; and the New York, Providence, Granite, Old Dad, Bristol, Rodman, and Ord mountain ranges to the north (State of California 2003). There are 64 sub-basins in the hydrologic region, and in portions of the region, this is a sole-source aquifer. The unconfined to confined aquifers are composed of unconsolidated alluvium varying from tens to thousands of feet in thickness depending on the size of the sub-basins. Wells can yield up to thousands of gallons per minute (gpm) of water to the municipal wells. The average depths to groundwater range from about 3 feet below ground surface (bgs) in the alluvial drainages near the Salton Sea to more than 400 feet in the mountainous areas in the Peninsular range. Groundwater is characterized by sodium, calcium, and, to a lesser extent, magnesium cation concentrations. The main water quality concerns include high total dissolved solids (TDS). Concentrations of fluoride, sulfate, and nitrate have exceeded the drinking water standards in agricultural areas (State of California 2003).

The groundwater resources in the Desert Link are predominately located in the Colorado River Hydrologic Region, with an overlap into the San Diego Hydrologic Subregion in the western portion of the Desert Link.

The following discussion of groundwater basins in the Colorado River Basin was adapted from California's Groundwater Bulletin 118 (State of California 2003).

**Ocotillo-Clark Valley Groundwater Basin:** The Ocotillo-Clark Valley Groundwater Basin drains internally to the Clark (dry) Lake with the remainder of the valley draining to the Salton Sea (Strand 1962; Rogers 1965; Jennings 1967). Due to limited data records, average domestic well depth was considered when determining the probability of encountering groundwater at depths less than 240 feet below ground surface (bgs) (State of California 2003e). A portion of the PSA is located within the U.S. EPA designated Ocotillo-Coyote Wells Sole Source Aquifer which is located in this groundwater basin. The Proposed Project from just south of N59 to N38 is located in this groundwater basin (see **Tables 4.6-2 and 4.6-3** for precise lat/long designations).

**Coyote Wells Valley Groundwater Basin:** The Coyote Wells Valley Groundwater basin is located southeast of the Vallecito-Carrizo Basin and lies near the international border with Mexico in the western Yuma Desert west of Imperial Valley. Palm Canyon Wash and Coyote Wash provide the main surface drainages for the basin (DWR 1973; Skrivan 1977). The most productive water-bearing zone in this sub-basin is the Holocene alluvium with depths ranging from 100 to 300 feet bgs (DWR 1973). The probability of encountering groundwater is likely at depths less than 100 feet bgs in the basin (State of California 2003b). The Alternative Alignment from west of N2 to north of N4 is in this groundwater basin (see **Table 4.6-3** for precise lat/long designations).

**Imperial Valley Groundwater Basin:** The Imperial Valley Groundwater Basin is the most southern part of the Colorado Desert Hydrologic Region, south of the Salton Sea. The physical groundwater basin extends across the border into Baja, California where it underlies a contiguous part of the Mexicali Valley (California Department of Public Works 1954). Major hydrologic features include the New and Alamo Rivers, which flow north towards the Salton Sea; the All-American Canal (three branches); and the Coachella Canal. The probability of encountering groundwater is likely at depths less than 200 feet bgs in the upper aquifer and 380 feet bgs in the lower aquifer (State of California 2003c). Both the Proposed Project from N1 to northwest of N6 and the Alternative Alignment from N2 to a point northwest of N4 are located in this groundwater basin (see **Tables 4.6-2 and 4.6-3** for precise lat/long designations).

**San Felipe Valley Groundwater Basin:** The San Felipe Groundwater Basin is located within San Diego County and is drained mostly by San Felipe and Banner creeks, which join drainage from Earthquake Valley and flow through Sentenac Canyon to the Yaqui Well Area. According to Brown (1923), recharge of the northwestern portion of the basin is largely from the infiltration of runoff in San Felipe and Banner creeks. Additional recharge of the basin is from the percolation of precipitation that falls on the valley floor and the infiltration of runoff through coarse-grained alluvial deposits at the base of the surrounding mountains. In the northwest half of the basin, water levels declined by about 21 feet between 1958 and 1971, and depth to water ranged from about 22 to 45 feet BGS. Beneath the central part of the valley, groundwater levels declined by about 30 feet between 1958 and 1971, and depths to water ranged from about 54 to 88 feet bgs. Groundwater in the basin moves southeastward from the north, and northwestward from the south, toward Sentenac Cienega. The Alternative Alignment from a point southwest of N74 to N16 is located in this groundwater basin (see **Table 4.6-3** for precise lat/long designations).

**Borrego Valley Groundwater Basin:** The Borrego Valley Groundwater Basin is located within the eastern Imperial and western San Diego counties and drained toward the southwest by Coyote Creek and

San Felipe Creek. The probability of encountering groundwater is likely within a range of 700 to 1,800 feet bgs depending on the relationship to the aquifer within the basin (State of California 2003). The Proposed Project through ABDSP from N13 to N18 and the Alternative Alignment from south of N43 to a point north of N66 are located in this groundwater basin (see **Tables 4.6-2 and 4.6-3** for precise lat/long designations).

**Yaqui Well Area Groundwater Basin:** The Yaqui Well Area Groundwater Basin underlies the ABDSP and flows eastward towards Ocotillo-Clark Valley Groundwater Basin (Brown 1923, Rogers 1965). Groundwater is found in unconsolidated younger Quaternary alluvial deposits and underlying unconsolidated to semi-consolidated older Tertiary to Quaternary alluvial deposits (DWR 1954). Data was not available on the depth of the aquifer for this basin (State of California 2003k). The Proposed Project from a point west of N13 to N66 and a small area of Segment Options N62 to N66 and N74 to N16 are located in this groundwater basin (see **Tables 4.6-2 and 4.6-3** for precise lat/long designations).

### *Sole Source Aquifers*

A portion of the Project is located within the U.S. EPA designated Ocotillo-Coyote Wells Sole Source Aquifer. That portion occurs within the Desert Link. The U.S. EPA's Sole Source Aquifer (SSA) Program was established under Section 1424(e) of the Safe Drinking Water Act (SDWA), and this area was so designated on September 10, 1996 (FR 1996). The U.S. EPA stated that "...all federally funded or otherwise federally assisted projects constructed in the Ocotillo-Coyote Wells area and its streamflow source zones will be subject to U.S. EPA review to ensure that these projects are designed and constructed such that they do not create a significant hazard to public health (FR 1996)."

The U.S. EPA determined that the Ocotillo-Coyote Wells Aquifer, underlying portions of Imperial County, currently serves as the "sole source" of drinking water for the residents of Ocotillo, Coyote Wells, Yuha Estates, and Nomirage. It was further determined that contamination of the aquifer would create a significant hazard to public health and that there is no economically feasible alternative drinking water source near the designated area.

The Ocotillo-Coyote Wells Sole Source Aquifer underlies an 87-square-mile area in the southwestern corner of Imperial County near Ocotillo, California. Ocotillo is approximately 25 miles west of El Centro and 90 east of San Diego. Groundwater is found primarily in the saturated Quaternary-age alluvial valley-fill deposits, which are derived from the surrounding mountains and consist of fine sand and gravel interspersed with silts and clays of varying thickness and extent. The designated area includes the surface area above the alluvial unconfined aquifer and the surrounding recharge areas located in the Jacumba and Coyote mountains. The boundaries of the sole source aquifer are largely topographically defined along major surface watershed boundaries in the Jacumba and Coyote mountains, with the exception of the Elsinore Fault boundary and the boundary with the United States/Mexican border. The Elsinore fault was chosen as a boundary because it separates the sole source aquifer area, which contains high-quality, potable water from high saline, non-potable water to the east of the fault (FR 1996).

#### **4.6.2.2.2 San Diego Hydrologic Subregion**

The San Diego Hydrologic Subregion is located in the South Coast Hydrologic Region, which covers 6.70 million acres of southern California and is bounded by the Pacific Ocean to the west, the Transverse Ranges to the north, and the San Jacinto Mountains and the Peninsular Range low-lying hills to the east (State of California 2003) (reference **Figures 4.6-2A through 4.6-2D**). The groundwater resources associated with the Project are located in the San Diego Subregion 9, which contains 27 groundwater basins. Groundwater is produced from the unconsolidated alluvial aquifer units (State of California 2003)

Groundwater is mainly composed of calcium and sodium ions and bicarbonate and sulfate anions. There are reportedly local impairments by nitrate, sulfate, and TDS contamination (State of California 2003.). Impairment to groundwater is an emerging problem. Wells located throughout the South Coast Aquifer yield 20 to several thousand gpm of water. Twenty-three percent (1,177 total acre-feet) of the region's water demand is met by groundwater resources (State of California 2003).

The following discussions of groundwater in the San Diego Region are adapted from California's Groundwater Bulletin 118 (State of California 2003). The PSA crosses these resources as depicted on **Tables 4.6-2 and 4.6-3**. The Inland Valley Link is located in both the San Diego Hydrologic Subregion and the Colorado River Hydrologic Region. The groundwater basins in the San Diego Region are the Warner Valley Groundwater Basin and the Ranchita Town Area Groundwater Basin.

**Ranchita Town Area Groundwater Basin:** The Ranchita Town Area Groundwater Basin is located east of the Warner Groundwater Basin and is drained by Buena Vista Creek into Lake Henshaw, and then to the San Luis Rey River. There are three principal water-bearing deposits that reach thicknesses of at least 130 feet in the basin resulting in the likely probability of encountering groundwater at depths less than 130 feet below ground surface (State of California 2003g). The Proposed Project from just east of N13 to N66 and the Alternative Alignment from just east of N66 are located in this groundwater basin (see **Tables 4.6-2 and 4.6-3** for precise lat/long designations).

**Warner Groundwater Basin:** The Warner Groundwater Basin is located in the northeastern part of San Diego County draining westward to Lake Henshaw by the Agua Caliente and Buena Vista Creeks and San Luis Rey River. The basin is bounded on the west by Lake Henshaw and the Elsinore fault and on all other sides by impermeable crystalline rocks of the Peninsular Ranges (Rogers 1965; DWR 1967, 1971). The principal water-bearing deposits are alluvium reaching thicknesses of at least 900 feet and residuum (DWR 1971). The Proposed Project from N16B-N17-N18 is located in, or provides recharge to, this groundwater basin (see **Table 4.6-2** for precise lat/long designations).

**Santa Maria Valley Groundwater Basin:** In the Santa Maria Valley Groundwater Basin, the principal water-bearing units consist of the alluvium and the residuum. The recharge of the basin is through percolation of precipitation of the valley floor, runoff, and flow in Santa Maria Creek. The basin is drained westward by Santa Maria Creek. The combined alluvial deposits in the basin are reported to range from 4 to 100 feet thick and have a specific yield of about 16 percent (DWR 1991). The probability of encountering groundwater in this basin is likely at depths ranging from 4 to 100 feet bgs (State of California 2003h). The Alternative Alignment from south of N27 to N23 is located in this groundwater basin (see **Table 4.6-3** for precise lat/long designations). In addition, the Proposed Project crosses the San Ysabel Creek at several locations from N46–N68–N20; the Alternative Alignment crosses San Ysabel Creek between N46 and N76 (see **Tables 4.6-2 and 4.6-3** for precise lat/long designations). San Ysabel Creek is associated with the Santa Maria Valley Groundwater Basin because it drains to Sutherland Reservoir, which in turn drains into the Santa Maria Groundwater Basin.

**Pamo Valley Groundwater Basin:** In the Pamo Valley Groundwater Basin, the principal water-bearing units consist of the alluvium and the residuum. The Pamo Valley Basin is located beneath an inland valley within San Diego County that is drained by the Temescal and Santa Ysabel creeks. Groundwater depths fluctuate from 10 to 20 feet bgs (State of California 2003f). The Proposed Project crosses the San Ysabel Creek at several locations from N46–N68–N20; the Alternative Alignment crosses San Ysabel Creek between N46 – N76 (see **Tables 4.6-2 and 4.6-3** for precise lat/long designations).

**Poway Valley Groundwater Basin:** The Poway Valley Groundwater Basin underlies a portion of the Poway Valley in west-central San Diego County. Poway Valley is drained by Poway and Los Penasquitos Creeks to the Pacific Ocean. Groundwater may be encountered near the surface to a depth of 75 feet bgs.

The principal water-bearing units within this basin include the alluvium and the residuum. The alluvium ranges from 10 to 75 feet with an average depth of 40 feet (Evenson 1989) and the residuum, which is produced by in-place weathering of crystalline basement rocks, reaches about 70 feet in thickness (DWR 1967). The Proposed Project from east of N28 in the headwaters of Beeler Canyon to west of N29 drains into this groundwater basin (see **Table 4.6-2** for precise lat/long designations).

### **4.6.2.3 Water Quality**

The following sections address the existing surface water quality in Colorado River Basin and the San Diego Hydrologic Area.

#### **4.6.2.3.1 Colorado River Basin**

The Colorado River Basin is characterized primarily by intermittent and ephemeral channels with the notable exceptions of the Salton Sea and the Colorado River. The Project would not be located near the Colorado River, but does cross the drainages into the Salton Sea, San Felipe Creek, Salt Creek and the Imperial Valley Agricultural Drains. There are numerous streams located in the Colorado River Basin and within the PSA as listed on **Tables 4.6-2 and 4.6-3**.

According to the California WQRCB (2005) the Colorado River Basin Region covers approximately 13 million acres (20,000 square miles) in the southeastern corner of California and includes all of Imperial County and portions San Diego County. The majority of the Region's surface waters are located in the Imperial Valley and east Colorado River planning areas, with a few situated in the Coachella Valley, Lucerne, Anza-Borrego, and Hayfield planning areas. The Salton Sea Trans-boundary Watershed contains five of six, 303(d)-listed impaired surface water bodies. Water from the Colorado River has created an irrigated agricultural ecosystem throughout this watershed. Wildlife and aquatic species are dependent on habitat created and maintained through the discharge of agricultural return flows. Major waterbodies in the watershed include the Salton Sea, Alamo River, New River, Imperial Valley Agricultural Drains, and Coachella Valley Storm Water Channel. San Felipe Creek and Salt Creek also occur in this watershed and provide critical habitat for the endangered species. The designated beneficial uses of the waters in the Watershed include agricultural supply, aquaculture, cold freshwater habitat, groundwater recharge, hydroelectric power generation, industrial, municipal and domestic, rare and endangered species, warm freshwater habitat, water contact recreation and wildlife habitat. The PSA crosses the drainages into the Salton Sea, San Felipe Creek, Salt Creek and the Imperial Valley Agricultural Drains.

A list of the Colorado River Basin waterbodies (streams, reservoirs, lakes) located within 0.5 miles of the Project is presented in **Tables 4.6-2 and 4.6-3**. The table also identifies the Section 303(d) waters. There are 303(d) waters within one 0.5 miles of the Project. The Imperial Valley drains are listed and the Total Maximum Daily Load (TMDL) for sediment/siltation was approved by the U.S. EPA in September 2005. No TMDL have been approved for the Salton Sea (U.S. EPA 2006).

#### **4.6.2.3.2 San Diego Basin**

According to the San Diego Board of Supervisors (2003), water quality concerns within the San Diego Basin can be attributed to increased levels of coliform bacteria, TDS, nutrients, petroleum, chemicals, and trash. The source of these contaminants is urban runoff, agricultural runoff, mining operations, sewage spills, and sand and gravel mining.

The TMDL program is required under Clean Water Act (CWA) Section 303(d). There are streams, lakes and coastal waters within the South Coast basin that do not meet certain water quality standards. CWA

Section 303(d) addresses these waters by requiring states to identify the waters and develop TMDLs for them. A TMDL is a quantitative assessment of water quality problems, contributing sources, and load reductions or control actions needed to restore and protect bodies of water. Each state is required to evaluate their water resources and identify waters that are impaired according to Section 303(d). A list of the San Diego Basin waterbodies (streams, reservoirs, lakes) located within a 0.5 miles of the Project are presented in **Tables 4.6-2 and 4.6-3**. The table also identifies the Section 303(d) waters. There are no 303(d) waters within 0.5 miles of the Project.

The San Diego Basin Water Quality Control Plan lists the water quality parameters for each watershed. Many of the waters are used for municipal supplies. According the San Diego RWQCB report (CRWQCB 2005), the Penasquitos hydrologic unit water quality is generally fair in regards to its ability to support a viable aquatic ecosystem (Bioassessment). The report further states that the designated Beneficial uses for the basin listed in the area of the PSA are for Agriculture Supply, Contact and Non-contact Recreation, Warm and Cold Habitat and Wildlife Habitat. It also reported that in 1985 the USGS had found high TDS, chlorine and sulfate levels in Penasquitos Creek, but in Beeler Creek, a tributary to Penasquitos, there were no exceedances. The USGS indicated that these differences may have been due to the differences in the geology and/or the level of development in the watershed.

#### **4.6.2.4 Floodplains**

Multiple streams would be crossed by the Project in both the Colorado River Basin and the San Diego Basin that are delineated as 100-year floodplains and designated as flood hazard areas by the Federal Emergency Management Agency (FEMA). The locations of these floodplains are identified in **Tables 4.6-2 and 4.6-3**. They include (east to west) Yula Wash, Palm Canyon, Carrizo Wash, San Felipe Creek, Fish Creek Wash, Coyote Creek, the tributaries to Lake Henshaw (which are Matagual Creek and Carrista Creek), Santa Ysabel Creek, Beeler Canyon, and Los Penasquitos Canyon.

##### **4.6.2.4.1 Flood Hazard Areas**

Flood hazard areas are defined by FEMA as areas prone to flooding and include such areas as dam break flooding and 100-year floodplains. Flood hazard areas are determined using statistical analyses of records of river flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. These include those areas subject to flooding from rivers and streams, along coastal areas and lake shores, or shallow flooding areas (FEMA 2006). The primary areas containing flood hazards are located in the Project's Desert Link and will be described in detail in the impact section. Other areas that have designated floodplains in the FEMA 100-year floodplains are also located in the PSA and will be described in detail in the appropriate mitigation sections. The locations of these flood hazard areas are identified in **Tables 4.6-2 and 4.6-3**. They include (east to west) Yula Wash, Palm Canyon, Carrizo Wash, San Felipe Creek, Fish Creek Wash, Coyote Creek, the tributaries to Lake Henshaw (which are Matagual Creek and Carrista Creek), Santa Ysabel Creek, Beeler Canyon, and Los Penasquitos Canyon.

To assist local jurisdictions in developing evacuation plans for possible inundation areas below dams, the State Office of Emergency Service and the California Department of Water Resources have identified areas of potential inundation in the event of dam failures throughout California. These agencies have also estimated when flood waters would arrive at downstream locations should a dam fail. The Proposed Project, from N17 to N18, would cross the inundation zone of Lake Henshaw and is the only location in the Project that has been identified as an area of potential inundation.

##### **4.6.2.5 Seiche, Tsunami, and Mudflow Hazards**

#### 4.6.2.5.1 Tsunami

The following evaluation of tsunami was excerpted from Legg et al. (2003). Historically, potential for tsunami generation from local sources has been considered insignificant because most of the faulting in the southern California region is strike-slip in character. However, major thrust and reverse faulting occurs throughout the Western Transverse Regions (WTR), resulting in historical tsunami occurrences following strong earthquakes in the Santa Barbara Channel region and west of Point Conception. **Table 4.6-4** shows possible locally-generated tsunami along the southern California coast between 1812 and 1989.

The major strike-slip faults offshore of southern California and south of the WTR have sinuous traces with many bends and step-overs. Local tectonic convergence at restraining bends and step-overs creates folding and seafloor uplift, whereas local tectonic divergence at releasing bends and step-overs produces extension and seafloor subsidence (Legg and Kennedy 1991). Rapid seafloor deformation at these fault bends and offsets may generate local tsunamis that could damage nearby coastal areas. This study examines the Santa Catalina Island Platform, the major restraining bend along the San Diego Trough fault system, and its potential for generating destructive local tsunami. The model results are for an area slightly north of San Diego in the PSA. However, the results should be comparable because of the uniformity of the San Diego Trough fault system, and can therefore be used to estimate the potential for destructive tsunami in the San Diego area.

In order to evaluate the potential for local offshore earthquakes to generate destructive tsunami, the Santa Catalina Island restraining bend was modeled with a realistic fault geometry and oblique-reverse earthquake displacement to match the overall shape of the island block morphology. Six sub-events were modeled, ranging from  $M_w = 7.0$  to 7.4.

Results of the model showed that the maximum run-up expected ranged from 1.5 to 2.2 meters, which is not expected to impact the existing Penasquitos Substation located above elevation 300 feet (90 meters). It should be noted that recent observations of tsunami run-up values predicted from simple elastic dislocation models of tectonic deformation may underestimate the actual peak run-up values by a factor of 2. Consequently, the actual coastal run-up values may range from 2 to 4 meters, which is not expected to impact the Penasquitos substation. In addition, this study only examined the tectonic deformation from large earthquakes as a potential tsunami source. Large-scale submarine landslides can also pose a significant threat in causing destructive tsunamis.

#### 4.6.2.5.2 Seiche

The following information on seiches was obtained from Wikipedia (2006). Based on this information it appears that any area of the Project that may be affected by a tsunami may also be affected by a seiche. In addition, as described in the following explanation of a seiche, even areas that are inland from a tsunami may see the effects of a seiche.

A seiche (or an underwater wave) is a standing wave in a body of water. Seiches are often imperceptible to the naked eye, and observers on the surface may not notice that a seiche is occurring. The effect is caused by resonances in a body of water that has been disturbed by one or more of a number of factors, most often wind or seismic activity. Gravity always seeks to restore the horizontal surface of a body of liquid water, as this represents equilibrium in the water. This results in a vertical harmonic motion and produces an impulse that travels the length of the basin at a velocity that depends on the depth of the water. The impulse is reflected back from the end of the basin, generating interference. Repeated reflections produce standing waves with one or more nodes, or points, which experience no vertical

motion. The frequency of the oscillation is determined by the size of the basin, its depth and contours, and the water temperature. The length of the lake is an exact multiple of the distance between nodes.

Lakes in seismically active areas, such as Lake Tahoe in California/Nevada, are significantly at risk from seiches. Geological evidence indicates that the shores of Lake Tahoe may have been hit by seiches and tsunamis as much as 10 meters (33 feet) high in prehistoric times, and local researchers have called for the risk to be factored into emergency plans for the region. Lake Henshaw is within the general Project Area, northwest of N17 and N18, which is also a seismically active area; therefore, the vicinity of Lake Henshaw may be at risk for seiches.

Earthquake-generated seiches can be observed thousands of miles away from the epicenter of a quake. Swimming pools are especially prone to seiches caused by earthquakes, as the ground tremors often match the resonant frequencies of small bodies of water. The 1994 Northridge earthquake in California caused swimming pools to overflow across southern California, and the massive Good Friday Earthquake that hit Alaska in 1964 caused seiches in swimming pools as far away as Puerto Rico. A related effect is the tsunami, a wave train (series of waves) generated in a body of water by a pulsating or abrupt disturbance that vertically displaces the water column. On occasion, tsunamis can produce seiches as a result of local geographic peculiarities. For instance, the tsunami that hit Hawaii in 1946 had a 15-minute interval between wave fronts. The natural resonant period of Hilo Bay is about 30 minutes. That meant that every second wave was in phase with the motion of Hilo Bay, creating a seiche in the bay. As a result, Hilo suffered worse damage than any other place in Hawaii, with the tsunami/seiche reaching a height of 14 meters and killing 159 inhabitants. Seiche waves may continue for several days after a tsunami.

The facilities that could be affected by a seiche are those in the vicinity of Lake Henshaw, particularly the facilities associated with the segments of the Proposed Project near N17 and N18. The physics of the hazard has to do with the depth of the water body. The deeper the water body, the higher the potential seiche wave could be. While highly unlikely, the creek crossings near the edge of Lake Henshaw could be affected by a seiche. The details of the impacts are addressed in the impact and mitigation section.

#### **4.6.2.5.3 Mudflows**

Mudflows are a significant problem in the San Diego Basin with high and moderate susceptibility in the PSA, specifically in the Poway and Miramar Reservoir watersheds. Morton et al. (2003) created maps depicting the susceptibility of the hill slopes to the rainfall-triggered, soil slip-debris flows (i.e., mudflows). Debris flows occur during winter months with above-normal rainfall and can cause considerable damage and loss of life. The Project would be located in areas ranging from low to high susceptibility. The analysis applied only to natural slopes and not to man-modified slopes. The susceptible slopes appear to be located in the Penasquitos Subregion, specifically in the Poway and Miramar Reservoir watersheds. The portion of the Project located in these watersheds will be located in existing SDG&E transmission line ROW. Morton identifies that “locations where transmission and transportation corridors lie across flow paths from susceptible drainage basins might indicate sites where defensive works should be constructed.”

### **4.6.3 Applicable Regulations, Plans, and Standards**

The primary enabling legislation that governs the water quality and hydrological aspect of an area is the federal CWA. Jurisdiction for various sections of the CWA has been delegated to the states and, in some cases, regional entities. **Table 4.6-5** presents a synopsis of the agencies and approvals that will need to be obtained regarding water quality and hydrological issues.

### **4.6.3.1 Federal Regulations**

#### **Clean Water Act**

The CWA (33U.S.C. Section 1251 et seq., formerly the Federal Water Pollutions Control Act of 1972), was enacted with the intent of reporting and maintaining the chemical, physical, and biological integrity of the waters of the United States. The CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point sources and certain non-point source discharges to surface water.

Section 402 of the CWA regulates those discharges under the National Pollutant Discharge Elimination System (NPDES) permit process. This is applicable to any discharge to surface waters (e.g., storm water from construction projects and groundwater dewatering). In California, NPDES permitting authority is delegated to and administered by the nine RWQCBs.

Section 401 of the CWA requires that any activity, including river or stream crossings, during road, pipeline, or transmission line construction which may result in a discharge into a state water body must be certified by the RWQCB or SWRCB. This certification, known as a Water Quality Certification, ensures that the proposed activity does not violate state and federal water quality standards.

Section 404 of the CWA authorizes the U.S. Army Corps of Engineers (ACOE) to regulate the discharge of dredged or fill material into waters of the United States which include wetlands. The ACOE issues individual site-specific or general (Nationwide) permits for such discharges.

#### **Safe Drinking Water Act (SDWA)**

The U.S. EPA's SSA Program was established under Section 1424(e) of the SDWA, and this area was so designated on September 10, 1996 (FR 1996).

### **4.6.3.2 State Regulations**

#### **Streambed Alteration Agreement**

Section 1601 of the California Fish and Game Code requires an agreement between the Department of Fish and Game and a public agency proposing to substantially divert or obstruct the natural flow or effect changes to the bed, channel, or bank of any river, stream, or lake. The agreement is designed to protect the fish and wildlife values of the river, lake, or stream (State of California 2006b).

#### **Porter-Cologne Water Quality Control Act:**

The Porter-Cologne Water Quality Control Act is California's comprehensive water quality control law and is a complete regulatory program designed to protect water quality and beneficial uses of the state's water. It requires the adoption of water quality control plans (basin plans) by the RWQCB for watersheds within their regions. The basin plans are reviewed triennially and amended as necessary by the RWQCB, subject to the approval of the California Office of Administrative Law, the State Water Board, and ultimately the U.S. EPA. Moreover, pursuant to Porter-Cologne, these basin plans shall become part of the California Water Plan, when such plans have been reported to the Legislature (Section 13141, California Water Code). The criteria for the PSA are contained in the Water Quality Control plans for the Colorado River Basin and the San Diego Basin (State of California 2006c). This Act also regulates river or stream crossings during road, pipeline, or transmission line construction, which may result in a discharge into a state waterbody that is not considered to be under the jurisdiction of the ACOE.

### **4.6.3.3 Regional and Local Regulations, Plans, and Standards**

#### **Water Quality Control Plans for the Colorado River and San Diego Basins**

The basin plans were prepared by the Colorado RWQCB in accordance with the criteria contained in the California Porter-Cologne Water Quality Control Act, the federal Clean Water Act, and other pertinent state and federal rules and regulations. The two regional plans that set the standards for compliance are the (1) Colorado River Basin – Region 7, Water Quality Control Plan and (2) the San Diego Basin – Region 9, Water Quality Control Plan.

#### **Municipal Storm Water Permit**

Municipalities meeting specified population densities are required to have municipal stormwater NPDES discharge permits. These permits may contain requirements that are applicable to the Sunrise Project's proposed construction activities. The SDRWQCB is planning to revise and reissue the MS4 permit for San Diego County and adjacent cities in August 2006, and the CRB Region plans to revise and reissue their MS4 permit in September 2006. The Project will obtain any necessary permits from the appropriate municipal entities. An analysis of the revised reissued permit scenarios can be found at:  
<http://www.waterboards.ca.gov/sandiego/programs/stormwater/sd%20permit/FinalExternal.pdf>