

C.7 Hydrology and Water Quality

This section describes the existing conditions and potential impacts related to hydrology and water quality in the area of the proposed Project. Section C.7.1 provides a description of the environmental setting, including surface water (Section C.7.1.1), groundwater (Section C.7.1.2), water quality (Section C.7.1.3), and climate (Section C.7.1.4). Applicable rules and regulations are introduced in Section C.7.2. Applicant-Proposed Measures (APMs), which are stipulations incorporated into the description of the proposed Project and alternatives, are presented in Section C.7.3. Significance criteria used to evaluate potential impacts of the proposed Project and analysis of potential impacts and mitigation measures for the proposed Project are located in Section C.7.4. A summary of all impacts and mitigation measures related to hydrology and water quality for the proposed Project is presented in Table C.7-8. Finally, a discussion of potential cumulative effects of the proposed Project is located in Section C.7.5. Analysis of potential impacts and mitigation measures for alternatives to the proposed Project are located in Sections D.4.1 through D.4.6.

For the purposes of this analysis of hydrology and water quality, the study area for the proposed Project and alternatives is defined as the encompassing the watersheds traversed by the proposed alignments. For the proposed Project route, this includes the Antelope-Fremont Valleys Watershed and the Santa Clara River Watershed. Other watershed classifications are discussed below, in Section C.7.1.1. The proposed Project is divided into two segments: Segment 2, which extends from Antelope Substation to Vincent Substation, and Segment 3, which extends from Substation Two to Antelope Substation. For the most part, for the purposes of this analysis of hydrology and water quality, Segments 2 and 3 are referred to collectively as the proposed Project. In addition, two route options (Option A and Option B), which are introduced in Section B.2 (Project Facilities and Modifications) are analyzed in this section as part of the proposed Project. As described in Section B.2, Option A deviates from and runs parallel to the proposed route between Mile S2-5.7 and Mile S3-7.7, in order to avoid three existing homes. Option B deviates from the proposed route between Mile S2-8.1 and Mile S2-14.9, continuing to run parallel to the existing Antelope-Vincent corridor and crossing through the Ritter Ranch and Anaverde Ranch development areas.

C.7.1 Environmental Setting

The proposed Project would traverse parts of Los Angeles County and Kern County. Within Los Angeles County, surface water and groundwater quality and use are regulated by the Los Angeles County Department of Public Works (LACDPW). Water quality in Los Angeles County is also under the jurisdiction of the Los Angeles Regional Water Quality Control Board (RWQCB). Within Kern County, surface water and groundwater quality and use are regulated by the County of Kern Engineering and Survey Service (KCESS). Water quality in Kern County is also under the jurisdiction of the South Lahontan RWQCB.

C.7.1.1 Surface Water

Surface water hydrology describes the dynamics in flow of surface water systems, including watersheds, floodplains, rivers, streams, lakes, and reservoirs, among others.

Watersheds

The term “watershed” refers to area of land within which all waterways drain to one specified outlet, or body of water such as a river, lake, ocean, or wetland. Watersheds are separated topographically by areas of

elevation, such as ridges, hills, or mountains. All precipitation that occurs within a given watershed (or “basin”) area will eventually drain into the same body of water as the rest of the watershed.

As described, the proposed Project would traverse three major watersheds. The southern end of the project area, surrounding Vincent Substation, is located in the Santa Clara River Watershed. The northern end of the Project area, surrounding Substations One and Two, is located in the Antelope Valley Watershed and Fremont Valley Watershed. Although the Antelope Valley and Fremont Valley Watersheds are separated by a topographic and hydrologic divide in the Antelope Valley, they are often referred to collectively as the Antelope-Fremont Valleys Watershed. The Santa Clara River Watershed is separated from the Antelope-Fremont Valleys Watershed by the northwest portion of the San Gabriel Mountains, which provides a topographic and hydrologic divide. Figure C.7-1 indicates the respective watershed boundaries as well as surface water bodies situated within each watershed.

Antelope-Fremont Valleys Watershed

The proposed Project would initiate at Substation 2, which is located in the southwestern portion of the Fremont Valley Watershed, within the Antelope-Fremont Valleys Watershed. Segment 3 of the proposed Project would traverse the Fremont Valley Watershed from Mile S3-0.0 (Substation 2) to approximately Mile S3-3.0, at which point it would enter the Antelope Valley Watershed. The proposed Project would remain within the Antelope Valley Watershed from Mile S3-3.0, through Substation One at Mile S3-9.6, to Antelope Substation at Mile S3-35.2. After Segment 3 connects to Antelope Substation at Mile S3-35.2, the proposed Project would remain within the Antelope Valley Watershed as Segment 2, from Mile S2-0.0 (Antelope Substation) to approximately Mile S2-19.5 of the proposed route. At this point, the proposed Project would enter the Santa Clara River Watershed, which is described below.

The Fremont Valley Watershed receives surface water runoff from Lone Tree Canyon, Cache Creek, and other ridges adjacent to the area. Throughout most of this watershed surface water drains toward Koehn Lake, which is a generally dry lake about 20 miles northeast of the community of Mojave. In the southwestern portion of the Fremont Valley Watershed, where the proposed Project is situated, surface water runoff flows south towards Rosamond. The Antelope Valley Watershed receives surface water runoff from the San Gabriel Mountains and the Tehachapi Mountains, including Big Rock Creek, Littlerock Creek, Oak Creek, and Cottonwood Creek. There are multiple intermittent or ephemeral waterways in the area which convey surface water runoff to Rosamond Lake during extreme rain events. Rosamond Lake, which is located on Edwards Air Force Base northeast of Lancaster, remains dry most of the year.

The Antelope Valley Watershed, which contains the majority of the proposed Project, is a large, closed basin in the western Mojave Desert. This watershed straddles the Los Angeles-Kern County line and drains a total of 3,387 square miles. Approximately 80 percent of the watershed is characterized by a low to moderate slope (0 -7 percent). The remaining 20 percent consists of foothills and rugged mountains, some of which reach up to 3,600 feet in elevation. The floor of the Antelope Valley Watershed generally lacks defined natural channels outside of the foothills and is subsequently subject to unpredictable sheet flow patterns (SDLAC, 2005). The Antelope Valley Watershed is a closed basin with no outlets to the ocean. All water that enters the watershed either infiltrates into the underlying groundwater basin, or flows toward three playa lakes located near the center of the watershed.

A playa lake is formed when rain fills a playa, or small, round depression in the surface of the ground. Playa lakes are usually endorheic, which means they have no outflow of water. The playa lakes in the Antelope

Valley Watershed are all located on Edwards Air Force Base, approximately 20 to 30 miles northeast of the Antelope Substation. They include the following: Rosamond Lake, which covers approximately 21 square miles and is the closest playa lake to the Antelope Substation; Rogers Dry Lake, which is located east of Rosamond Lake and encompasses approximately 32 square miles; and Buckhorn Dry Lake, which is located between Rosamond and Rogers Dry Lake, encompassing three square miles. These playa lakes are usually dry, and they only receive water following large winter storms. Surface runoff that collects in the dry lakes quickly evaporates from the surface, and only a small quantity of water infiltrates to the groundwater due to the nearly impermeable nature of the playa soils (SDLAC, 2005).

Santa Clara River Watershed

As mentioned above, the proposed route would enter the Santa Clara River Watershed along Segment 2, at approximately Mile S2-18.5. Segment 2 would continue through the watershed for approximately three miles, before terminating at Mile 21.6 (Vincent Substation). The Santa Clara River Watershed encompasses the Santa Clara River system, which is divided into two sections: the Upper Santa Clara River and the Lower Santa Clara River. The proposed Project would cross the Upper Santa Clara River just before Vincent Substation. Portions of the Upper Santa Clara River are perennial (year-round flow) due to baseflow occurring from groundwater. The baseflow contributes to surface water flow by seeping through thick alluvial deposits, which characterize the area.

The Santa Clara River originates at Pacifico Mountain in the San Gabriel Mountains and flows westward for approximately 84 miles to the Pacific Ocean. The Santa Clara River Watershed drains a total area of 1,634 square miles. Ninety percent of the watershed consists of rugged mountains which reach up to 8,800 feet in elevation. The remaining 10 percent consists of valley floor and coastal plain (VCWPD and LACDPW, 2005). The average slope severity in the Santa Clara River Watershed decreases from the northeast to the southwest, with the proposed Project situated in the southeastern area of the watershed. The result of this changing topography is the deposition of sediments carried by the river in the vicinity of the City of Santa Clarita, forming an alluvial valley that widens as it progresses downstream towards the Pacific Ocean.

Other important hydrologic resources in the Santa Clara River Watershed include multiple tributaries of the Santa Clara River, as well as four major reservoirs. Principal tributaries to the Santa Clara River include: Castaic Creek in Los Angeles County, and Piru, Sespe, and Santa Paula Creeks in Ventura County. The four reservoirs, which include Lake Piru and Pyramid Lake on Piru Creek, Castaic Lake on Castaic Creek, and the Bouquet Reservoir on Bouquet Creek, control approximately 37 percent of runoff that occurs within the watershed boundaries (VCWPD and LACDPW, 2005).

Watershed Classification Levels

The State of California uses a hierarchical naming and numbering convention to define watershed areas for management purposes. This means that boundaries are defined according to size and topography, with multiple sub-watersheds within larger watersheds. A general description of how watershed levels are defined is provided below, in Table C.7-1. The Natural Resources Conservation Service (NRCS), which is part of the U.S. Department of Agriculture (USDA), is responsible for maintaining the California Interagency Watershed Mapping Committee (IWMC), formerly the CalWater Committee. This committee works on watershed mapping and dataset creation throughout the State. The IWMC has defined a set of naming and numbering conventions applicable to all watershed areas in the State, for the purposes of interagency cooperation and management. Table C.7-1 shows the primary watershed classification levels used by the State of California, as

defined by the IWMC, which are applicable to this analysis. The second column indicates the approximate size that a watershed area may be within a particular classification level, although variation in size is common.

Watershed Level	Approximate Square Miles (Acres)	Description
Hydrologic Region (HR)	12,735 (8,150,000)	Defined by large-scale topographic and geologic considerations. The State of California is divided into ten HRs.
Hydrologic Unit (HU)	672 (430,000)	Defined by surface drainage; may include a major river watershed, groundwater basin, or closed drainage, among others.
Hydrologic Area (HA)	244 (156,000)	Major subdivisions of hydrologic units, such as by major tributaries, groundwater attributes, or stream components.
Hydrologic Sub-Area (HSA)	195 (125,000)	A major segment of an HA with significant geographical characteristics or hydrological homogeneity.

Due to a wide variety in the topographic and geologic characteristics of the watershed levels described in Table C.7-1, the size of a watershed area on any given level may vary greatly. For instance, although the approximate size of an HSA is 125,000 acres, the actual size may vary between 50,000 acres and upwards of 450,000 acres, depending on the specific location (IWMC, 2004). The boundaries of watershed areas on different levels, for instance an HU and an HA, are only the same when their boundaries include “all the source area contributing surface area to a single defined outlet point” (USBR, 2004).

The proposed Project route would traverse two Hydrologic Regions, which include three Hydrologic Units. Within the Hydrologic Units, the proposed route would cross through six Hydrologic Areas, contained within which are six Hydrologic Sub-Areas. Table C.7-2, below, provides the names of these watershed levels and their associated hierarchy (see Figure C.7-2 [Hydrologic Sub-Areas Crossed by the Proposed Project]).

For the purposes of this EIR, the boundaries of the Antelope-Fremont Valleys Watershed and the Santa Clara River Watershed, as discussed above and shown in Figure C.7-1, are used as the basis for analysis of surface water hydrology. The watershed levels shown in Table C.7-1 are applied to this analysis as appropriate, for instance with regards to cumulative effects.

South Lahontan HR		South Coast HR
Fremont Valley HU	Antelope Valley HU	Santa Clara-Calleguas HU
East Tehachapi HA	Willow Springs HA Neenach HA Lancaster HA Rock Creek HA	Upper Santa Clara HA
East Tehachapi HSA	Chafee HSA Willow Springs HSA Neenach HSA Lancaster HSA Rock Creek HSA	Acton HSA

Lakes, Reservoirs, and Aqueducts

Playa Lakes

A playa lake is formed when rain fills a playa, or small, round depression in the surface of the ground. Playa lakes are usually endorheic, which means they have no outflow of water. Playa lake soil is typically impervious; water that collects in a playa lake tends to evaporate rather than infiltrate. There is one playa lake in the Fremont Valley Watershed, called Koehn Lake. There are three playa lakes in the Antelope Valley

Watershed, which are all located on Edwards Air Force Base, approximately 20 to 30 miles northeast of Antelope Substation. These play lakes include: Rosamond Lake, Rogers Dry Lake, and Buckhorn Dry Lake.

- **Koehn Lake.** With the exception of the southwestern-most portion of Fremont Valley Watershed, which drains toward Rosamond, surface water in Fremont Valley Watershed generally drains toward Koehn Lake, in the northeastern portion of the watershed. Alluvium near Koehn Lake is interbedded with thick layers of lacustrine silt and clay. There are locally confined groundwater conditions near Koehn Lake (DWR, 2004b). Water in the Fremont Valley Groundwater Basin generally flows toward Koehn Lake.
- **Rosamond Lake.** This playa lake encompasses approximately 21 square miles. Rosamond Lake is the closest playa lake to Antelope Substation. Groundwater in the Antelope Valley Groundwater Basin flows from the base of the San Gabriel Mountains and the Tehachapi Mountains toward Rosamond Lake in the north-central part of the basin (USGS, 2006). Collects surface water runoff from the surrounding hills, as well as from the San Gabriel Mountains to the south and the Tehachapi Mountains to the east. Used by the Edwards Air Force Base for flight test activities, research operations, and emergency landings (AFFTC, 2005).
- **Rogers Dry Lake.** This playa lake encompasses approximately 44 square miles. Collects surface water runoff from the surrounding hills, as well as from the San Gabriel Mountains to the south and the Tehachapi Mountains to the east. Used by the Edwards Air Force Base for flight test activities, research operations, and emergency landings. Rogers Lake has been declared a National Historic Landmark by the US National Parks Service due to its role in the development of the United States' space program (AFFTC, 2005).
- **Buckhorn Dry Lake.** This small playa lake is approximately three square miles in size, located between Rosamond Lake and Rogers Dry Lake.

Palmdale Lake and Littlerock Reservoir

Palmdale Lake is located on the southern edge of the City of Palmdale. Palmdale Lake receives water from Littlerock Reservoir and the Littlerock Wash (SDLAC, 2005). Littlerock Reservoir provides primary water supply for the Palmdale Water District and the Littlerock Irrigation District. Littlerock Dam was first constructed in 1924 and has undergone numerous upgrades. The reservoir is fed by the Littlerock Creek and is located approximately 22 miles southeast of the proposed Project route (SDLAC, 2005) (Figure C.7-1).

Bouquet Reservoir

The proposed Project route would not cross Bouquet Reservoir which is located approximately 14 miles west of the proposed route, within Angeles National Forest. However, Bouquet Reservoir is located within the Santa Clara River Watershed and is therefore situated within the same hydrologic basin as Vincent Substation, which is part of the proposed Project. Bouquet Reservoir collects runoff from a number of intermittent creeks and streams, and provides some surface flow to Bouquet Creek. The reservoir is owned by Los Angeles Department of Water and Power (LADWP) and provides storage for the water transported through the Los Angeles Aqueduct from the Owens Valley. Bouquet Reservoir was completed in 1934, and has a storage capacity of approximately 36,500 acre-feet, and a drainage area of approximately 13.6 square miles.

California Aqueduct

The California Department of Water Resources (DWR) operates the State Water Project (SWP), which transports water from the Sacramento Delta to southern California via the California Aqueduct. The East Branch of the California Aqueduct extends eastward along the southern edge of the Antelope Valley, passing just south of the City of Palmdale. The Aqueduct continues eastward to Silverwood Reservoir, where water is conveyed southward. Segment 2 of the proposed Project would cross the California Aqueduct at approximately Mile S2-4.5, as noted below in Table C.7-3. The East Branch of the California Aqueduct, which runs along the northeastern margin of the San Gabriel Mountains, delivers water from the SWP to the Antelope Valley-East Kern Water Agency (AVEK) and, further east, to the Mojave Water Agency. As a State Water

Contractor, AVEK delivers SWP water to 22 water purveyors for agricultural, municipal, and industrial use, with a maximum allocation of 141,400 acre-feet per year.

Los Angeles Aqueduct

The proposed Project route crosses the Los Angeles Aqueduct at approximately Mile S3-15.0, as noted below in Table C.7-3. The Los Angeles Aqueduct conveys water from Mono Lake in the Owens Valley to the City of Los Angeles. Construction of the aqueduct was completed in 1913. The project includes 223 miles of 12-foot-diameter steel pipe, which still transports water to the southern California market today. A second Los Angeles Aqueduct was built in 1970, stretching 137 miles. The proposed Project would be situated near the original aqueduct, which has a present capacity of 485 cubic feet per second (cfs).

Rivers and Streams

Ephemeral Streams and Desert Washes

Due to arid conditions throughout the proposed Project area, there are numerous waterways that may be characterized as ephemeral streams, or as a desert wash. An ephemeral stream is a stream or reach of a channel that flows only in direct response to precipitation in the immediate locality. The channel of an ephemeral stream is at all times above the saturation zone, so it is not re-charged by groundwater. Therefore, ephemeral streams lose water to the streambed, which causes flood discharge downstream to be less than flood discharge upstream, except under the condition of flow that is significant enough to saturate the streambed (Briggs, 1996). Similarly, a desert wash is a dry streambed which only carries water after heavy rainfall. During thunderstorms or heavy rain events, desert washes may fill rapidly, triggering flash flood conditions.

Near the proposed Project, there are multiple ephemeral streams and washes that carry surface water to the playa lakes described above. As a result of the dry climate in the Project area, the existing ephemeral streams and washes typically flow only during periods of heavy rainfall, or as a result of melting snowpack from the local mountains. Many areas in the Antelope Valley experience sheet flow during heavy rainstorms due to a lack of prior saturation, but they tend to remain dry with moderate and low-intensity storms (SDLAC, 2005). The proposed Project route would traverse approximately 47 ephemeral waterways or desert washes: 35 along Segment 3 and 12 along Segment 2. A summary of the major waterways traversed by the proposed Project is provided below, in Table C.7-3.

Mile	Name	Description
S3-11.6	Oak Creek	Antelope Valley Watershed; receives surface water runoff from the Tehachapi Mountains
S3-15.0	Los Angeles Aqueduct	Owned and operated by LADWP. Total length of 223 miles to transport water in pipes from Owens Valley to southern California.
S3-32.6	Myrick Canyon Creek	A large wash which drains the north-facing slopes of Portal Ridge onto the floor of the Antelope Valley Watershed.
S2-4.4	Railroad Canyon Creek	Valley wash draining the north slopes of Portal Ridge
S2-4.5	California Aqueduct	Primary aspect of the CA State Water Project (SWP). Operated and maintained by the CA Department of Water Resources. Total length of 444 miles to transport water for the SWP as well as the federal Central Valley Project.
S2-7.7	Amargosa Creek	Large ephemeral stream. Collects runoff from the Sierra Pelona Mountain Range. Flows eastward and drain northerly through Palmdale and Lancaster. Eventually terminates at Rosamond Dry Lake.
S2-9.4	Ritter Canyon Creek	Located in the foothills of the Sierra Pelona Mountains. Tributary of Amargosa Creek. Traverses western portion of the Ritter Ranch development.
S2-10.8	Ritter Canyon Creek	Same as above.

Mile	Name	Description
S2-11.2	Anaverde Creek	Collects runoff from the Sierra Pelona Mountains. Drains easterly through Anaverde Valley. Flows into a retention basin in western Palmdale, then to Amargosa Creek.
S2-12.2	Anaverde Creek	Same as above.
S2-21.2	Santa Clara River (upper)	Headwaters of the Santa Clara River system. Upper SCR is largely intermittent, with some ephemeral reaches and other portions that flow for several days after a rain event. Crossed by the proposed Project in Soledad Canyon.

Cache Creek

Cache Creek is one of the largest streams in the Fremont Valley Watershed, with a drainage area of approximately 96.5 square miles (SCE, 2005). This is a desert wash (see above), which remains dry throughout most of the year. Cache Creek is prone to flashfloods during rain events and carries surface water from the Tehachapi area into the Mojave Desert.

Cottonwood Creek, Oak Creek, Big Rock Creek and Littlerock Creek

In the Antelope-Fremont Valleys Watershed, Cottonwood Creek, Oak Creek, Big Rock Creek, and Littlerock Creek contribute more than 50 percent of total runoff into the basin (SCE, 2005). Cottonwood Creek, located in the northeast area of the watershed, within the Fremont Valley Watershed, would not be crossed by the proposed Project. Oak Creek, located just south of the southwestern border of the Fremont Valley Watershed, would be crossed by the proposed Project. Oak and Cottonwood Creeks both collect runoff from the Tehachapi Mountains and flow southerly into Rosamond Dry Lake. Each of these creeks contributes runoff and groundwater recharge to the area.

Big Rock and Littlerock Creeks, located in the southern part of the Antelope Valley Watershed, would not be crossed by the proposed Project. Big Rock Creek collects runoff from the San Gabriel Mountains, flows northerly through the unincorporated area of Pearblossom, and then on to Rosamond, Buckhorn, and Rogers Dry lakes. Littlerock Wash is ephemeral in nature, and flows west of Littlerock through the east side of Palmdale to Rosamond Dry Lake. The waterway originates as Littlerock Creek and conveys runoff from the San Gabriel Mountains through Littlerock Canyon.

Upper Santa Clara River

The Upper Santa Clara River is largely an intermittent river, with some portions that may be characterized as ephemeral (see above) and other portions that flow for several days after a rain event. The Upper Santa Clara River comprises the headwaters for the Santa Clara River system. It originates as a typical mountain stream with a relatively narrow channel incised into hard bedrock. It has a straight to meandering channel pattern, and characteristic channel bedforms represented by a sequence of bars, riffles, and pools. The bars are accumulations of the bed material positioned successively downriver on the opposite side of the channel. The pools are deep zones located directly opposite from the bars, and the riffles are the shallow zones between the pools (VCWPD and LACDPW, 2005). The proposed Project route crosses the Upper Santa Clara River at approximately Mile S2-21.2, where the river is within Soledad Canyon. Tributaries of the Santa Clara River in Los Angeles County (from upstream to downstream) include Mint Canyon, Bouquet Canyon, Haskell Canyon, and San Francisquito Canyon, which are all located west of the proposed Project and would not be crossed by the proposed alignment.

Floodplains

A floodplain is a geographic area of relatively level land that is occasionally subject to inundation by surface water from rivers or streams that lie within the floodplain. A “100-year flood” refers to the maximum level of water that is expected to inundate a floodplain once every 100 years, on average. In other words, a 100-year floodplain is an area of land that has a one percent chance of being inundated by a flood in any given year. The Federal Emergency Management Agency (FEMA) estimates the boundaries for 100-year floodplains, referred to as “Flood Hazard Areas,” and produces Flood Insurance Rate Maps (FIRMs) which define the 100-year floodplain boundaries. Any development which takes place in a Flood Hazard Area must comply with floodplain management ordinances (FEMA, 2005).

The proposed Project route would traverse the following designated Flood Hazard Areas, which are listed in geographic order from the northern-most project facilities associated with Segment 3B to the southern-most facilities associated with Segment 2 (SCE, 2005; LADPW, 2006): Cache Creek, Oak Creek, Los Angeles Aqueduct, Amargosa Wash, Anaverde Creek, California Aqueduct, and Santa Clara River. Figure C.7-3 shows FEMA’s predicted 100-year flood boundaries for the Flood Hazard Areas listed above. Although the proposed Project route traverses multiple Flood Hazard Areas, none of the substation facilities associated with the proposed Project would be located in a Flood Hazard Area (SCE, 2005). As mentioned above, any development in a Flood Hazard Area, including the proposed transmission line facilities would be required to comply with floodplain management ordinances.

Similar to the FEMA-defined Flood Hazard Areas, the California State Office of Emergency Services (OES) and the California Department of Water Resources (DWR) require that dam owners identify the potential magnitude of flooding, or the dam inundation area, that would occur in the case of a dam failure. There are no dams that would inundate the proposed Project (Segments 2 and 3) in the case of a dam failure (SCE, 2005).

C.7.1.2 Groundwater

Tehachapi Valley East Groundwater Basin

The portion of the proposed Project which is situated in the Fremont Valley Watershed, from Mile S3-0.0 to Mile S3-3.0, would be situated partially over the Tehachapi Valley East Groundwater Basin, from Mile S3-0.0 to about Mile S3-1.0 (Figure C.7-4). The proposed Substation Two (Mile S3-0.0) would be situated entirely within the boundaries of this groundwater basin.

The Tehachapi Valley East Groundwater Basin is relatively small, with a surface area of approximately 37 square miles. The basin trends in a northeast-southwest direction and is located entirely within Kern County. This groundwater basin is bounded to the north by the Sierra Nevada Mountains, to the south and east by the Tehachapi Mountains, and to the west by an alluvial high topographic boundary which divides the Tehachapi Valley East Groundwater Basin from the Tehachapi Valley West Groundwater Basin (SCE, 2005).

This basin is made up of younger alluvium which extends to a depth of approximately 750 feet. Storage capacity is roughly 150,000 acre-feet. Between 1951 and 1978, groundwater levels in this basin decreased by about 58 feet. Between 1978 and 1999, the groundwater level recovered by about 55 feet, for a total loss of approximately three feet. The depth to groundwater level in domestic wells ranges between 102 feet and 440 feet, with the average depth to groundwater across 33 wells being 285 feet (DWR, 2004).

Antelope Valley Groundwater Basin

The vast majority of groundwater resources that would be traversed by the proposed Project are within the Antelope Valley Groundwater Basin. Segment 3 of the proposed Project would cross through this groundwater basin for roughly 32 miles, from approximately Mile S3-3.2 to Antelope Substation, at Mile S3-35.2. Segment 2 would also cross through the Antelope Valley Groundwater Basin, from Antelope Substation, at Mile S2-0.0, to approximately Mile S2-4.5, where the transmission line would cross the California Aqueduct. Continuing from this point to Vincent Substation, at Mile S2-21.6, Segment 2 would intermittently cross over fingers of the groundwater basin, along its southeastern boundary. The Antelope Valley Groundwater Basin is mostly contained within the Antelope Valley Watershed. The northern-most regions of the Antelope Valley Groundwater Basin cross into the Fremont Valley Watershed and small portions along the southeastern boundary cross into the Santa Clara River Watershed, including the portion beneath Vincent Substation. See Figure C.7-4.

The Antelope Valley Groundwater Basin is the principal groundwater basin for southeastern Kern County and the portion of Los Angeles County surrounding the City of Lancaster. The basin is bounded on the northwest by the Garlock Fault zone at the base of the Tehachapi Mountains and on the southwest by the San Gabriel Mountains. To the east, the basin is bounded by ridges, buttes, and low hills, and to the north it is bounded by the Fremont Valley Groundwater Basin (DWR, 2004a). The surface area of the Antelope Valley Groundwater Basin is approximately 1,580 square miles, extending across Kern, Los Angeles, and San Bernardino Counties (SCE, 2005).

The primary water-bearing materials of the basin are Pleistocene- and Holocene-age unconsolidated alluvial and lacustrine deposits that consist of compact gravels, sand, silt, and clay. In general, groundwater in the Antelope Valley is divided vertically into three aquifers: a shallow, unconfined, upper aquifer that is not highly productive; a thicker, deeper, confined middle aquifer that produces the most groundwater; and a thin, lower aquifer that is the deepest and produces little groundwater. Horizontally, the Antelope Valley Ground Water basin is divided into twelve subbasins, including the Lancaster, Pearland, and Buttes subbasins. The proposed Project route is underlain by the Lancaster subbasin (SDLAC, 2005).

Most recharge occurs at the foot of the mountains and hills by percolation through the head of alluvial fan systems. Eighty percent of natural recharge comes from mountain runoff, of which more than 50 percent is attributed to Big Rock and Littlerock Creeks. Hydrographs of wells in the vicinity of the proposed Project route show that the unconfined groundwater table has been decreasing steadily from 1981 through 1997 at a rate of 0.25 to 0.5 feet per year (SCE, 2005).

C.7.1.3 Water Quality

An effective water quality control plan requires the determination of one or more beneficial uses categories, as defined by the applicable RWQCB Basin Plans. Beneficial use designation is a legislated process meant to reduce the impacts of water quality impairment by assigning a particular use to the water body, with corresponding water quality criteria. Beneficial use designations may include categories such as agriculture, culture, supply, and environmental, among others. Once beneficial uses are designated, appropriate water quality objectives can be established. Programs that maintain or enhance water quality can then be implemented to ensure the protection of the designated beneficial uses. Water quality standards are formed through the combined designated beneficial uses and water quality objectives. Such standards are mandated for

all water bodies within the State of California, including surface water and groundwater, under the California Water Code. Table C.7-4 presents the beneficial uses designated for water bodies in the proposed Project area.

Surface Water Quality

Section 303 (d) of the Clean Water Act (CWA) requires the following: “Each State shall identify those waters within its boundaries for which the effluent limitations are not stringent enough to implement any water quality standards applicable to such waters.” The CWA also requires states to establish a priority ranking for water bodies that qualify them for the 303(d) list of impaired water bodies and establish a total maximum daily load (TMDL) for such waters. Table C.7-4 presents the Section 303(d) listing and TMDLs for all surface waters in the Antelope-Fremont Valleys Watershed and the Santa Clara River Watershed (LARWQCB, 2003).

Antelope-Fremont Valleys Watershed

Water quality problems in the Antelope-Fremont Valleys Watershed and in the South Lahontan Hydrologic Region (HR) overall are largely related to non-point sources of pollution, including erosion from construction and agricultural activities such as livestock grazing. Non-point sources of pollution can also be significant and include stormwater, acid drainage from inactive mines, and individual wastewater disposal systems (SCE, 2005). Water quality data in the Antelope-Fremont Valleys Watershed indicate that the level of total dissolved solids (TDS) ranges from 80 to 404 milligrams per liter (mg/l). The average TDS level between January of 1995 and July of 1997 was 214 mg/L. Arsenic averaged 2 parts per million (ppm) over the same period, which is less than the 5 ppm maximum contaminant level (MCL) allowed for arsenic in drinking water (SCE, 2005).

Beneficial Uses. The Lahontan RWQCB has jurisdiction over the Antelope-Fremont Valleys Watershed. Together with the State Water Board, the Lahontan RWQCB has identified 22 beneficial uses within the South Lahontan HR. Table C.7-4 shows the beneficial uses designated for the water bodies located in the Antelope Valley Watershed which are also in the vicinity of the proposed Project. As the table indicates, there are no Section 303(d) listings (impaired water bodies) in the South Lahontan HR or the Antelope-Fremont Valleys Watershed.

Santa Clara River Watershed

Water quality in the Santa Clara River is relatively poor due to the combined impacts of natural mineralization processes as well as widespread agricultural runoff. Based on water quality data collected by the United Water Conservation District (UWCD) and DWR, concentrations of TDS and sulfates in the Santa Clara River at the Ventura/Los Angeles County Line (the most downstream sample point) are about ten times higher than TDS concentrations at Lang Station (the most upstream sample point) (SCE, 2005 and VCWPD and LACDPW, 2005). This can be attributed to the increased development in the City of Santa Clarita and other land use changes that have taken place within the Santa Clara River Watershed. In addition, there are two Los Angeles County Sanitation District (LACSD) wastewater plants in the area, both of which also contribute to poor water quality in the Santa Clara River.

Table C.7-4. Beneficial Uses and Section 303(d) Listing of Surface Water in the Vicinity of the Proposed Project Route

Water Body	Beneficial Use																	303(d)	TMDL						
	MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC-1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL			RARE	MIGR	SPWN	WQE	FLD	
Fremont Valley Watershed																									
Oak Creek Pass Springs	X	X		X	X				X	X			X			X								N/A	N/A
Upper Cottonwood Creek	X	X			X				X	X			X			X					X			N/A	N/A
Cache Creek	X	X			X				X	X			X			X								N/A	N/A
Koehn Dry Lake	X	X	X	X	X				X	X			X	X	X	X								N/A	N/A
Minor Surface Waters	X	X			X				X	X	X		X			X								N/A	N/A
Minor Wetlands	X	X			X	X			X	X			X			X					X	X		N/A	N/A
Antelope Valley Watershed																									
Rogers Lake Wetlands	X								X	X			X	X	X						X	X		N/A	N/A
Oak Creek	X	X		X	X				X	X	X		X			X								N/A	N/A
Littlerock Creek	X				X				X	X	X		X			X								N/A	N/A
Big Rock Creek	X	X		X	X				X	X	X		X			X				X				N/A	N/A
Littlerock Reservoir	X	X		X	X				X	X	X		X			X								N/A	N/A
Lake Palmdale	X	X			X				X	X	X		X			X								N/A	N/A
Minor Surface Waters	X	X			X				X	X	X		X	X		X								N/A	N/A
Minor Wetlands	X	X			X	X			X	X			X			X					X	X		N/A	N/A
Santa Clara River Watershed																									
Upper Santa Clara River	X	X		X		X			X	X			X			X		X						Rch 9	Coliform
Agua Dulce Canyon Creek*	X	X			X				X	X			X			X								N/A	N/A
Mint Canyon Creek*	X	X		X	X	X			X	X			X			X								Rch 1	Nitrate/Nitrite
San Francisquito Canyon*	X	X		X	X	X			X	X			X			X		X		X				N/A	N/A

* Tributary of the Upper Santa Clara River

MUN: Municipal Supply and Recharge
IND: Industrial Service Supply
NAV: Navigation
REC-2: Non-contact Water Recreation
WARM: Warm Freshwater Habitat
COLD: Cold Freshwater Habitat
MIGR: Migration of Aquatic Organisms
WILD: Wildlife Habitat

AGR: Agricultural Supply
GWR: Ground Water Recharge
POW: Hydropower Generation
COMM: Commercial and Sportfishing
RARE: Rare, Threatened, or Endangered Species
BIOL: Preservation of Biological Habitats of Special Significance
SPWN: Spawning, Reproduction, and Development
FLD: Flood Peak Attenuation / Flood Water Storage

PRO: Industrial Process Supply
FRSH: Freshwater Replenishment
REC-1: Water Contact Recreation
AQUA: Aquaculture
SAL: Inland Saline Water Habitat
WQE: Water Quality Enhancement

In recent years, there has been a general trend towards a decrease in TDS and sulfate concentrations, thus resulting in better overall water quality in the area. The general increase in water quality is attributed to the effects of importing water, which has decreased the use of groundwater containing relatively high TDS and sulfate levels. Other sections of the Upper Santa Clara River, such as the heavily urbanized Santa Clara River basin, continue to have poor water quality due to high levels of non-point source pollution, most of which enter the creeks and flood channels.

Beneficial Uses and Section 303(d) Listing. The Los Angeles Regional Water Quality Control Board (LARWQCB) has jurisdiction over the Santa Clara River Watershed. As the presiding authority, the LARWQCB has documented 24 beneficial uses that apply to waters within the South Coast HR, including the Santa Clara River Watershed. The beneficial uses for the major creeks and streams that would be traversed by the proposed Project include the following: municipal/domestic supply; industrial process/service supply; agricultural supply; groundwater recharge; freshwater replenishment; power generation; recreation; warm

water fisheries, and wildlife habitat. From among these beneficial uses, waterways that provide wildlife habitat is the key area of concern regarding surface water quality, particularly due to shrinking wetland habitat areas.

The Upper Santa Clara River, which is traversed by the proposed Project (Figure C.7-1), is on the 2003 Section 303(d) list for coliform. In addition, Mint Canyon Creek, a tributary of the Santa Clara River, is on the 2003 Section 303(d) list for nitrate and nitrite. Table C.7-4 lists the beneficial uses, Section 303(d) listing, and TMDLs for water bodies that in the vicinity of the proposed Project route (VCWPD and LACDPW, 2005).

Groundwater Quality

All groundwater contains dissolved particles or constituents, which may be either naturally-occurring or man-made. As water travels through the hydrologic cycle, it dissolves and incorporates a variety of constituents. The federal Safe Drinking Water Act of 1974 and its respective updates require that Maximum Contaminant Level (MCL) standards be applied to all water intended for public drinking water supply. MCL standards are both primary and secondary. Primary standards are legally enforceable and are imposed for the protection of public health and safety. In comparison, secondary standards are generally non-enforceable guidelines, which are imposed for the protection of aesthetic quality (taste, odor, appearance) and cosmetic quality (skin or tooth discoloration). Under these primary and secondary MCL standards, the USEPA regulates more than 90 contaminants and the California Department of Health and Services (CDHS) regulates approximately 100 contaminants. MCL standards for Total Dissolved Solids (TDS) are used to indicate the aesthetic characteristics of drinking water, such as odor, taste, and appearance, and to indicate the presence of chemical constituents which could affect water treatment methodologies. Tables C.7-5 and C.7-6 present the groundwater quality in public supply wells for the Tehachapi Valley East Groundwater Basin and the Antelope Valley Groundwater Basin, respectively.

Tehachapi Valley East Groundwater Basin

The Tehachapi Valley East Groundwater Basin covers approximately 37 square miles of the Tehachapi Valley area. As mentioned above, all groundwater contains dissolved particles or constituents. The Lahontan Basin plan lists the beneficial uses for groundwater from this basin as municipal, agricultural, and industrial supply, and freshwater replenishment (LRWQCB, 2002). As described above, MCL standards for TDS levels are used to indicate and protect the odor, taste, and appearance of drinking water. Table C.7-5 presents water quality data for the Tehachapi Valley East Groundwater Basin. TDS levels in the Tehachapi Valley East Groundwater Basin range from 298 to 405 mg/L, with an average concentration of 361 mg/L (DWR, 2004). Primary inorganics exist in concentrations which exceed the applicable MCLs in approximately 14 percent of the public supply wells tested.

Antelope Valley Groundwater Basin

The Antelope Valley Groundwater Basin covers approximately 1,580 square miles of the Antelope Valley. Over this large area, the characteristics of groundwater vary somewhat. Near the surrounding mountains, the groundwater is characterized primarily by concentrations of calcium bicarbonate, whereas in the central part of the basin, groundwater is characterized by sodium bicarbonate or sodium sulfate concentrations. In the eastern part of the basin, the upper aquifer contains water with sodium-calcium bicarbonate characteristics and the lower aquifer contains water with sodium bicarbonate characteristics. As described above, MCL standards for

Table C.7-5. Water Quality in Public Supply Wells – Tehachapi Valley East Groundwater Basin

Constituent Group ¹	Number of Wells Sampled ²	Number of Wells which Exceed the Applicable MCL/s ³ (%)
Inorganics - Primary	7	1 (14)
Radiology	2	0
Nitrates	10	0
Pesticides	7	0
VOCs and SVOCs*	8	0

Source: DWR, 2004

¹ A description of each member in the constituent groups and the relevance of these groups are included in *California's Groundwater: Bulletin 118*, which is available online: <http://www.groundwater.water.ca.gov/bulletin118/update2003/index.cfm> (DWR, 2004).

² Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.

³ This data represents the water quality at the sample location, and not the water quality delivered to the consumer. This information is intended as an indication of the types of activities that cause contamination in a given basin.

*VOC: Volatile Organic Compound, SVOC: Semivolatile Organic Compound.

TDS levels are used to indicate and protect the odor, taste, and appearance of drinking water. Table C.7-6 presents water quality data for the Antelope Valley Groundwater Basin. Throughout the Antelope Valley Groundwater Basin, TDS content averages 300 mg/L, ranging from 200 to 800 mg/l (DWR, 2004a). Primary inorganics exist in concentrations which exceed the applicable MCLs in approximately 12 percent of the wells tested.

Table C.7-6. Water Quality in Public Supply Wells – Antelope Valley Groundwater Basin

Constituent Group ¹	Number of Wells Sampled ²	Number of Wells which Exceed the Applicable MCL/s ³ (%)
Inorganics - Primary	214	25 (12)
Radiology	183	6 (3)
Nitrates	243	8 (3)
Pesticides	207	2 (1)
VOCs and SVOCs*	207	4 (2)

Source: DWR, 2004a

¹ A description of each member in the constituent groups and the relevance of these groups are included in the Lahontan Basin Plan.

² Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.

³ This data represents the water quality at the sample location, and not the water quality delivered to the consumer. This information is intended as an indication of the types of activities that cause contamination in a given basin.

*VOC: Volatile Organic Compound, SVOC: Semivolatile Organic Compound.

C.7.1.4 Climate

The climate of the Project area is characterized by long, hot, dry summers, and short, mild, relatively wet winters. Storms that have the potential to produce significant amounts of precipitation and flooding are extra-tropical cyclones of North Pacific origin, which normally occur from December through March. As these large winter storms move south over the ocean, they are warmed and accumulate moisture until they are forced landward by high pressure over the Pacific. When the storms reach land, they encounter colder air masses and the orographic effect of the mountains, producing widespread precipitation. These storms often last for several days. In addition to the extra-tropical cyclones, the area of the proposed Project may receive thunderstorms, which can occur at any time of the year. Thunderstorms cover comparatively small areas, but result in high-intensity precipitation, usually lasting for less than three hours. On a smaller watershed, thunderstorms can produce flash flooding, which is generally not large enough to produce widespread flooding.

The average maximum and minimum air temperatures recorded at weather stations in the cities of Lancaster and Mojave are presented in Table C.2-1 (Monthly Average Temperatures and Precipitation), located in the

Section C.2 (Air Quality). The average maximum and minimum winter (January) temperatures in Lancaster are 57°F and 31°F respectively, and in Mojave are 58°F and 34°F, respectively. The average maximum and minimum summer (July) temperatures in Lancaster are 95°F and 66°F respectively, and in Mojave are 97°F and 67°F, respectively. The average annual precipitation ranges from 7.4 inches (Lancaster) to 9.48 inches (Mojave), with over 75 percent of all annual precipitation occurring between the months of December and March. Little precipitation occurs during summer because migrating storm systems traveling over the eastern Pacific are diverted from the Antelope Valley area by a high pressure cell. Higher altitude areas have slightly more extreme temperatures and precipitation events that vary somewhat from lower-altitude areas.

C.7.2 Regulatory Framework

C.7.2.1 Federal

Clean Water Act. The Clean Water Act (CWA) (33 U.S.C. Section 1251 et seq.), formerly the Federal Water Pollution Control Act of 1972, was enacted with the intent of restoring 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 source and certain non-point source discharges to surface water. Those discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). In California, NPDES permitting authority is delegated to, and administered by, the nine RWQCBs. For the proposed Project, NPDES permits would be delegated to the Lahontan RWQCB and the Los Angeles RWQCB.

Section 401 of the CWA requires that any activity, including river or stream crossing during road, pipeline, or transmission line construction, which may result in discharges of dredged or fill material into a State waterbody, must be certified by the RWQCB. This certification ensures that the proposed activity does not violate State and/or federal water quality standards. Proposed Project activities would adhere to State and federal water quality standards and would be in compliance with Section 401 of the CWA.

Section 404 of the CWA authorizes the U.S. Army Corps of Engineers (USACE) to regulate the discharge of dredge or fill material to the waters of the U.S. and adjacent wetlands. The limits of non-tidal waters extend to the Ordinary High Water (OHW) line, defined as the line on the shore established by the fluctuation of water and indicated by physical characteristics, such as natural line impressed on the bank, changes in the character of the soil, and presence of debris. The USACE may issue either individual, site-specific permits or general, nationwide permits for discharge into US waters. A Section 404 permit would be required for the proposed Project construction activities involving excavation or replacement of fill material into waters of the United States (i.e., road construction involving cut-and-fill in streams). A Water Quality Certification pursuant to Section 401 of the CWA is required for Section 404 permit actions. If applicable, construction would also require a request for Water Quality Certification (or waiver thereof) from the applicable RWQCB. Proposed Project activities would adhere to State and federal water quality standards and would be in compliance with Section 404 of the CWA.

Section 303(d) of the CWA (CWA, 33 USC 1250, et seq., at 1313(d)) requires states to identify “impaired” water bodies as those which do not meet water quality standards. States are required to compile this information in a list and submit the list to the US EPA for review and approval. This list is known as the Section 303(d) list of impaired waters. As part of this listing process, states are required to prioritize waters and watersheds for future development of TMDL requirements. The State Water Resources Control Board (SWRCB) and RWQCBs have ongoing efforts to monitor and assess water quality, to prepare the Section

303(d) list, and to develop TMDL requirements (LARWQCB, 2004). Beneficial uses of surface waterways in the proposed Project area are described above and in Table C.7-4 (Beneficial Uses and Section 303(d) Listing of Surface Water in the Vicinity of the Proposed Project Route). The proposed Project is not expected to disrupt current or designated beneficial uses of water bodies.

C.7.2.2 State

Streambed Alteration Agreement. Section 1602 of the California Fish and Game Code protects the natural flow, bed, channel, and bank of any river, stream, or lake designated by the California Department of Fish and Game (CDFG) in which there is, at any time, any existing fish or wildlife resources, or benefit for the resources. Section 1602 requires an agreement between the CDFG and a public agency proposing a project that would:

- Divert, obstruct, or change a streambed,
- Use material from the streambed, or
- Result in the disposal, or deposition of debris, waste, or other material containing crumbed, flaked, or ground pavement where it can flow into a stream.

As described in the following impact analysis, it is not expected that the proposed Project would cause or facilitate the actions listed above. However, if it is determined during final engineering and design of the proposed Project that any Project-related actions would have the potential to necessitate a Streambed Alteration Agreement, then such an agreement would be prepared and implemented prior to construction of the proposed Project, thus maintaining compliance with Section 1602 of the California Fish and Game Code.

Porter Cologne Water Quality Control Act. The Porter Cologne Water Quality Control Act of 1967, Water Code Section 13000 et seq., requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect State waters. These criteria include the identification of beneficial uses, narrative and numerical water quality standards, and implementation procedures. Beneficial uses and water quality criteria and beneficial uses for waters in the proposed Project area are described above, in Section C.7.1.3.

California Water Code §13260. California Water Code §13260 requires that any person discharging waste, or proposing to discharge waste, within any region that could affect the quality of the waters of the State, other than into a community sewer system, must submit a report of waste discharge to the applicable RWQCB. Any actions related to the proposed Project that would be applicable to California Water Code §13260 would be reported to the applicable RWQCB (Lahontan or Los Angeles).

C.7.2.3 Local

Local water quality control plans applicable to the proposed Project include the Lahontan RWQCB Basin Plan and the Los Angeles RWQCB Basin Plan. Each of these plans defines water quality objectives for their jurisdiction. These Regional Boards regulate the sources of water quality problems which could result in the impairment of beneficial uses or degradation of water quality, including both point sources of pollution and non-point sources of pollution (LARWQCB, 2004; LRWQCB, 2002). In order to maintain compliance with each of these plans, which are described below, a National Pollutant Discharge Elimination System (NPDES) permit would be developed and implemented for each of the applicable Regional Boards (the Los Angeles RWQCB and the Lahontan RWQCB). In general, the NPDES permits would be used to regulate point sources of pollution, with point sources including all single, identifiable source of contamination. In addition, Best Management Practices (BMPs) included in the NPDES permits and in the impact analysis section below (Section C.7.4.2) would be used to regulate non-point sources of pollution, with non-point sources including

all diffuse sources such as stormwater runoff. By using NPDES permits and BMPs to regulate and minimize potential sources of water quality degradation or impairment of beneficial uses associated with the proposed Project, as regulated by the RWQCBs, proposed Project activities would remain in compliance with the Basin Plans described below.

Water Quality Control Plan for the Lahontan Region (Basin Plan). The Basin Plan for the Lahontan Region (South and North regions) is administered by the State Water Resources Control Board. The Basin Plan for the Lahontan Region is the master policy document that contains description of the legal, technical, and programmatic bases of water quality regulation in the Lahontan Region. The Basin Plan sets forth the water quality standards for surface and groundwater, defines types of water quality problems and makes recommendations to address such problems. In addition, the Basin Plan summarizes water quality programs and identifies monitoring activities for the water resources of the area (LRWQCB, 2003).

Water Quality Control Plan for the Los Angeles Region (Basin Plan). The Basin Plan contains water quality standards for the Los Angeles Region. Water quality standards include designated beneficial uses for surface and ground waters, narrative or numeric water quality objectives to protect those beneficial uses, and a policy to maintain high quality waters (i.e., anti-degradation policy). The Basin Plan also includes implementation plans for water quality objectives through various regulatory programs, and fulfills statutory requirements for water quality planning in California Water Code (CWC) section 13240 and the federal Clean Water Act (CWA) section 303(c) (LARWQCB, 2004).

C.7.3 Applicant-Proposed Measures (APMs)

This section presents the Applicant-Proposed Measures (APMs) designed by SCE to reduce impacts of the proposed Project to hydrology and water quality. These APMs are incorporated into the project description and considered part of the proposed Project. APMs are separate from mitigation measures, which are proposed in addition to the project description for the purpose of mitigating significant impacts. If the proposed Project is approved, these measures will be monitored by the CPUC. Table C.7-7, seen below, presents a complete list of APMs related to hydrology and water quality for the proposed Project.

APM HYD-1	A Construction SWPPP would be submitted to Los Angeles and Kern counties along with grading permit applications. Implementation of the Plan would help stabilize graded areas and waterways, and reduce erosion and sedimentation. The plan would designate BMPs that would be adhered to during construction activities. Erosion minimizing efforts such as straw wattles, water bars, covers, silt fences, and sensitive area access restrictions (for example, flagging) would be installed before clearing and grading begins. Mulching, seeding, or other suitable stabilization measures would be used to protect exposed areas during construction activities. During construction activities, measures would be in place to ensure that contaminants are not discharged from the construction sites. The SWPPP would define areas where hazardous materials would be stored, where trash would be placed, where rolling equipment would be parked, fueled and serviced, and where construction materials such as reinforcing bars and structural steel members would be stored. Erosion control during grading of the construction sites and during subsequent construction would be in place and monitored as specified by the SWPPP. A silting basin(s) would be established, as necessary, to capture silt and other materials, which might otherwise be carried from the site by rainwater surface runoff.
APM HYD-2	An environmental training program would be established to communicate environmental concerns and appropriate work practices, including spill prevention and response measures, and SWPPP measures, to all field personnel. A monitoring program would be implemented to ensure that the plans are followed throughout the period of construction.

APM HYD-3	The Construction SWPPP identified above would include procedures for quick and safe cleanup of accidental spills. This plan would be submitted with the grading permit application. The Construction SWPPP would prescribe hazardous materials handling procedures for reducing the potential for a spill during construction, and would include an emergency response program to ensure quick and safe cleanup of accidental spills. The plan would identify areas where refueling and vehicle maintenance activities and storage of hazardous materials, if any, would be permitted.
APM HYD-4	Oil-absorbent materials, tarps, and storage drums would be used to contain and control any minor releases of transformer oil. In the event that excess water and liquid concrete escapes from foundations during pouring, it would be directed to bermed areas adjacent to the borings where the water would infiltrate or evaporate and the concrete would remain and begin to set. Once the excess concrete has been allowed to set up (but before it is dry), it would be removed and transported to an approved landfill for disposal.
APM HYD-5	A Phase I ESA would be performed at each new substation location and along newly acquired transmission line ROWs. Depending on the results of the Phase I ESA, soil sampling would be conducted and remedial activities would be implemented, if applicable. If hazardous materials were encountered during any construction activities, work would be stopped until the material was properly characterized and appropriate measures were taken to protect human health and the environment. If excavation of hazardous materials is required, they would be handled, transported, and disposed of in accordance with federal, state, and local regulations.
APM HYD-6	If groundwater were encountered while excavating or constructing the transmission line or substations, dewatering operations would be performed. These operations would include, as applicable, the use of sediment traps and sediment basins in accordance with BMP NS-2 (Dewatering Operations) from the California Stormwater Quality Association's (CASQA) California Stormwater BMP Handbook – Construction (CASQA, 2003).

C.7.4 Environmental Impacts and Mitigation Measures

This section discusses the significance of potential hydrology and water quality impacts associated with the proposed Project. The construction of new Project-related infrastructure could have impacts to hydrology and water quality through direct or indirect disturbance of surface water or groundwater resources. This section evaluates the potential impacts to hydrology and water quality that could occur as a result of the proposed Project. The assessment is based on an evaluation of existing hydrology and water quality features in the Project area, including existing and planned uses and stresses, as well as consideration of information provided in the proponent's PEA.

C.7.4.1 Criteria for Determining Significance

The following significance criteria are based on the CEQA environmental checklist presented in Appendix G to the State CEQA Guidelines. Water resources impacts would be considered significant if the proposed Project:

- Criterion HYD1: Violates any water quality standard or waste discharge requirement, or otherwise degrades water quality, including through providing substantial additional sources of polluted runoff.
- Criterion HYD2: Substantially depletes groundwater supplies or interferes with groundwater recharge, such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).
- Criterion HYD3: Substantially alters the existing drainage pattern of the site or area, which includes the redirection of existing watercourses, creation of new discharge concentration points, or increasing the amount, frequency and rate of runoff, such that a substantial increase in downstream flooding, erosion, or siltation will occur.
- Criterion HYD4: Creates or contributes runoff water that would exceed the capacity of existing or planned stormwater drainage systems.

- Criterion HYD5: Places housing or structures within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map, or within a watercourse, which would impede or redirect flood flows to the detriment of adjacent property through flooding, erosion, or sedimentation.
- Criterion HYD6: Exposes people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.
- Criterion HYD7: Results in or is subject to damage from inundation by seiche, tsunami, or mudflow.

C.7.4.2 Impact Analysis

The following discussion identifies the proposed Project’s impacts to hydrology and water quality, as determined by the significance criteria listed above in Section C.7.4.1. Mitigation measures have been introduced where necessary in order to reduce potentially significant impacts to less-than-significant levels. In the case where an impact is significant and unavoidable, mitigation measures may still be introduced in order to lessen or minimize the severity of the impact.

C.7.4.2.1 Impact and Mitigation Summary

This section summarizes the conclusions of the impact analysis and associated mitigation measures presented in Section C.7.4.2.2. Table C.7-8 lists each impact identified for the proposed Project, along with the significance of each impact. Impacts are classified as Class I (significant, cannot be mitigated to a level that is less than significant), Class II (significant, can be mitigated to a level that is less than significant), Class III (adverse, but less than significant), or Class IV (beneficial). Detailed discussions of each impact and the specific locations where each is identified are presented in the following sections.

Table C.7-8. Impact and Mitigation Summary – Hydrology and Water Quality		
Impact	Impact Significance	Mitigation Measures*
H-1: Water quality degradation would result from soil erosion and sedimentation caused by construction activities.	Class II	H-1a through H-1e
H-2: Degradation of water quality would result from the accidental release of hazardous materials during construction activities.	Class II	H-2a through H-2d HAZ-1a through HAZ-1d, HAZ-2b
H-3: Degradation of water quality would result from the accidental release of hazardous materials during operational activities.	Class III	None Required
H-4: Existing groundwater resources would be disturbed through Project-related excavation activities.	Class II	H-4
H-5: Increased surface water runoff would result through the introduction of new impermeable areas.	Class III	None Required
H-6: Runoff introduced as a result of permanent Project features would cause the overloading of a local stormwater drainage system.	Class III	None Required
H-7: Flood hazards would be created through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse.	Class II	H-7

* Applicable to significant impacts only (i.e., Class I and Class II).

C.7.4.2.2 Project Impacts and Mitigation Measures

Violation of Water Quality Standards or Waste Discharge Requirements or Other Degradation of Water Quality (Criterion HYD1)

Impact H-1: Water quality degradation would result from soil erosion and sedimentation caused by construction activities. (Class II)

Disturbance of soil during construction could result in soil erosion and sedimentation, as discussed in Section C.5 (Geology). Construction of the proposed Project would include the following land-disturbing activities that could result in soil erosion and sedimentation:

- Installation of approximately 390 new transmission towers (180 for Segment 3 and 210 for Segment 2), including grading and excavation as needed for level foundation pads
- Grading and excavation at the Substation Two site, resulting in 28.3 acres of land disturbance
- Grading and excavation at the Substation One site, resulting in 62.9 acres of land disturbance
- Upgrades to Antelope Substation and Vincent Substation, including grading and excavation as needed for the installation of new infrastructure
- Grading and clearing as needed for temporary pulling and splicing locations, set-up locations, and marshalling yards
- Road construction and improvements as needed to provide temporary construction access as well as permanent maintenance access along the length of the route

In particular, road construction for both temporary and permanent roadways has the potential to cause soil instability resulting in erosion and sedimentation, which could potentially degrade surrounding water quality. Land disturbance associated with road construction and improvements would include the following activities: removal of vegetation, blade grading, soil compaction, installation of drainage structures, and installation of slope-strengthening structures as needed. These activities involve soil disturbance and stockpiling of earth that could potentially accelerate soil erosion. Exposed and/or eroding sediment could wash into surrounding waterways and their downstream tributaries, including Oak Creek, Amargosa Creek, Ritter Canyon Creek, Anaverde Creek, and the Upper Santa Clara River, in addition to the Los Angeles Aqueduct, the California Aqueduct and multiple ephemeral waterways in the area. As described above in Section 3.7.7.1 (Surface Water), there are numerous ephemeral streams and desert washes in the Project area. In total, the proposed Project would traverse approximately 35 ephemeral streams or desert washes along the length of the route, any of which could be affected by soil erosion and sedimentation in the case of a precipitation event.

As discussed in Section B (Project Description) and noted in Table B.1-1 (Summary of Proposed Project Components), approximately 311.8 acres of total land disturbance would occur due to the proposed Project. Although approximately 147.2 acres of the total disturbed area would be restored to minimize permanent land disturbance, potential impacts to water quality from soil erosion and sedimentation are dependent upon the total area disturbed during construction. For instance, although some portion of the proposed substation sites would be restored after construction, the initial land disturbance could have lasting effects on water quality through soil erosion and sedimentation. The proposed sites for Substations One and Two are located on relatively flat valley floors and gently sloping alluvial fans (SCE, 2005). Grading would be required to provide a level surface for facility installation and to divert stormwater runoff away from these facilities, into ephemeral streams and desert washes. This would introduce the potential for accelerated soil erosion and sedimentation.

The Storm Water Pollution Prevention Plan (SWPPP) required through APM HYD-1 would be implemented during construction, in accordance with Section 402 of the CWA. A SWPPP is required by the State Water Quality Control Board (SWQCB) for construction projects that disturb one acre or more of ground surface. The SWPPP would be prepared once the proposed Project is approved and after the necessary facilities are sited and designed, in order to ensure site-specific conditions are effectively addressed. All SWPPPs must include Best Management Practices (BMPs) for erosion and sediment control, as well as for construction waste handling and disposal (SWRCB, 2006). This plan would require erosion-minimizing BMPs for construction activities, including: use of hay bales, water bars, covers, and sediment fences; restricted access to sensitive areas; use of vehicle mats in wet areas; and installation of retention/settlement ponds prior to the onset of extensive clearing and grading.

Although the SWPPP help to minimize the proposed Project's impact on water quality from soil erosion and sedimentation, such impacts would still be potentially significant without the implementation of appropriate mitigation measures. Therefore, mitigation measures are recommended to ensure that specific BMPs are utilized for the proposed Project. Because the proposed Project would not require construction activities in mountainous or steeply sloping areas, the recommended mitigation measures do not specifically address construction activities in hillside areas, such as requiring the dispersion of subsurface drainage from cut and fill slopes. The following mitigation measures are recommended to minimize this potential impact: Mitigation Measures H-1a (Implementation of ~~Erosion and Sediment~~ Best Management Practices for Erosion and Sediment Control), H-1b (Maximum Road Gradient), H-1c (Road Surface Treatment), H-1d (Timing of Construction Activities) and H-1e (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris). The purpose of the mitigation measures described below is to recommend specific BMPs that are not already described by the APMs applicable to Impact H-1 and that are not explicitly required by a regulatory body such as the SWRCB or the RWQCB. With the implementation of these mitigation measures, Impact H-1 for the proposed Project would be reduced to a less-than-significant (**Class II**) level.

Mitigation Measures for Impact H-1

H-1a Implementation of Best Management Practices for Erosion and Sediment Control. The following Best Management Practices (BMPs) shall be implemented to minimize potential hydrologic impacts of erosion and sedimentation created through project construction:

- Mechanical and vegetative measures shall be implemented to provide surface soil stability in areas where Project construction requires the exposure of cut slopes, fill slopes, or spoil disposal. The level of stabilization effort depends upon site-specific factors such as slope angle, soil type, climate, and proximity to waterways. Mechanical measures may include but are not limited to: wattles, erosion nets, terraces, side drains, blankets, mats, riprapping, much, tackifiers, pavement, soil seals, and windrowing construction slash at the toe of fill slopes. Vegetative measures shall be used to supplement mechanical measures, as appropriate. The appropriate stabilization effort using mechanical and vegetative measures shall be determined by the supervising project or crew leader prior to the onset of construction, based on site-specific conditions.
- Road slope stabilization practices shall be implemented prior to the first winter rains. These practices shall include: verification of the correct cut and fill slope steepness as dependent upon the dominant soil type/s present, implementation of methods to handle surface and subsurface runoff, and finalization of road surface compaction or application of appropriate surfacing material.
- Any temporary roadways which are built or used for the purpose of transporting construction equipment and materials to construction sites shall be situated to prevent undercutting of the designated final cut slope, avoid deposition of materials outside the designated roadway limits, and accommodate drainage with temporary culverts. Road siting is dependent upon site-specific conditions and shall be determined by the supervising project or crew leader prior to the onset of construction activities.

- Embankment methods shall be implemented to ensure adequate strength of the roadway and shoulder and to minimize potential failure of road embankments and fill areas. Acceptable stabilization methods include: sidecasting and end dumping, layer placement (roller compaction), controlled compaction, minimization of fill volumes, or strengthening of fills using retaining walls, confinement systems, plantings, or a combination of techniques. The appropriate stabilization effort shall be determined by the supervising project or crew leader prior to the onset of construction, based on site-specific conditions.
- Strictly control vehicular traffic to only that which is minimally necessary to transport materials, equipment, and construction personnel to the Project site. Roads that must be used during wet periods shall have a stable surface and sufficient drainage, as determined by the supervising project or crew leader, to prevent rutting and churning of the road surfaces.
- Re-vegetate all areas disturbed by grading or clearing following construction, unless operation and maintenance of the Project would require the area to remain clear (such as with an access road).
- Establish the use of concrete washout stations to capture and contain concrete washout material and wastewater to avoid direct release of washout to surface water.

H-1b Maximum Road Gradient. The maximum allowable road gradient applicable to all new roadways, including access roads and spur roads, which would be installed to provide temporary or permanent access during construction and/or operation and maintenance activities shall be no greater than ten percent.

H-1c Road Surface Treatment. Road surface treatments shall be implemented in order to minimize the erosion of road surface materials and reduce the likelihood of related sediment production. Treatments may include watering, dust oiling, penetration oiling, sealing, aggregate surfacing, chip sealing, or paving. The technique utilized at each site shall depend upon traffic, soils, geology, and road design specifications. Site-specific road surface treatments shall be specified by the supervising project or crew leader prior to the onset of construction activities.

H-1d Timing of Construction Activities. Construction activities, particularly regarding roadway installations and improvements, must not occur when precipitation events are expected.

H-1e Control of Side-cast Material, Right-of-Way Debris and Roadway Debris. Side-cast material includes any loose, unconsolidated materials that must be re-located to facilitate construction activities. This may include rocks and boulders as well as other organic materials. Prior to the onset of any construction activities, waste areas must be designated where excess material can be deposited and stabilized. During road construction and maintenance, potential sidecast and other waste material will be utilized on the road surface. Any unused material shall be removed to designated disposal sites. Waste areas shall not be left exposed and must be transported to disposal facilities on a regular basis, which will be determined based on site-specific conditions.

Option A

As described above in the proposed Project discussion, land disturbing activities that could result in soil erosion and sedimentation include transmission tower installation, substation construction and upgrades, establishment of temporary pulling and splicing locations, set-up locations, and marshalling yards, and road construction and improvements. All substation facilities and roadway construction efforts associated with Option A would be the same as for the proposed Project. Option A would require one additional single-circuit 500-kV LST than the proposed Project. This difference is not substantial with regards to the production of soil erosion and sedimentation and is therefore not expected to cause a change in the potential for water quality impacts. The potential for Option A to affect water quality through soil erosion and sedimentation would be the same as the proposed Project. Prior to the implementation of appropriate mitigation measures, this impact has

the potential to be significant. However, with the implementation of Mitigation Measures H-1a (Implementation of ~~Erosion and Sediment~~ Best Management Practices for Erosion and Sediment Control), H-1b (Maximum Road Gradient), H-1c (Road Surface Treatment), H-1d (Timing of Construction Activities) and H-1e (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris), Impact H-1 for Option A would be reduced to a less-than-significant (**Class II**) level.

Option B

Rather than circumventing the Ritter Ranch community area, as the proposed Project does, Option B would continue traveling parallel to the existing Antelope-Vincent corridor, heading towards Vincent Substation. In comparison with the proposed Project, Option B would not traverse Ritter Canyon Creek (proposed Project Mile S2-9.4 and Mile S2-10.8) but it would traverse Anaverde Creek at Option B Mile 10.0 (versus proposed Project Mile S2-11.2 and Mile S2-12.2). In addition, Option B would not traverse five of the valley washes and creeks that would be crossed by the proposed Project between proposed Project Mile S2-8.0 and Mile S2-15.0. However, Option B would traverse three creeks, all of which are tributaries of Anaverde Creek, at Option B Mile S2-8.6, Mile S2-9.2, and Mile S2-10.4, while running parallel to existing transmission lines in the Antelope-Vincent corridor.

The potential impacts to water quality from soil erosion and sedimentation caused by Option B would be the same as the proposed Project. Prior to the implementation of appropriate mitigation measures, this impact has the potential to be significant. However, with the implementation of Mitigation Measures H-1a (Implementation of ~~Erosion and Sediment~~ Best Management Practices for Erosion and Sediment Control), H-1b (Maximum Road Gradient), H-1c (Road Surface Treatment), H-1d (Timing of Construction Activities) and H-1e (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris) would reduce Impact H-1 for Option B to less than significant (**Class II**).

Impact H-2: Degradation of water quality would result from the accidental release of hazardous materials during construction activities. (Class II)

Surface water and groundwater quality could be affected through the accidental release of hazardous materials during Project-related construction activities. Such materials include: diesel fuel, gasoline, lubricant oils, hydraulic fluid, antifreeze, transmission fluid, lubricant grease, and other fluids. The preparation and pouring of concrete and the use of motorized equipment are examples of construction activities that would specifically involve the use of potentially harmful materials. The release of one or more hazardous materials could occur at pole or tower installation locations, site laydown and preparation areas, substation construction sites, substation expansion sites, and other locations where construction activities would occur.

Accidentally spilled hazardous materials could pollute surface water through direct runoff into nearby waterways or water bodies, including ephemeral streams and desert washes. These materials could also pollute groundwater through soil infiltration or direct runoff, if the groundwater table is exposed during excavation activities and such activities coincide with the occurrence of an accidental spill. Any of the waterways listed in Table C.7-3 (Waterways Traversed by the Proposed Project) could be affected by this impact. In addition, tributaries of these waterways could also be affected, depending on the severity of the spill. For instance, if a spill were to occur between Mile S3-5.0 and S3-6.0, where the proposed Project runs parallel to Oak Creek within approximately 500 feet from the waterway, the spilled materials could wash directly into Oak Creek. There are multiple branches and tributaries of Oak Creek downstream of this point which, under conducive circumstances including weather and flow, could be affected by this impact.

The SWPPP required by APM HYD-1 would include BMPs for soil erosion and sedimentation, which would also help to minimize the potential impacts of an accidental spill. In addition, the environmental training and monitoring program required by APM HYD-2 would help to avoid the occurrence of accidental spills and the hazardous materials handling procedures that are required by APM HYD-3 to be included in the SWPPP would help to ensure rapid and effective clean-up of any accidental spills that do occur. Furthermore, the specifications regarding the handling of transformer oil and concrete materials which are required in APM HYD-4 would also help to minimize impacts in the event of a spill. Although the APMs included as part of the project description would help to minimize Impact H-2 for the proposed Project, without the implementation of appropriate mitigation measures, this impact would be potentially significant.

In order to strengthen APMs HYD-1 through HYD-4, the following mitigation measures from Section C.6 (Hazards and Hazardous Materials) would be implemented: Mitigation Measures HAZ-1a (Implement an Environmental Training and Monitoring Program), HAZ-1b (Implement a Hazardous Substance Control and Emergency Response Plan), HAZ-1c (Ensure Proper Disposal of Construction Waste), HAZ-1d (Emergency Spill Supplies and Equipment for Construction Activities), and HAZ-2b (Emergency Spill Supplies and Equipment for Operation and Maintenance Activities). With the implementation of these mitigation measures, Impact H-2 for the proposed Project would be reduced to a less-than-significant (**Class II**) level.

Option A

The quality of water resources (surface water and groundwater) located in area of Option A could potentially be degraded from the accidental release of hazardous materials during construction activities. In comparison with the proposed Project, Option A would involve the construction of one additional transmission tower and 0.1 miles of additional ROW located adjacent to existing ROW. As described above, the accidental release of potentially hazardous materials such as those used for the operation of motorized equipment and construction vehicles could pollute water resources through direct runoff or infiltration. The one additional transmission tower and slightly extended length of Option A would not cause a substantial difference in the potential for an accidental release of hazardous materials. In addition, the same construction methods, infrastructure, and hazardous materials would be utilized for Option A as for the proposed Project. Therefore, the potential for Option A to cause water quality degradation from the accidental release of hazardous materials during construction activities (Impact H-2) would be the same as the proposed Project. Prior to the implementation of appropriate mitigation measures, this impact has the potential to be significant. However, with the implementation of Mitigation Measures HAZ-1a (Implement an Environmental Training and Monitoring Program), HAZ-1b (Implement a Hazardous Substance Control and Emergency Response Plan), HAZ-1c (Ensure Proper Disposal of Construction Waste), HAZ-1d (Emergency Spill Supplies and Equipment for Construction Activities), and HAZ-2b (Emergency Spill Supplies and Equipment for Operation and Maintenance Activities), Impact H-2 for Option A would be reduced to a less-than-significant (**Class II**) level.

Option B

As described above in the discussion for Impact H-1, Option B would not traverse Ritter Creek, but it would traverse Anaverde Creek and several of its tributaries. The quality of water resources (surface water and groundwater) located in area of Option B could potentially be degraded from the accidental release of hazardous materials during construction activities. As described above, the accidental release of potentially hazardous materials such as those used for the operation of motorized equipment and construction vehicles could pollute water resources through direct runoff or infiltration. In comparison with the proposed Project, Option B would involve the construction of 19 fewer transmission towers and 1.2 fewer miles of ROW located

adjacent to existing ROW. However, these differences would not cause a substantial difference in the potential for an accidental release of hazardous materials. In addition, the same construction methods, infrastructure, and hazardous materials would be utilized for Option B as for the proposed Project, as described above. Prior to the implementation of appropriate mitigation measures, this impact has the potential to be significant. However, with the implementation of Mitigation Measures HAZ-1a (Implement an Environmental Training and Monitoring Program), HAZ-1b (Implement a Hazardous Substance Control and Emergency Response Plan), HAZ-1c (Ensure Proper Disposal of Construction Waste), HAZ-1d (Emergency Spill Supplies and Equipment for Construction Activities), and HAZ-2b (Emergency Spill Supplies and Equipment for Operation and Maintenance Activities), Impact H-2 for Option B would be less than significant (**Class II**).

Impact H-3: Degradation of water quality would result from the accidental release of hazardous materials during operational activities. (Class III)

Surface and groundwater quality could potentially be affected during activities associated with the operation and maintenance of the proposed Project. Potentially harmful materials could be accidentally released during operational and maintenance activities at pole and tower locations, substation sites, and along access roads. Due to the use of vehicles and other motorized equipment, some of the potentially hazardous substances that could be released include: diesel fuel, gasoline, lubricant oils, hydraulic fluid, antifreeze, transmission fluid, and lubricant grease. Transformer oil and other substances associated with transformers could also be accidentally released during operation or maintenance activities. These materials could contaminate surface water through direct release or runoff to local surface waterways. Groundwater resources could be affected through soil infiltration or through direct runoff, if exposure of the groundwater table coincides with the accidental release of hazardous materials. APMs HYD-1 through HYD-4 as described for Impact H-2 would help to minimize this potential impact.

Section C.6.2, which describes the regulatory framework for the Hazards and Hazardous Materials issue area, indicates that there are multiple federal, State, and local agencies and bodies of law with authority over the mitigation of hazardous materials spills. The specific authority over a spill depends on multiple factors such as the location and nature of the spill. It should be noted that Impact HAZ-2, which is discussed in Section C.6 (Hazards and Hazardous Materials) of this document, also addresses the potential for an accidental release of hazardous materials during operational and maintenance activities. However, whereas Impact HAZ-2 addresses the potential occurrence of an accidental release, Impact H-3 more specifically addresses the potential for degradation of water quality in the potential circumstance that an accidental release has occurred. Therefore, these two impacts are discussed separately and assigned separate significance classifications, as appropriate.

In contrast with construction activities, which would include greater land disturbance and more invasive activities for the installation of Project facilities, operation of the proposed Project would include activities with substantially less potential to result in water quality degradation from the accidental spill of hazardous materials. Operational activities would include annual visual inspections of Project facilities via helicopter and truck, with maintenance performed on an as-needed basis. These activities would not have the potential to cause a significant degradation in water quality from the accidental release of hazardous materials. Therefore, no mitigation measures are recommended for operational and maintenance activities due to the less invasive and less hazardous nature of such activities. Therefore, Impact H-3 would be less than significant with no mitigation recommended (**Class III**).

Option A

Operations and maintenance activities associated with Option A would include the potential for the accidental release of hazardous materials. The requirements for operation and maintenance of Option A would be identical to the proposed Project and, as described above, would include annual visual inspections of Project facilities via helicopter and truck, with maintenance performed on an as-needed basis. Therefore, the potential for Option A to cause water quality degradation from the accidental release of hazardous materials during operation and maintenance activities (Impact H-3) would be the same as the proposed Project. Impact H-3 for Option A would be less than significant with no mitigation recommended (**Class III**).

Option B

As described above in the discussion for Impact H-1, Option B would not traverse Ritter Creek, but it would traverse Anaverde Creek and several of its tributaries. Operations and maintenance activities associated with Option B would include the potential for the accidental release of hazardous materials. The requirements for operation and maintenance of Option B would be identical to the proposed Project and, as described above, would include annual visual inspections of Project facilities via helicopter and truck, with maintenance performed on an as-needed basis. Therefore, the potential for Option B to cause water quality degradation from the accidental release of hazardous materials during operation and maintenance activities (Impact H-3) would be the same as the proposed Project. Impact H-3 for Option B would be less than significant with no mitigation recommended (**Class III**).

Interference with groundwater supply and recharge (Criterion HYD2)

Impact H-4: Existing groundwater resources would be disturbed through Project-related excavation activities. (Class II)

As described above in Section C.7.1.2 (Groundwater), the proposed Project alignment traverses two separate groundwater basins: the Tehachapi Valley East Groundwater Basin (Mile S3-0.0 – Mile S3-3.0) and the Antelope Valley Groundwater Basin (Mile S3-3.2 – Mile S3-35.2 and Mile S2-0.0 – S2-21.6). Excavation activities associated with the proposed Project would be largely associated with the construction of Substations One and Two, in addition to drilling for the installation of new transmission tower foundations. Additional excavation would be required for improvements at Antelope Substation and Vincent Substation. The proposed site for Substation Two and approximately the first three miles of the proposed transmission line route are within the boundaries of the Tehachapi Valley East Groundwater Basin. The proposed site for Substation One and other Project features situated over known groundwater resources are within the boundaries of the Antelope Valley Groundwater Basin.

Project-related excavation is not expected to result in the disturbance of existing groundwater resources. The Project would not use groundwater supplies or interfere with groundwater recharge. Local streamflow would not be altered by the Project such that it would result in a lowering of the local groundwater table. If groundwater resources are encountered during excavation activities or other Project-related construction activities, dewatering operations would be performed as required by APM HYD-6, per the California Stormwater Quality Association's "California Stormwater BMP Handbook" for Construction (CASQA, 2003). In addition, the SWPPP required by APM HYD-1 would include specific BMPs that would indirectly help to protect groundwater resources through improvement construction techniques. Prior to the implementation of appropriate mitigation measures, this impact has the potential to be significant. However, with the

implementation of Mitigation Measure H-4 (Develop and Implement a Groundwater Remediation Plan), Impact H-4 for the proposed Project would be reduced to a less-than-significant level (**Class II**).

Mitigation Measure for Impact H-4

H-4 Develop and Implement a Groundwater Remediation Plan. Prior to the onset of any construction activities, the Applicant shall determine the specific location and extent of any groundwater resources that may be encountered through project-related excavation activities such as the installation of underground infrastructure. The Applicant shall develop and implement a groundwater remediation plan if it is determined that known groundwater resources would be unavoidable during construction. In the event that unknown groundwater resources are encountered or an unplanned disturbance of known resources occurs, the Applicant shall immediately halt the disruptive excavation activity and develop a site-specific remediation plan. This remediation plan may require activities such as bioremediation or other applicable technology, as determined appropriate under site-specific conditions.

Option A

Option A would introduce the potential for existing groundwater resources to be disturbed through Project-related excavation activities (Impact H-4). This option is situated within the same groundwater resource areas as the proposed Project and would include the same excavation activities as the proposed Project, described above. There are no differences between Option A and the proposed Project with regards to existing groundwater resources that could be disturbed by Project-related activities. Therefore, Impact H-4 for Option A would be the same as the proposed Project. Prior to the implementation of appropriate mitigation measures, this impact has the potential to be significant. However, with the implementation of Mitigation Measure H-4 (Develop and Implement a Groundwater Remediation Plan) Impact H-4 for Option A would be less than significant (**Class II**).

Option B

Option B would introduce the potential for existing groundwater resources to be disturbed through Project-related excavation activities (Impact H-4). This option is situated within the same groundwater resource areas as the proposed Project and would include the same excavation activities as the proposed Project, described above. There are no differences between Option B and the proposed Project with regards to existing groundwater resources that could be disturbed by Project-related activities. Therefore, Impact H-4 for Option B would be the same as the proposed Project. Prior to the implementation of appropriate mitigation measures, this impact has the potential to be significant. However, with the implementation of Mitigation Measure H-4 (Develop and Implement a Groundwater Remediation Plan) Impact H-4 for Option B would be less than significant (**Class II**).

Alter the existing drainage pattern or increase surface runoff (Criterion HYD3)

Impact H-5: Increased surface water runoff would result through the introduction of new impermeable areas. (Class III)

Permeability is a measure of the ability of a substance to transmit fluids through it. Impervious surfaces seal the soil surface, eliminating the infiltration of precipitation and natural groundwater recharge. As a result, stormwater washes directly across impervious surfaces, raising flood peaks in the area, which causes erosion of unlined stream channels and increased sediment loads. New impervious surfaces would be introduced during construction of the proposed Project. In general, the construction or improvement of access roads and

spur roads would introduce permanent impervious areas because they would be maintained throughout the lifetime of the Project in order to complete operational activities. Other new permanent impervious surfaces include areas at the proposed sites for Substation One and Substation Two, transmission tower pads, and any concrete-filled areas. The new impervious areas associated with temporary construction access ways, laydown areas, and marshalling yards would be returned to existing conditions (to the extent possible) after the completion of Project construction.

As described in Section B (Project Description), construction of the proposed Project would cause land disturbance of approximately 311.8 acres, with restoration planned for approximately 147.2 acres. Permanent land disturbance is estimated to be approximately 164.6 acres, due to the construction of transmission towers and footings, grading for new spur roads and the turning radius for access roads to spur roads, construction of Substations One and Two, and improvements to Antelope Substation and Vincent Substation. These construction activities would increase the area of impermeable surfaces in the vicinity of the proposed Project, which could increase surface water runoff.

Scraping and grading for new spur and access roads would remove vegetation and disturb the soil surface, which would result in a reduction in the infiltration and absorption capacity of the impacted area. The potential impacts from spur roads and access roads would be localized and temporary. In addition, the SWPPP required by APM HYD-1 would include an erosion control plan to minimize any potential increase in surface water runoff resulting from new or improved roads.

Construction of the 390 transmission towers associated with the proposed Project would introduce new impermeable areas through concrete structure pads, foundations, and footings. For instance, each new lattice steel tower (LST) would require four drilled pier concrete footings approximately 42-inch to 48-inch diameter each. Each tubular steel pole (TSP) would require one drilled pier footing with an approximately 66-inch diameter. In general, the new impervious area that would be permanently introduced through these footings would range from approximately 0.0006 acres each for TSPs and 0.0005 acres each for LSTs. The total area of permanent impervious area that would be introduced from transmission tower footings would be approximately 0.15 acres. Drainage control features would be installed where appropriate, as well as other stormwater protection measures included as part of the SWPPP required by APM HYD-1. Improvements required at Antelope Substation and Vincent Substation are not expected to introduce new impermeable areas that could increase surface runoff because they would maintain the same surface materials currently present at the substation sites.

The total land disturbance caused by Substation Two is estimated to be 28.3 acres, with most of the substation facilities contained within a 1.5-acre area of the site. Similarly, the total land disturbance caused by Substation One is estimated to be 62.9 acres, with most of the substation facilities contained within a 1.8-acre area of the site. As shown in Table B.1-1 (Summary of Proposed Project Components), substation facilities include the following: one-position bus structure, line dead-end structures, 220-kV circuit breaker, 220-kV disconnect switches, coupling capacitor voltage transformers (CCVTs), Mechanical Electrical Equipment Room (MEER), and protective relaying equipment. These facilities would be constructed on concrete pads and foundations as needed, thus introducing new impermeable areas that could increase surface water runoff. However, as described in Section B.3.2 (Substation Facility Construction), each new substation site would be graded, fenced, and covered with a four-inch layer of crushed rock in all areas where other materials such as concrete would not be required. The crushed rock material would increase permeability of the graded site and facilitate infiltration of surface water runoff.

Drainage structures would be installed as part of new temporary and permanent access roads and spur roads. These structures may include the following: wet crossings, water bars, overside drains, and pipe culverts (SCE, 2005). Any new transmission tower sites that would require grading or clearing would be graded so that surface water runoff would continue in the direction of the natural drainage (SCE, 2005). For the new substation sites, site-specific drainage features would be developed during final engineering design, ensuring consistency with the National Pollutant Discharge Elimination System (NPDES) and the SWPPP prepared for the site, as well as local ordinances (SCE, 2005). Drainage improvements at the substation sites may include concrete swales, ditches, and culverts. All Project-related drainage features and improvements would be maintained as needed during regular facility operations and maintenance activities. Therefore, although construction of the proposed Project would introduce some new impermeable areas, as described above, these areas would not significantly increase surface water runoff due to the drainage features associated with the proposed Project. Impact H-5 for the proposed Project would be less than significant with no mitigation recommended (**Class III**).

Option A

Option A includes a very minor deviation of the proposed Project route and would traverse all of the same surface water and groundwater bodies as would the proposed Project. Option A would include the installation of one more transmission tower than the proposed Project. This would introduce approximately 0.0006 more acres of new and permanent impervious area than would the proposed Project. All other aspects of Option A would be identical to the proposed Project, including features that would introduce temporary or permanent impervious areas. The installation of one additional transmission tower would not substantially affect the total impervious area introduced through Option A versus the proposed Project. Therefore, the potential for Option A to increase surface water runoff through the introduction of new impermeable areas (Impact H-5) would be the same as the proposed Project. Impact H-5 for Option A would be less than significant with no mitigation recommended (**Class III**).

Option B

Option B includes a deviation of the proposed Project route that would require the installation of 19 fewer transmission towers than the proposed Project. This would effectively avoid the introduction of approximately 0.01 acres of new impermeable areas. Along this re-route, some of the waterways traversed by Option B would be different from those traversed by the proposed Project, as described in the Option B discussion for Impact H-1. Although some of the specific waterways are different, the overall hydrology of the area is the same for Option B and for the proposed Project. The surface waterways crossed by Option B drain in the same direction and eventually connect to the same surface waterways crossed by the proposed Project route. All other aspects of Option B would be identical to the proposed Project, including features that would introduce temporary or permanent impervious areas. The installation of 19 fewer transmission towers would not substantially affect the total impervious area introduced through Option B versus the proposed Project. The potential for Option B to increase surface water runoff through the introduction of new impermeable surfaces (Impact H-5) would be the same as the proposed Project. Impact H-5 for Option B would be less than significant with no mitigation recommended (**Class III**).

Create or contribute to runoff that would exceed the capacity of a stormwater drainage system (Criterion HYD4)

Impact H-6: Runoff introduced as a result of permanent Project features would cause the overloading of a local stormwater drainage system. (Class III)

The two main categories of Project-related features that could potentially affect a local stormwater drainage system include: construction or improvement of substation facilities including the new Substation One and Substation Two sites, and construction of 389 new transmission towers (includes 96 new double-circuit 66-kV TSPs for relocation of 4.4 miles of 66-kV subtransmission line immediately south of Antelope Substation) along the length of the 56.8-mile proposed route. The proposed Project would include construction of two substation sites, with a combined total land disturbance of approximately 91.2 acres. These new facilities would result in the installation of some areas of paved concrete or asphalt surfaces, which would potentially increase the quantity of surface water runoff. Both substation sites are located on a relatively flat alluvial fan on the floor of the Antelope Valley. This land surface would allow for the infiltration of surface water runoff not captured by the substation drainage features. In addition, most of the substation sites would be covered with a crushed rock material rather than paved, as described above in the discussion for Impact H-5, thus allowing for infiltration of surface water runoff. Furthermore, both proposed substation sites are located in rural areas where there is not a stormwater drainage system in place.

Each new transmission tower associated with the proposed Project would introduce an impervious area of 0.0006 acres to 0.0005 acres per tower due to the installation of concrete footings and/or tower pads, as discussed above in the discussion for Impact H-5. As discussed above, total area of permanent impervious area that would be introduced from transmission tower footings would be approximately 0.15 acres. Each new transmission tower would be designed and engineered to facilitate natural drainage patterns. Along the length of its 56.8-mile alignment, the proposed Project would cross through or adjacent to the established communities of Mojave and Rosamond, as well as the Cities of Lancaster, Palmdale, and the community of Acton. Stormwater drainage systems are in place throughout these populated areas. The potential runoff generated by permanent Project features such as the transmission towers is expected to be minimal due to the inclusion of drainage features in Project design. Impact H-6 for the proposed Project would be less than significant with no mitigation recommended (**Class III**).

Option A

As discussed above for Impact H-5, Option A would effectively introduce the same amount of new impervious area as the proposed Project, thus having the same affect on associated surface water runoff. Therefore, the potential for Option A to result in surface water runoff that would cause the overloading of a local stormwater drainage system (Impact H-6) would be the same as the proposed Project. Impact H-6 for Option A would be less than significant with no mitigation recommended (**Class III**).

Option B

As discussed above for Impact H-5, Option B would effectively introduce the same amount of new impervious area as the proposed Project, thus having the same affect on associated surface water runoff. Therefore, the potential for Option B to result in surface water runoff that would cause the overloading of a local stormwater drainage system (Impact H-6) would be the same as the proposed Project. Impact H-6 for Option B would be less than significant with no mitigation recommended (**Class III**).

Place structures within a 100-year flood hazard area or in a watercourse which would alter flood flows (Criterion HYD5)

Impact H-7: Flood hazards would be created through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse. (Class II)

As described in Section C.7.1.1 (Surface Water), a 100-year floodplain, or FEMA-designated Flood Hazard Area, is an area of land that has a one percent chance of being inundated by a flood in any given year. None of the Project's proposed or existing substation sites would be located in a Flood Hazard Area. However, as described in Section C.7.1 (Environmental Setting), the proposed transmission line route would cross through seven individual Flood Hazard Areas, including those associated with the following waterways: Cache Creek, Oak Creek, Los Angeles Aqueduct, Amargosa Wash, Anaverde Creek, California Aqueduct, and the Santa Clara River. According to FEMA, development is permitted in Flood Hazard Areas, provided that the development complies with local floodplain management ordinances (FEMA, 2005). The placement of towers in Flood Hazard Areas is not expected to cause diversion of flows or increased flood risk for adjacent property. All applicable floodplain management ordinances would be fully complied with, in accordance with FEMA's regulations on development in Flood Hazard Areas.

None of the infrastructure associated with the proposed Project would be situated within a watercourse. Although the proposed route does span multiple waterways, as indicated in Table C.7-3 (Waterways Traversed by the Proposed Project), towers would be located on nearby hillsides and other land areas, and engineered to withstand stresses associated with their proximity to the waterways. Prior to the implementation of appropriate mitigation measures, this impact has the potential to be significant due to differences in site-specific tower locations and the associated stresses such conditions could impose upon aboveground infrastructure. However, with the implementation of the specific construction standards and approvals required by Mitigation Measure H-7 (Protect Aboveground Structures Against Flood and Erosion Damage), potential impacts resulting from the placement of transmission towers in a Flood Hazard Area would be reduced to a less-than-significant (**Class II**) level.

Mitigation Measure for Impact H-7

H-7 Protect Aboveground Structures Against Flood and Erosion Damage. Aboveground project features such as transmission line towers and substation facilities shall be designed and engineered to withstand any mechanical stresses that may result from location, such as potential flooding or erosion of the surrounding area. Site-specific measures may include tower anchoring, installation of slope protection, or raising foundation levels. All Project-related facilities shall be placed outside the current and reasonably expected future flow path of watercourses. No Project-related facilities shall be positioned within a known watercourse.

Option A

Option A would include the placement of permanent aboveground structures in a flood hazard area or a flood plain (Impact H-7), as would the proposed Project. As shown on Figure C.7-3 (FEMA-designated Flood Hazard Areas), the portion of the route for Option A which is different from the proposed Project route is not situated within a flood hazard area. All other aspects of Option A would be identical to the proposed Project. Therefore, Impact H-7 would be the same for Option A as for the proposed Project. Prior to the implementation of appropriate mitigation measures, this impact has the potential to be significant. However, with the implementation of Mitigation Measure H-7 (Protect Aboveground Structures Against Flood and Erosion Damage), Impact H-7 for Option A would be reduced to a less-than-significant (**Class II**) level.

Option B

Option B would include the placement of permanent aboveground structures in a flood hazard area or a flood plain (Impact H-7), as would the proposed Project. As shown on Figure C.7-3 (FEMA-designated Flood

Hazard Areas), the portion of the route for Option B which is different from the proposed Project route is not situated within a flood hazard area. All other aspects of Option B would be identical to the proposed Project. Therefore, Impact H-7 would be the same for Option B as for the proposed Project. Prior to the implementation of appropriate mitigation measures, this impact has the potential to be significant. However, with the implementation of Mitigation Measure H-7 (Protect Aboveground Structures Against Flood and Erosion Damage), Impact H-7 for Option B would be reduced to a less-than-significant (**Class II**) level.

Expose people or structures to flooding as a result of failure of a levee or dam (Criterion HYD6)

Neither construction nor operation and maintenance of the proposed Project would have the potential to cause the failure of a levee or dam. The proposed Project does not include the construction or modification of a levee or dam. Although the proposed Project route is situated within the same watershed as a levee or dam, such as Littlerock Dam in the Antelope Valley Watershed, none of the Project features would be located adjacent to a levee or dam. Furthermore, the proposed Project would not, in any way, create or contribute to water volume in a lake or reservoir to a degree that could cause mechanical stresses on the dam or levee containing such volume. The proposed Project would not result in the failure of a levee or dam and would therefore not expose people or structures to flooding as a result of failure of a levee or dam. No impact would occur.

Option A

As with the proposed Project, no impacts would occur as a result of people or structures being exposed to flooding as a result of failure of a levee or dam in connection with Option A.

Option B

As with the proposed Project, no impacts would occur as a result of people or structures being exposed to flooding as a result of failure of a levee or dam in connection with Option B.

Results in damage from inundation by tsunami, seiche, or mudflow (Criterion HYD7)

If the proposed Project facilities were inundated by a tsunami, a seiche, or a mudflow event, damage could occur through the failure of Project infrastructure. However, it is not expected that such inundation would occur. Tsunamis are waves generated in large bodies of water by fault displacement or major ground movement. The proposed Project would not be located near the coast and would therefore not be subject to any tsunami hazards. Seiches are large waves generated in enclosed bodies of water in response to ground shaking. The proposed Project is not located within a dam inundation area or within the inundation area for any other natural body of water and would therefore not be subject to seiche hazards. Mudflows are a type of mass wasting or landslide, where earth and surface materials are rapidly transported downhill under the force of gravity. The proposed Project site is characterized by a general lack of elevation difference across and adjacent to the site. Slope stability concerns, such as the potential for a mudflow or landslide to occur, are not considered a significant hazard to the proposed site. The proposed Project would not be subject to mudflow hazards. No impact would occur.

Option A

As with the proposed Project, no impacts would occur due to tsunami, seiche, or mudflow hazards associated with Option A.

Option B

As with the proposed Project, no impacts would occur due to tsunamis, seiche, or mudflow hazards associated with Option B.

Figure Links

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