

## C.8 Hydrology and Water Quality

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This section describes the existing conditions and potential impacts related to hydrology and water quality in the area of the proposed Project and alternatives, including the No Project/No Action Alternative. Section C.8.1 provides a description of the affected environment for the proposed Project. Applicable rules and regulations are introduced in Section C.8.2. Significance criteria used to evaluate potential impacts of the proposed Project and alternatives are discussed in Section C.8.3. Applicant-Proposed Measures (APMs), which are stipulations incorporated into the description of the proposed Project and/or alternatives, are presented in Section C.8.4. Analysis of potential impacts and mitigation measures for the proposed Project is located in Section C.8.5, while analyses of potential impacts and mitigation measures for alternatives to the proposed Project are located in Sections C.8.6 through C.8.13. A summary table of all impacts and mitigation measures related to hydrology and water quality for the proposed Project and alternatives is in Section C.8.14. Finally, a discussion of potential cumulative effects of the proposed Project and alternatives is located in Section C.8.15.

### C.8.1 Affected Environment

With specific regards to hydrology and water quality, the following sections provide discussion of the affected environment for the Project area. This includes descriptions of the surrounding climate (Section C.8.1.1), surface hydrology (Section C.8.1.2), groundwater (Section C.8.1.3), and water quality (Section C.8.1.4). Supplemental discussions of the affected environments for each of the Project alternatives are provided in Sections C.8.6 through C.8.10 as appropriate. For the most part, the affected environment for the proposed Project and Alternatives 1 through 4 is the same due to vast similarities in the proposed route alignments. Where the affected environment for an alternative would be the same as the affected environment for the proposed Project, reference is made to Section C.8.1.

#### C.8.1.1 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 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 Santa Clarita are presented in Table C.2-1, located in the Section C.2 (Air Quality). The Lancaster weather station is located near the northern area of the proposed Project and all alternatives. The Santa Clarita weather station is located near the southern area of the proposed Project and all alternatives. The average maximum and minimum winter (January) temperatures in Lancaster are 57°F and 31°F, respectively, and in Santa Clarita are 64°F and 36°F, respectively. The average maximum and minimum summer (July) temperatures in Lancaster are 95°F and 66°F, respectively, and in Santa Clarita are 94°F and 54°F, respectively. The average annual precipitation ranges from 7.4 inches to 14.0 inches, 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 that experienced in Lancaster and Santa Clarita.

### **C.8.1.2 Surface Hydrology**

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 and alternatives would traverse two major watersheds: the Antelope Valley Watershed and the Santa Clara River Watershed. Surface water in the northern area of the Project, which includes the Antelope Substation in Lancaster, flows into the Antelope Valley Watershed. Surface water in the southern area of the Project, including the Pardee Substation in Santa Clarita, flows into the Santa Clara River Watershed. These two watersheds are separated by the northwest portion of the San Gabriel Mountains, which provide a topographic and hydrologic divide (SCE, 2004). Figure C.8-1 indicates the respective watershed boundaries as well as surface water bodies situated within each watershed.

#### **Antelope Valley Watershed**

From Antelope Substation to approximately Mile 7.0, the proposed Project and Alternatives 1 through 4 routes would be located within the Antelope Valley Watershed, which is a large, closed basin in the western Mojave Desert. Section C.8.10 describes the Alternative 5 route across the Antelope Valley Watershed. 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 – 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).

Important hydrologic resources in the Antelope Valley Watershed include the California Aqueduct, the Los Angeles Aqueduct, Lake Palmdale, Little Rock Reservoir, and multiple creeks such as Amargosa Creek, Little Rock Creek, and Big Rock Creek. The proposed Project and Alternatives 1 through 4 would cross the California Aqueduct near Mile 2.8 and Amargosa Creek near Mile 5.1. Other hydrologic resources within the Antelope Valley Watershed are not situated in the vicinity of the Project.

### **Santa Clara River Watershed**

From approximately Mile 7.0 to its terminus at the Pardee Substation in Santa Clarita, the proposed Project and Alternatives 1 through 4 would travel through the Santa Clara River Watershed, which encompasses the Santa Clara River system. See Section C.8.10 for a discussion of the Alternative 5 route. 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, traveling away from the mountains and towards the ocean. The result of this changing topography is the deposition of sediments carried by the river in the vicinity of the City of Santa Clarita, where the Project ends at Pardee Substation. This subsequently forms an alluvial valley that widens as it progresses downstream towards the Pacific Ocean.

Within the Santa Clara River Watershed, the Santa Clara River is divided into two sections: the Upper Santa Clara River and the Lower Santa Clara River. The Project is situated in the vicinity of the Upper Santa Clara River but not the Lower Santa Clara River. 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 flows through the following Los Angeles County and Ventura County areas: the incorporated communities of Acton, Santa Clarita, Fillmore, Santa Paula, Ventura, and Oxnard; and the unincorporated communities of Piru, Bardsdale, and Saticoy. The largest percentage of the Santa Clara River Watershed lies in unincorporated Ventura County (65 percent) followed by unincorporated Los Angeles County (19 percent). Each of the six incorporated communities contains less than 10 percent of the total watershed area, with the largest area in the City of Santa Clarita (8 percent). The most prevalent land use is open space (62 percent), followed by agriculture (29 percent). The remaining land uses can be considered developed or urbanized, and make up less than 10 percent of the total watershed area. Please refer to Section C.9 (Land Use and Recreation) for more specific information regarding land use characterization in the Project area.

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.8-1. 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.8-1 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.

<b>Watershed Level</b>	<b>Approximate Square Miles (Acres)</b>	<b>Description</b>
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.8-1, 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). For the purposes of this EIR/EIS, the watershed boundaries for the Antelope Valley Watershed and the Santa Clara River Watershed, as discussed above and shown in Figure C.8-1, are used as the basis for analysis of surface water hydrology. The watershed levels shown in Table C.8-1 are applied to this analysis as appropriate, for instance with regards to groundwater resources (Section C.8.1.3), water quality (Section C.8.1.4), and cumulative effects (Section C.8.14).

### **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 occur 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) has estimated the boundaries for 100-year floodplains for several watercourses in the Antelope Valley Watershed and the Santa Clara River Watershed, as shown in Figure C.8-2. FEMA has also created Flood Insurance Rate Maps (FIRMs), which define the predicted boundaries of 100-year floods (SCE, 2004). FEMA refers to 100-year floodplains, such as those seen on Figure C.8-2, as “Flood Hazard Areas”. Any development that takes place in a Flood Hazard Area must comply with floodplain management ordinances (FEMA, 2005).

The proposed Project and Alternatives 1 through 5 would directly cross the following four designated Flood Hazard Areas, which are listed in geographic order starting at the Antelope Substation: Amargosa Creek, Bouquet Reservoir, Haskell Canyon Creek, and San Francisquito Creek. See Section C.8.10 for a discussion of the Alternative 5 route. The Project would also be in the vicinity of other drainage courses mapped by FEMA, including Lake Elizabeth and Bouquet Canyon Creek. The Project's substations and other primary infrastructure (excluding the transmission line and towers) are not located within FEMA-designated Flood Hazard Areas.

### **Ephemeral Streams**

Due to the arid conditions of the area, most of the surface waters that exist in the area of the Project are ephemeral streams and washes. 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). Near the Project, there are numerous ephemeral streams and washes that carry surface water to the playa lakes, which are described in the discussion of the Antelope Valley Watershed. As a result of the dry climate in the area of the Project, 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).

Major ephemeral streams in the area of the Project, within the Antelope Valley, include Amargosa Creek, Big Rock and Little Rock Creeks, Oak Creek, and Cottonwood Creek (see Figure C.8-1 for stream locations). Amargosa Creek collects runoff from the Sierra Pelona Mountain Range, initially flowing eastward and then draining northerly through Palmdale and Lancaster. The creek eventually terminates at Rosamond Dry Lake. The proposed Project and Alternatives 1 through 4 would cross Amargosa Creek at approximately Mile 5.1.

Big Rock, Little Rock, Oak and Cottonwood Creeks are not crossed by the Project (see Figure C.8-1). Big Rock and Little Rock Creeks, located in the southern part of the basin, are situated approximately 25 miles southeast of the proposed Project route. These creeks contribute more than 50 percent of total runoff into the basin. Oak and Cottonwood Creeks, located in the northeast part of the basin, are situated approximately 25 miles north and northeast of Antelope Substation. These creeks 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 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. Little Rock Wash is ephemeral in nature, and flows west of Littlerock through the east side of Palmdale to Rosamond Dry Lake. The waterway originates as Little Rock Creek and conveys runoff from the San Gabriel Mountains through Little Rock Canyon.

### **Palmdale Lake and Littlerock Reservoir**

Palmdale Lake is located on the southern edge of the City of Palmdale, about 15 miles southeast of the Project route. Palmdale Lake receives water from Littlerock Reservoir and the Little Rock Wash (SDLAC, 2005). Littlerock Reservoir provides primary water supply for the Palmdale Water District and the Littlerock Irrigation District. Little Rock 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 Project route (SDLAC, 2005) (Figure C.8-1).

## **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 traverses 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. The proposed Project and Alternatives 1 through 4 traverse the California Aqueduct near Mile 2.8 (SDLAC, 2005) (see Figure C.8-1).

## **Upper Santa Clara River**

As previously described, the Santa Clara River is distinguished by its upper segment and its lower segment, of which the Project would be situated in the vicinity of the upper segment, referred to as the 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 (VCWPDD and LACDPW, 2005). The Project route does not cross the Upper Santa Clara River; however, the point of nearest approach is at the Pardee Substation in the City of Santa Clarita. At this location, the Upper Santa Clara River is within one mile of the Pardee Substation.

Major tributaries of the Santa Clara River in Los Angeles County (from upstream to downstream) include Mint Canyon, Bouquet Canyon, Haskell Canyon, San Francisquito Canyon, and Castaic creeks. Figure C.8-1 shows the water bodies in the Santa Clara River Watershed. The proposed Project and Alternatives 1 through 4 cross two of the above mentioned tributaries: Haskell Canyon Creek and San Francisquito Creek. Haskell Canyon Creek crosses the proposed Project route at Mile 20.3. Haskell Canyon Creek is a south-trending intermittent stream located between Bouquet Canyon and San Francisquito Creek. Haskell Canyon Creek is a tributary of Bouquet Canyon Creek. San Francisquito Canyon Creek crosses the proposed Project route at approximately Mile 24.1 within the City of Santa Clarita. The creek is an intermittent stream that runs west of Bouquet Canyon Creek. From Mile 0 to 24.1, the proposed route is situated east of San Francisquito Creek. South of Mile 24.1, San Francisquito Creek runs south and east of the proposed Project route.

The Project would not cross Mint Canyon Creek, Bouquet Canyon Creek, or Castaic Creek. However, they are located in the project vicinity and contribute significant runoff and groundwater recharge to the area. Mint Canyon Creek runs generally parallel to the Project route approximately 2.5 miles to the southeast, and it borders the southeast boundary of the Angeles National Forest. Mint Canyon Creek has its confluence with the Santa Clara River near Solemint Junction, within the City of Santa Clarita. While dry most of the year, Mint Creek drains a large portion of the mountains to the north.

A portion of Bouquet Canyon Creek is located approximately one mile from the Project route. Bouquet Canyon Creek is a southwest-trending, intermittent stream that originates in the San Gabriel Mountains and meets with the Santa Clara River in the City of Santa Clarita. Most of the creek has a natural channel in the undeveloped Angeles National Forest. The terminus of the proposed transmission line is located approximately 2.5 miles east of the Castaic Creek-Santa Clara River confluence. Castaic Creek is a south-trending creek that originates in the San Gabriel Mountains and meets the Santa Clara River downstream of the City of Santa Clarita.

## **Bouquet Reservoir and Castaic Lake**

The proposed Project and Alternatives 1, 3, and ~~through~~ 4 cross the western end of the Bouquet Reservoir near Mile 9.2 and extends over the reservoir for approximately half a mile. Alternative 2 crosses the eastern end of Bouquet Reservoir. 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.

Castaic Lake is located approximately 10 miles north of the proposed transmission line terminus at Pardee Substation. The reservoir was completed in 1973 as part of the California State Water Project and stores water transported from northern California for use by water contractors in southern California. It has a storage capacity of approximately 323,700 acre-feet, a drainage area of approximately 153.7 square miles, and provides flood control to the area.

## **Los Angeles Aqueduct**

The proposed Project route crosses the Los Angeles Aqueduct near Mile 21.7. 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 Project would be situated near the original aqueduct, which has a present capacity of 485 cubic feet per second (cfs).

### **C.8.1.3 Groundwater**

After leaving Antelope Substation, approximately the first seven miles of the Project route would traverse the Antelope Valley Groundwater Basin, within the South Lahontan HR and the Antelope HU. In addition, for approximately the final 3.6 miles of the proposed Project route, from Mile 22.0 to its terminus at Pardee Substation, the proposed Project route would cross the Santa Clara Valley East Groundwater Basin, within the South Coast HR (DWR, 2003). Please see Figure C.8-3.

## **Antelope Valley Groundwater Basin**

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, 2003). 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, 2004).

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 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 Little Rock Creeks. Hydrographs of wells in the vicinity of the 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, 2004).

### **Santa Clara Valley East Groundwater Basin**

The Santa Clara Valley East Groundwater Basin encompasses an area of approximately 103 square miles. It is bordered in the north by the Piru Mountains, on the west by impervious rocks, on the south by the Santa Susana Mountains, and on the south and east by the San Gabriel Mountains. The surface is drained by the Santa Clara River, Bouquet Creek, and Castaic Creek.

The principal hydrogeologic formations found in the Santa Clara Valley East Groundwater Basin are alluvium, terrace deposits, and Saugus Formation. Alluvium consists of unconsolidated, poorly sorted sand, gravel and clay with cobbles and boulders. Terrace deposits consist of poorly consolidated, weakly cemented, gravel, sand, and silt. The Saugus Formation consists of as much as about 8,500 feet of poorly consolidated and sorted sandstone, siltstone, and conglomerate (DWR, 2003). Alluvial deposits generally form a relatively thin layer of sediments with a maximum thickness of about 225 feet that directly overlay the Saugus Formation. Terrace deposits are found on the low-lying flanks of the foothills and upper reaches of the Santa Clara River tributaries, with a maximum thickness of 200 feet. The upper part of the Saugus Formation is the main aquifer, while the lower portion is not considered to contain usable groundwater due to low quantity and quality (SCE, 2004).

The alluvial aquifer is recharged primarily by infiltration of runoff waters in the Santa Clara River and its tributaries, with additional natural recharge from percolation of rainfall to the valley floor and subsurface inflow. Additional recharge is from percolation of excess irrigation water applied to urban landscaping and from reclaimed water discharged into the Santa Clara River. Recharge to the Saugus Formation is from infiltration of rainfall from the alluvial aquifer (DWR, 2003).

#### **C.8.1.4 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 use/s. Water quality standards are formed through the combined designated beneficial use/s 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.8-2 presents the beneficial uses designated for water bodies in the 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

**Table C.8-2. Beneficial Uses and Section 303(d) Listing of Surface Water in the Vicinity of the Project Route and Alternative Routes**

Water Body	Beneficial Use																303(d) Listing	TMDL	
	MUN	AGR	PROC	IND	GWR	REC-1	REC-2	COMM	FRSH	WARM	COLD	WILD	RARE	SPWN	WET	MIGR			
<b>Antelope Valley Hydrologic Unit<sup>1</sup> (Antelope Valley Watershed)</b>																			
Amargosa Creek	✓	✓			✓	✓	✓			✓		✓	✓		✓				
Oak Creek	✓	✓		✓	✓	✓	✓	✓		✓		✓						NA	NA
Little Rock Creek	✓				✓	✓	✓	✓			✓	✓						NA	NA
Big Rock Creek	✓	✓		✓	✓	✓	✓	✓			✓	✓		✓				NA	NA
Little Rock Reservoir	✓	✓		✓	✓	✓	✓	✓			✓	✓						NA	NA
Lake Palmdale	✓	✓			✓	✓	✓	✓			✓	✓						NA	NA
<b>Santa Clara-Calleguas Hydrologic Unit<sup>2</sup> (Santa Clara River Watershed)</b>																			
Santa Clara River	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	Reach 8	Chloride, Coliform
																		Reach 9	Coliform
Bouquet Canyon Creek	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓			NA	NA
Bouquet Canyon Reservoir	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓						NA	NA
Mint Canyon Creek	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓						Reach 1	Nitrate, nitrite
San Francisquito Canyon Creek	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓			NA	NA
Castaic Lake	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓				NA	NA

<sup>1</sup> Source: LRWQCB, 2003

<sup>2</sup> Source: LARWQCB, 2004

MUN: Municipal and Domestic Supply

AGR: Agricultural Supply

PROC: Industrial Process Supply

IND: Industrial Service Supply

GWR: Groundwater Recharge

REC-1: Water Contact Recreation

REC-2: Non-contact Water Recreation

COMM: Commercial and Sport Fishing

FRSH: Freshwater Replenishment

WARM: Warm Freshwater Habitat

COLD: Cold Freshwater Habitat

WILD: Wildlife Habitat

RARE: Rare, Threatened or Endangered Sp.

SPWN: Spawning, reproduction and/or early development

WET: Wetland Habitat

MIGR: Migration of Aquatic Organism

(TMDL) for such waters. Table C.8-1 presents the Section 303(d) listing and TMDLs for all surface waters in the Antelope HU (Antelope Valley Watershed) and the Santa Clara-Calleguas HU (Santa Clara River Watershed) (LARWQCB, 2003).

### **Antelope Valley Hydrologic Unit (Antelope Valley Watershed)**

Water quality problems in the Antelope Valley HU and in the South Lahontan 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, 2004). Water quality data in the Antelope Valley HU 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, 2004).

**Beneficial Uses.** The Lahontan RWQCB has jurisdiction over the Antelope Valley HU. Together with the State Water Board, the Lahontan RWQCB has identified 22 beneficial uses within the South Lahontan HR. Table C.8-2 shows the beneficial uses designated for the water bodies located in the vicinity of the Project, within the Antelope Valley HU. There are no Section 303(d) listings (impaired water bodies) in the South Lahontan HR or the Antelope Valley HU.

### **Santa Clara-Calleguas Hydrologic Unit (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, 2004 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.

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-Calleguas HU. As the presiding authority, the LARWQCB has documented 24 beneficial uses that apply to waters within the South Coast HR, including the Santa Clara-Calleguas HU. The beneficial uses for the major creeks and streams that would be traversed by the 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 within the area of the Project (Figure C.8-1), is on the 2002 Section 303(d) list for chloride, coliform, nitrate, and nitrite. In addition, Lake Elizabeth, located approximately 2.5 miles north of the Project route, is listed for eutrophication, trash, dissolved solids (DO), and pH. Table C.8-2 lists the beneficial uses, Section 303(d) listing, and TMDLs for all water bodies that would be traversed by the Project or are located in the general vicinity of the 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. Tables C.8-3 and C.8-4 present the groundwater quality in public supply wells for the Antelope Valley Groundwater Basin and the Santa Clara Valley East Groundwater Basin, respectively.

### **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. Throughout the Antelope Valley Groundwater Basin, TDS content averages 300 mg/L, ranging from 200 to 800 mg/l (DWR, 2003). Table C.8-3 presents water quality data for the Antelope Valley Groundwater Basin. Primary inorganics exist in concentrations which exceed the applicable MCLs in approximately 12 percent of the wells tested.

<b>Constituent Group<sup>1</sup></b>	<b>Number of Wells Sampled<sup>2</sup></b>	<b>Number of Wells which Exceed the Applicable MCL/s<sup>3</sup> (%)</b>
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, 2003

<sup>1</sup> A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in the Lahontan Basin Plan.

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

<sup>3</sup> 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.

### **Santa Clara Valley East Groundwater Basin**

The quality of groundwater in the Santa Clara Valley East Groundwater Basin varies greatly across the basin. Groundwater in the alluvial aquifer contains calcium bicarbonate in the east and calcium sulfate in the western

part of the subbasin. TDS content increases from 550 to 600 mg/l in the east to about 1,000 mg/l in the west. In the Saugus Formation, the aquifer is of calcium bicarbonate character in the southeast, calcium sulfate in the central, and sodium bicarbonate in the western part of the subbasin. Table C.8-4 presents water quality data from the Santa Clara Valley East Groundwater Basin. Primary inorganics and pesticides are the constituents of primary concern.

<b>Constituent Group<sup>1</sup></b>	<b>Number of Wells Sampled<sup>2</sup></b>	<b>Number of Wells which Exceed the Applicable MCL/s<sup>3</sup> (%)</b>
Inorganics - Primary	67	4 (6)
Radiology	56	2 (4)
Nitrates	74	2 (3)
Pesticides	66	4 (6)
VOCs and SVOCs*	66	0 (0)

Source: DWR, 2003

<sup>1</sup> A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in the Water Quality Control Plan for the Los Angeles Region.

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

<sup>3</sup> 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.8.2 Regulatory Framework**

### **C.8.2.1 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 and alternatives, NPDES permits would be delegated to the Lahontan and the Los Angeles RWQCBs.

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 discharge 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.

Section 404 of the CWA authorizes the U.S. Army Corps of Engineers (USACE) to regulate the discharge of dredged or fill material to the waters of the U.S., including wetlands. The limits of non-tidal waters extend to the Ordinary High Water Mark (OHWM), defined as the line on the shore established by the fluctuation of water and indicated by physical characteristics, such as a 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 (Standard Permit, Letter of Permission) or general permits (Nationwide Permit, Regional General Permit) for discharges of dredged or fill material into waters of the U.S. A Section 404 permit would be required for Project construction activities involving certain types of excavation (i.e., resulting in more than incidental fallback of material off the shovelhead), addition of fill material, or replacement of fill material into waters of the United States (e.g., 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 require submitting an application for Water Quality Certification (or waiver thereof) from the applicable RWQCB.

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 USEPA 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).

**USDA Forest Service Land Management Plan for the Angeles National Forest (2005).** The Land Management Plan of 2005 provides management direction for the Angeles National Forest. The 2005 Land Management Plan was approved on September 20, 2005, and became effective on October 31, 2005. Part 2, Appendix B, of the 2005 Land Management Plan includes a description of “Program Strategies and Tactics” that the ANF may choose to emphasize to progress toward achieving the desired conditions and goals of the Plan. The following is a summary of the program strategies related to hydrology and water quality that are applicable to the proposed Project and alternatives.

**WAT 1 - Watershed Function.** Protect, maintain and restore natural watershed functions including slope processes, surface water and groundwater flow and retention, and riparian area sustainability:

- Restore, maintain and improve watershed conditions. Assure approved and funded rehabilitation and emergency watershed treatments are implemented in an effective and timely manner.
- Maintain or restore soil properties and productivity to ensure ecosystem health (soil microbiota and vegetation growth), soil hydrologic function, and biological buffering capacity.
- Manage Riparian Conservation Areas (RCA) to maintain or improve conditions for riparian dependent resources. Riparian Conservation Areas include aquatic and terrestrial ecosystems and lands adjacent to perennial, intermittent, and ephemeral streams, as well as around meadows, lakes, reservoirs, ponds, wetlands, vernal pools, seeps, and springs and other bodies of water. Riparian dependent resources are those natural resources that owe their existence to the area, such as fish, amphibians, reptiles, fairy shrimp, aquatic invertebrates, plants, birds, mammals, soil, and water quality.
- Achieve and maintain natural stream channel conductivity, connectivity and function.
- Maintain watershed integrity by disposing of displaced soil and rock debris in approved placement sites.

**WAT 2 - Water Management.** Manage groundwater and surface water to maintain or improve water quantity and quality in ways that minimize adverse effects:

- Promote water conservation at all national forest administrative and authorized facilities. Protect and improve water quality by implementing best management practices and other project-specific water quality protection measures for all national forest and authorized activities. When reviewing non-forest water-related projects that may affect national forest resources, include appropriate conservation and water quality mitigation measures into the review response.
- Conserve and protect high quality water sources in quantities adequate to meet national forest needs.
- Take corrective actions to eliminate the conditions leading to California State listing of 303(d) impaired waters on NFS land. For those waters that are both on and off NFS land, ensure that Forest Service management does not contribute to listed water quality degradation.

**WAT 3 – Hazardous Materials.** Manage known hazardous materials risks:

- Maintain a written Hazardous Materials Response Plan that addresses risk and standard cleanup procedures.

- Coordinate with federal, tribal, state, city and county agencies and local landowners to develop emergency response guidelines for hazardous spills on NFS land or on adjacent land with potential to affect threatened, endangered, proposed, candidate and sensitive fish and amphibian habitat. In the event of hazardous material spills in known habitat on NFS land, the Forest Service will contact the USFWS within 24 hours. Quickly contact resource personnel and use them as consultants to minimize impacts to habitat and to initiate emergency consultation with the USFWS if necessary. Provide habitat maps to response personnel for hazardous spills.

### **C.8.2.2 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.

**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.

**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.

### **C.8.2.3 Local / Regional**

**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 designated beneficial uses of 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 applying to designated beneficial uses of 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.8.3 Significance Criteria**

#### **C.8.3.1 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 are considered to be 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 significant 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.8.4 Applicant-Proposed Measures**

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 and the Forest Service. Table C.8-5, seen below, presents a complete list of APMs related to hydrology and water quality for the proposed Project.

<b>Table C.8-5. Applicant-Proposed Measures – Hydrology and Water Quality</b>	
<b>Measure Number</b>	<b>SCE-Proposed Measure</b>
APM HYD-1	Transmission towers would not be placed within the waterway protection corridors defined by city and county codes.
APM HYD-2	In accordance with the Clean Water Act, a Storm Water Pollution Prevention Plan (SWPPP) would be prepared and implemented, including Best Management Practices (BMPs), in order to minimize construction impacts on surface and groundwater quality. The SWPPP would be prepared once the proposed Project is approved and after the necessary facilities are sited and designed.

<b>Table C.8-5. Applicant-Proposed Measures – Hydrology and Water Quality</b>	
<b>Measure Number</b>	<b>SCE-Proposed Measure</b>
APM HYD-3	An erosion control and sediment transport control plan (part of SWPPP) would be submitted to Los Angeles County 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 hay bales, water bars, covers, sediment fences, sensitive area access restrictions (for example, flagging), vehicle mats in wet areas, and retention/settlement ponds would be installed before extensive clearing and grading begins. Standard erosion and dust control practices would be used during construction according to BMPs to protect biological and hydrological resources.
APM HYD-4	An environmental training program would be established to communicate environmental concerns and appropriate work practices, including spill prevention and response 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-5	The Construction SWPPP would include preparations for quick and safe cleanup of accidental spills. This plan would be submitted with the grading permit application. It 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-6	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 pole 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 had been allowed to set up (but before it is dry), it would be removed and transported to an approved landfill for disposal.
APM HYD-7	If hazardous materials are encountered in excavated soils, work would be stopped until the material is properly characterized and appropriate measures are 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.

### **C.8.5 Impact Analysis: Proposed Project/Action**

#### **Violation of a water quality or water discharge requirement (Criterion HYD1)**

***Impact H-1: Soil erosion and sedimentation caused by construction activities would degrade water quality.***

Disturbance of soil during construction could result in soil erosion and sedimentation, as discussed in Section C.5 (Geology). Impact G-1 (Excavation and grading during construction activities could cause slope instability) and Impact G-2 (Erosion could be triggered or accelerated by construction or disturbance of landforms) both describe that construction activities, including grading and excavation, are expected to cause slope instability and excessive erosion. Construction activities along the length of the proposed route would take place on a variety of gradients, from level ground to a range of slopes. Table C.5-2 (Major Soils along the Proposed Antelope-Pardee 500-kV Transmission Line Route) indicates that the hazard of erosion on roads and trails along the proposed route would have Erosion Hazard Ratings (EHR) ranging from Moderate to Severe<sup>1</sup>. Section C.5 also discusses that potential geologic impacts related to slope instability and erosion would be mitigated to less-than-significant levels. If slope stability and erosion were to occur in connection with Project-related

<sup>1</sup> As defined in Section C.5 (Geology and Paleontology), a Moderate EHR is for soils where some erosion is likely and simple erosion control measures are needed and a Severe EHR is for soils where significant erosion is expected and major erosion control measures may be needed.

construction activities, sediment deposition and subsequent elevated turbidity could cause a decrease in water quality of waterways in the area of the proposed Project.

Transmission line construction would require excavation and grading for individual transmission tower footings and foundations, twelve leveled transmission tower pads (on non-NFS lands), temporary construction areas, and permanent access and spur roads. In particular, the construction of roads (temporary and permanent) has the potential to cause slope instability and erosion (see Section C.5) which could potentially cause water quality degradation. As discussed in Section B (Project Description), approximately 25.7 acres of land disturbance is expected to occur as a result of access and spur road construction and improvements associated with the proposed Project. Of this total area, 22.6 acres would occur on NFS lands and 3.1 acres would occur off NFS lands.

Land disturbance associated with road construction and improvement would include removal of vegetation, blade grading, and soil compaction, as well as the installation of drainage structures and slope-strengthening structures (such as walls), as needed. As described in Section C.9 (Land Use and Public Recreation), upgrades to existing OHV routes from Maintenance Level 2 to Maintenance Level 3 would prohibit continued OHV use (see Section C.9 for definition and discussion). Mitigation Measure R-3 (Avoid Upgrades to Forest System Road Maintenance Levels) is recommended in connection with Impact R-3 (The Project would contribute to the long-term loss or degradation of OHV routes) in order to address the potential for permanent closure of OHV routes related to road upgrades. Although this mitigation measure would avoid upgrades to OHV routes during operation of the proposed Project and alternatives, temporary upgrades during construction activities would be allowable to provide access along the proposed route. Activities associated with road upgrades would involve soil disturbance and stockpiling of earth that could potentially accelerate soil erosion. Exposed and/or eroding sediment could potentially wash into Amargosa Creek, Haskell Canyon Creek, San Francisquito Creek, Bouquet Canyon Creek, and the Bouquet Reservoir. Eroded sediment and surface runoff in the Project area could affect the Santa Clara River Watershed, including the Upper and Lower Santa Clara River systems, as well as the Antelope Valley Watershed.

In order to address the potential impacts to water quality from construction-related soil erosion and sedimentation, APMs HYD-2 and HYD-3 would be implemented. APM HYD-2 addresses the need to minimize construction impacts on surface water quality by requiring a Storm Water Pollution Prevention Plan (SWPPP), which would be implemented during construction in accordance with Section 402 of the CWA. A SWPPP is required by the SWRCB 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). However, the SWRCB does not specify the exact content of BMPs to be included in the SWPPP. APM HYD-3 further addresses construction impacts by requiring an erosion and sediment transport control plan, which would be implemented as part of the SWPPP to reduce potential impacts from soil erosion and sedimentation. This plan would require BMPs for construction activities including: erosion-minimizing efforts such as 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. APM HYD-3 also requires the use of standard erosion and dust control practices during construction.

In addition, APMs GEO-2 and GEO-3 would be implemented to facilitate understanding of site-specific geologic conditions and minimize erosion from construction. Mitigation Measures G-1 (Protect Against Slope Instability), G-2 (Minimization of Soil Erosion), and R-4 (Permanent Closure and Re-vegetation of Construction

Roads) would be implemented to strengthen the applicable APMs and further reduce potential impacts to water quality from soil erosion. In order to reduce the potential for degradation of water quality from construction-related erosion and sedimentation to a less-than-significant level, additional, specific mitigation measures are recommended, as described below. With the implementation of Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~, H-1b (Maximum Road Gradient), H-1c (Road Surface Treatment), H-1d (Timing of Construction Activities), H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), and H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris), Impact H-1 for the proposed Project would be reduced to a less-than-significant level (Class II).

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.

### ***Mitigation Measure for Impact H-1***

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

- Mechanical and vegetative measures shall be implemented to provide surface soil stability where necessary, as described in Section 12.22 (Road and Building Site Construction Best Management Practices) of the USDA's guidance document entitled "Water Quality Management for Forest System Lands in California" (USDA, 2005). 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.
- Road slope stabilization practices shall be implemented prior to the first winter rains. These practices shall include: verification of the correct 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 as necessary. Proposed road designs on NFS lands shall be submitted to the USDA Forest Service for prior approval and shall be incorporated into the Special Use Authorizations to be issued by the USDA Forest Service.
- 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. Proposed stabilization efforts on NFS lands shall be submitted to the USDA Forest Service for prior approval and shall be incorporated into the Special Use Authorizations to be issued by the USDA Forest Service.
- Strictly control vehicular traffic to only that which is necessary.
- Restore temporary construction areas (e.g., temporary roads, pulling and splicing stations) to a near natural condition and ensure that the sites are re-vegetated and stabilized, unless operation and maintenance of the project would require the areas to remain clear. Restoration plans on NFS lands shall be submitted to the USDA Forest Service for prior approval, and shall be incorporated into the Special Use Authorizations to be issued by the USDA Forest Service.

- 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. Any concrete waste shall be disposed of properly on non-NFS lands.
- Erosion control measures shall be completed prior to the first anticipated rains at all construction sites. An Erosion Control Plan shall be prepared as part of the Project SWPPP, and shall be submitted to the USDA Forest Service for prior approval and incorporated into the Special Use Authorizations to be issued by the USDA Forest Service.

**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 on non-NFS lands 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. The Forest Service shall approve all road surface treatments implemented on NFS lands. Watering of roads shall be required on NFS lands. 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 occur during the dry season or when precipitation events are not expected.

**H-1e Dispersion of Subsurface Drainage from Slope Construction Areas.** In order to minimize sediment production from the potential failure of slope construction areas, subsurface drainage devices shall be implemented where necessary, as determined during final siting and engineering of transmission towers. Where it is determined necessary due to site-specific conditions such as slope severity, soil condition, precipitation levels, and inherent instability, subsurface drainage will be utilized to avoid moisture saturation and potential subsequent slope failure. Subsurface dispersion methods would include underdrains or subdrains such as pipes, horizontal drains, or chimney drains. Proposed subsurface drainage devices on NFS lands shall be submitted to the USDA Forest Service for prior approval, and shall be incorporated into the Special Use Authorizations to be issued by the USDA Forest Service.

**H-1f 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. Temporary waste areas shall be located on NFS lands as needed, but shall be subject to prior approval by the USDA Forest Service Officer. At a minimum, temporary waste areas shall be removed before the first anticipated rains. Disposal areas shall not be located on NFS lands.

### **Environmental Effects of Mitigation Measure H-1b**

Minimizing the allowable road gradient of new access roads and spur roads to ten percent as recommended by Mitigation Measure H-1b above would result in additional adverse effects as well as certain beneficial effects.

These effects pertain primarily to biological resources, air quality, geology, and visual resources, as described below.

To maintain road gradients that do not exceed ten percent, access to areas with slopes steeper than ten percent would require the installation of roads in a switchback pattern, resulting in a greater area of disturbance. The steeper the slope, the greater the area of disturbance, as more switchbacks would be required to maintain a suitable grade for access by construction and maintenance vehicles. For example, a road built in a straight line from Point A to Point B would result in an overall length of approximately half or less that of a road placed in a switchback pattern.

Impacts to biological resources would increase as a result of greater ground disturbance, and therefore, increased impacts in terms of spatial extent to site-specific habitat and associated flora and wildlife. In general, the impacts associated with this mitigation measure would be limited to areas of steep terrain, where helicopter construction is not recommended (see Mitigation Measure V-4a, Construction, Operate, and Maintain with Helicopters). Habitat most likely to be affected for the proposed Project and Alternatives 1 through 4 would include chaparral in the steep areas of the ANF.

Construction of longer, switchback roads would require more construction-related activities involving pollutant-emitting equipment and a greater amount of earth movement. These activities would result in increased air quality emissions, specifically NOx and PM10 emissions.

These longer more apparent roads would result in greater visual impacts as these roads would appear as a “scar” down the hillside. Switchbacks on steep terrain are regarded as severe wounds to the landscape if they cannot be sufficiently shielded by wooded areas, which generally do not exist within the Project area. However, per Mitigation Measure R-4 (Permanent Closure and Re-vegetation of Construction Roads), visual impacts associated with access roads would be reduced, as these roads would be rehabilitated to a near natural condition.

Alternatively, roads with reduced slopes would result in a beneficial impact to geology, as less erosion would be expected to occur on these roadways compared to roads of steeper slopes, and slope instabilities would be less likely to occur at these lower gradients.

***Impact H-2: Degradation of surface water or groundwater quality would occur from the accidental release of potentially harmful materials during construction activities.***

Surface water and groundwater quality could potentially be impacted during construction activities if any potentially harmful materials are accidentally spilled. This impact could occur at pole or tower installation locations, site laydown and preparation areas, substation expansion sites, and other locations where construction activities would occur. 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. Some of the materials of concern (potentially hazardous substances) include: diesel fuel, gasoline, lubricant oils, hydraulic fluid, antifreeze, transmission fluid, lubricant grease, and other fluids. If any of these materials are accidentally released during construction, they could pollute surface water through direct runoff into nearby water bodies, and/or pollute groundwater through soil infiltration or direct runoff, if the groundwater table is exposed due to excavation. The waters of Bouquet Canyon Reservoir, local tributaries, and other streams could receive these potentially harmful materials in the case of an accidental spill.

APMs HYD-4 through HYD-6 would reduce the potential impact of accidentally spilled materials on water quality. APM HYD-4 would require a training program to address hazardous material safety. APMs HYD-5 and HYD-6 would address the rapid and effective clean-up of any spilled materials, even if the spill is

considered to be minor. Implementation of APMs HYD-4 through HYD-6 would ensure protection of local surface water and groundwater quality. In addition, a spill plan related to activities on NFS lands would be approved by the Forest Service and attached to the required Special Use authorization. In order to strengthen APMs HYD-4 through HYD-6, the following mitigation measures would also be implemented: Mitigation Measures PH-1a (Environmental Training and Monitoring Program), PH-1b (Hazardous Substance Control and Emergency Response Plan), PH-1c (Proper Disposal of Construction Waste), and PH-1d (Emergency Spill Supplies and Equipment). With the implementation of these mitigation measures, which are fully discussed in Section C.6 (Public Health and Safety), Impact H-2 for the proposed Project would be less than significant (**Class II**).

***Impact H-3: Degradation of surface water or groundwater quality would result from the accidental release of potentially harmful materials during operational activities.***

Surface and groundwater quality could potentially be impacted during activities associated with the operation and maintenance of the proposed Project. Potentially harmful materials could be accidentally released during operational or 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 the groundwater table is exposed due to excavation. As described for Impact H-2, above, APMs HYD-4 through HYD-6 would be incorporated into the project description in order to avoid and reduce the impact of accidentally released materials. These APMs require implementation of environmental training and procedures to prevent and control the accidental spill of potentially hazardous materials. Unlike with construction activities, as described for Impact H-2, no mitigation measures are recommended for operational activities due to the less invasive and less hazardous nature of operational activities. Therefore, Impact H-3 would be less than significant with no mitigation recommended (**Class III**).

**Interference with groundwater supply and recharge (Criterion HYD2)**

***Impact H-4: Disturbance of existing groundwater resources through project-related excavation activities.***

There are two areas along the length of the proposed Project route where project-related excavation activities would overlie existing, known groundwater resources. The proposed Project would be routed within the boundaries of the Antelope Valley Groundwater Basin for approximately the first 7.0 miles after leaving Antelope Substation, and within the boundaries of the Santa Clara Valley East Groundwater Basin for approximately the final 3.6 miles before its terminus at Pardee Substation. Excavation activities associated with the proposed Project would consist primarily of drilling for the installation of new transmission line tower foundations and grading for expansion of Antelope Substation. These activities would be located in hillside areas that are not adjacent to riparian zones. 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 unexpectedly encountered during construction, the APMs discussed below would ensure that any potential impact would be minimized.

Implementation of APMs HYD-2 through HYD-6 would help to minimize the potential for Project-related excavation to disturb groundwater. APM HYD-2 calls for the preparation and implementation of a SWPPP,

which would be prepared after approval of the proposed Project as well as siting and design of project facilities. Although the SWPPP would not directly address groundwater resources, it would require specific BMPs regarding construction activities and procedures. These BMPs would minimize any potential impacts to water quality. In addition, APM HYD-3 would address erosion control methods to reduce the transport of potentially contaminating materials and APMs HYD-4 through HYD-6 would require specific hazardous substance control and emergency response procedures to also protect water quality. With the implementation of Mitigation Measure H-4 (Develop and Implement a Groundwater Remediation Plan ~~Protection of Groundwater Resources~~), 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 and implement 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.

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

***Impact H-5: Increased runoff from the creation of new impervious areas.***

The perviousness, or permeability, of a substance refers to the degree to which it allows liquid to pass 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 areas include transmission tower pads and any concrete-filled areas. Temporary construction access ways, laydown areas, and marshalling yards would introduce temporary impervious areas because they would be returned to existing conditions (to the extent possible) after the completion of Project construction.

During construction of the proposed Project, approximately 121.8 acres of land would be disturbed, of which 63.3 acres would be restored. Permanent land disturbance would occur on 58.5 acres along the length of the proposed route, resulting from the construction of lattice steel tower pads and footings, grading for new spur roads and the turning radius for access roads to spur roads, and expansion of the Antelope Substation. Construction activities would take place on a variety of gradients, from level ground to a range of slopes. Table C.5-2 (Major Soils along the Proposed Antelope-Pardee 500-kV Transmission Line Route) indicates that the hazard of erosion on roads and trails along the proposed route would have an EHR of Moderate to Severe. Construction activities would increase the area of impervious surfaces in the vicinity of the proposed Project, which could increase surface water runoff.

Construction of the proposed 33-acre expansion of Antelope Substation has the potential to increase surface runoff. The proposed Antelope Substation expansion would require scraping and grading, as well as the installation of concrete foundations and pavement in some areas. These project features could result in an

increase in runoff volumes and rates. However, the amount of the new impervious area at Antelope Substation would not substantially increase surface runoff in the proposed Project area because most of the substation expansion area would be covered with untreated crushed rock, as described in SCE's PEA for the proposed Project. The crushed rock would be permeable to the subsurface, thus allowing infiltration of surface water.

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. However, the potential impacts from spur roads and access roads would be localized and temporary. The total amount of new impervious area that would be introduced from road construction (access and spur roads) would be the equivalent of approximately 5.5 acres, spanned over the 25.6-mile proposed transmission line route. Therefore, this new impervious area introduced through road construction is not expected to substantially increase surface runoff in the Project area.

Another project feature which would introduce new impervious area is the footings and pads required for transmission towers and other support structures. Some tower pads would also require grading in order to accommodate construction equipment and tower assembly. At each support structure location, a concrete foundation would be constructed and the use of impervious materials would slightly restrict storm water infiltration. Each lattice steel tower would require four drilled pier concrete footings approximately 42-inch to 48-inch diameter each. Each tubular steel pole would require one drilled pier footing with an approximately 66-inch diameter. The new impervious area that would be permanently introduced through these footings would range between 0.0013 acres each (TSPs) and 0.0003 acres each (single-circuit LSTs). This new impervious area is small enough in size that it would not have the potential to significantly increase stormwater runoff in the Project area or alter the area's drainage pattern and overall infiltration potential. Therefore, Impact H-5 for the proposed Project 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.***

Expansion of the Antelope Substation in the City of Lancaster would include the development of approximately 33 acres of land adjacent to the existing Antelope Substation. This expansion would result in the installation of some areas of paved concrete or asphalt surfaces, which would potentially increase the quantity of surface water runoff. As described in Section C.8.1, the Antelope Substation is located on a relatively flat alluvial fan, which would allow for the infiltration of surface runoff not captured by the drainage system. In addition, most of the substation would not be paved, and would be covered with untreated crushed rock, which would allow for some of the surface runoff to infiltrate through the soil. Due to these absorptive characteristics, the substation expansion would result in only small volumes of surface water runoff entering the drainage system. Runoff may also be introduced as a result of the concrete footings associated with the transmission towers. As described in Section B.2, the proposed Project route would be situated within the ANF for approximately 12.9 miles (12.6 miles on NFS lands) of its 25.6-mile route. There is no stormwater drainage system in place within the ANF and the Project would therefore have no potential to overload a system in this area. There are stormwater drainage systems in place in the populated areas surrounding Lancaster and Santa Clarita. Therefore, although the potential runoff generated by the proposed Project is expected to be minimal, the Project could affect local stormwater drainage systems. Impact H-6 for the proposed Project 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 created through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse.***

As described in Section C.8.1.2, a 100-year floodplain, or Flood Hazard Area, is an area of land that has a one percent chance of being inundated by a flood in any given year. The proposed Project's substations would not be located in a FEMA-defined Flood Hazard Area. However, as described in Section C.8.1, the proposed Project route would cross through four Flood Hazard Areas, including: Amargosa Creek, Bouquet Reservoir, Haskell Canyon Creek, and San Francisquito Creek. 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 in a watercourse. Although the proposed route does span approximately one-half mile of the western end of Bouquet Reservoir, towers would be located on nearby hillsides and other land areas, and engineered to withstand any stresses associated with its proximity to the reservoir. Implementation of the construction standards and approvals required by Mitigation Measure H-7 (Aboveground Structures shall be Protected Against Flood and Erosion Damage), described below, would ensure that any potential impacts of the placement of transmission towers in Flood Hazard Areas, such as those described in Section C.8.1, would be less than significant. Therefore, Impact H-7 for the proposed Project would be less than significant with mitigation incorporated (**Class II**).

#### ***Mitigation Measure for Impact H-7***

**H-7 Aboveground Structures shall be Protected 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.

### **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. If the Bouquet Dam, which is located on the southern edge of the Bouquet Reservoir, were to fail, water would flow along Bouquet Canyon Creek into the Bouquet floodplain. The proposed Project route is parallel to Bouquet Canyon Creek, but does not cross it. In addition, transmission towers located near the creek would be situated at higher elevations, therefore avoiding potential impacts from flooding in the case of a dam failure. Therefore, people and/or structures would not be exposed to flooding as a result of the failure of a levee or dam. No impact would occur.

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

The proposed Project would not be located near the coast and would therefore not be subject to any tsunami hazards. However, the proposed Project route could be subject to seiche hazards, due to its location adjacent to

Bouquet Reservoir. A seiche refers to wave events that occur in a lake, reservoir, or harbor as a result of atmospheric or seismic conditions. In seismically active areas, it is likely that minor below-surface seiche events are common, yet unnoticeable from the surface. According to the Earthquake Hazards Program of the United States Geological Survey (USGS, 2005), seiches in the United States are most likely to occur in southeastern states, due to a variety of factors such as thickness of surface sediments, presence of thrust faults, and structural uplifts and basins. It is extremely rare for recordable seiches to occur in areas west of the Rocky Mountains, which includes southern California. Therefore, although flooding could occur as the result of a major seiche, it is not probable that such a seiche would occur in the proposed Project area. The proposed Project is not subject to seiche hazards.

***Impact H-8: Mudflow hazards created through the placement of permanent, aboveground structures.***

Although tsunamis and seiches do not pose hazards to the proposed Project area, the area may be subject to mudflows and associated hazards or impacts. Mudflow events occur due to a combination of soil type, precipitation, and slope. Mudflow may be triggered by heavy rainfall that the soil is not able to sufficiently drain or absorb. As a result, soil and rock materials become unstable and eventually slide away from their existing location, in a mudflow event. Project construction would be scheduled to occur year-round, between March of 2008 and April of 2009, which would include the rainy season. Heavy rains could result in potentially damaging mudflow in proposed Project construction areas, particularly in mountainous terrain. The use of BMPs and preventative measures utilized during construction activities, including those described in the following mitigation measures would reduce the impacts of mudflows as a result of construction of the proposed Project (SCE, 2004). With the implementation of Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~, H-1be (Maximum Road Gradient), H-1cd (Road Surface Treatment), ~~H-1d (Timing of Construction Activities)~~, H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), and H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris) the potential Impact H-8 associated with the proposed Project would be less than significant (Class II).

## **C.8.6 Alternative 1: Partial Undergrounding of Antelope-Pardee Transmission Line**

### **C.8.6.1 Affected Environment**

The affected environment for Alternative 1 is largely the same as the proposed Project. Alternative 1 would follow the same route as the proposed Project, with the exception of the underground segment along Del Sur Ridge in the ANF and the underground segment within urban city streets in Santa Clarita. Underground construction along the Del Sur Ridge would begin just south of Mile 11.0 and continue until just south of Mile 15.0. In Santa Clarita, underground construction would begin at Mile 22.7 and continue until Mile 26.2 (Pardee Substation). The proposed route for Alternative 1 crosses through the Antelope Valley Watershed and the Santa Clara River Watershed, which are described in Section C.8.1 (Affected Environment) for the proposed Project. Alternative 1 could potentially affect the following waterways: Amargosa Creek, Haskell Canyon Creek, San Francisquito Creek, and Bouquet Reservoir, as well as the Upper and Lower Santa Clara River systems. In addition, the proposed route for Alternative 1 overlies the same groundwater basins as the proposed Project: the Antelope Valley Groundwater Basin and the Santa Clara Valley East Groundwater Basin. As with the proposed Project, this alternative would cross through the boundaries of the Antelope Valley Groundwater Basin for approximately the first 7.0 miles after it departs from Antelope Substation. It would also cross through the boundaries of the Santa Clara Valley East Groundwater Basin for approximately the final 4.2 miles before its

terminus at Pardee Substation. The underground segment along Del Sur Ridge would not begin until just south of Mile 11.0 on the route for Alternative 1, so it is not located within the boundaries of the Antelope Valley Groundwater Basin. However, the 3.5-mile underground segment in the Santa Clarita area is situated entirely within the boundaries of the Santa Clara Valley East Groundwater Basin.

### **C.8.6.2 Impacts and Mitigation Measures**

#### **Violation of a water quality or water discharge requirement (Criterion HYD1)**

Construction activities for Alternative 1 would include land disturbance expected to result in soil erosion and sedimentation with the potential to degrade water quality in the surrounding area (Impact H-1). As with the proposed Project, the following waterways could potentially be affected by construction-generated runoff: Amargosa Creek, Haskell Canyon Creek, San Francisquito Creek, Bouquet Canyon Creek, and Bouquet Reservoir, as well as the Upper and Lower Santa Clara River systems. Alternative 1 would require land disturbance activities that would not be required for the proposed Project. These activities include extensive grading, trenching, and excavation, as necessary for underground transmission line construction. In particular, the following requirements of underground transmission line installation would generate potentially significant soil erosion and sedimentation with the ability to degrade water quality:

- Within the ANF, an 85-foot wide construction zone for the length of the trench that must be leveled by grading and filling and kept clear of vegetation and ground cover, which would encourage soil erosion and sedimentation. Grading and filling activities would create a permanent topographic alteration of Del Sur Ridge. The clearing of vegetation be a temporary condition.
- Trenches would be dug and large areas excavated for the duct banks and splicing vaults. Excavated materials would be stored onsite and either used as fill material or transported offsite for disposal. Excavation, storage of materials, and transport of materials would encourage temporary soil erosion and sedimentation.
- A 2- to 3-acre transition station located at each end of the underground segments would be leveled, cleared, and covered with a semi-permeable substance such as crushed rock. Although the use of semi-permeable cover material in favor of impermeable material such as concrete would facilitate drainage and discourage erosion, grading and clearing the transition station locations would encourage both temporary and permanent soil erosion and sedimentation.
- Up to eight feet of thermal fill may be required over the top of all buried facilities and infrastructure, including duct banks and splicing vaults. The replacement of existing soil matter and composition with foreign materials has the potential to encourage temporary soil erosion and sedimentation due to differences in characteristics such as moisture, cohesiveness, and granular size, among others.

Installation of the underground segments for Alternative 1 would also include the construction of a three-mile all-weather access road along Del Sur Ridge in the ANF. The all-weather access road on Del Sur Ridge would permanently upgrade the existing roadway from Maintenance Level 2 (OHV use) to Maintenance Level 3. As described in the following Section C.9.6, designated Level 3 roads can accommodate standard passenger vehicles. Due to engineering differences, the all-weather road segments would be more resistant to degradation from age, weather, and use stresses and therefore are expected to cause less soil erosion and sedimentation than roads which are maintained at a lower level.

In order to facilitate understanding of site-specific geologic conditions and to minimize erosion from construction, APMs GEO-2 and GEO-3 would be implemented. In order to strengthen these APMs from Section C.5 (Geology), and further reduce potential impacts of soil erosion, Mitigation Measures G-1 (Protect Against Slope Instability), G-2 (Minimization of Soil Erosion), and R-4 (Permanent Closure and Re-vegetation of Construction Roads) would also be implemented. Due to the known land disturbance that would occur for Alternative 1 and the potential for this land disturbance to degrade water quality through soil erosion and sedimentation, APMs HYD-2 and HYD-3 would be incorporated into the project description (to require a

SWPPP and an erosion and sediment transport control plan). In order to strengthen the effect of these APMs and to minimize the impact of soil erosion and sedimentation on water quality, the following mitigation measures would also be implemented for Alternative 1: Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~, H-1be (Maximum Road Gradient), H-1cd (Road Surface Treatment), ~~H-1d (Timing of Construction Activities)~~, H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), and H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris). With the implementation of these APMs and mitigation measures, Impact H-1 for Alternative 1 would be reduced to a less-than-significant level (**Class II**).

Another concern for Alternative 1 with regards to the potential violation of a water quality or water discharge requirement (Criterion HYD1) is the accidental spill or release of harmful materials during construction, operation, or maintenance activities. Such an occurrence could potentially impact surface water and/or groundwater quality (Impacts H-2 and H-3). Due to the specialized requirements of underground transmission line installation, Alternative 1 would involve invasive construction activities, which would require specialized equipment, machinery, and materials. Hazardous materials such as diesel fuel, gasoline, lubricant oils, hydraulic fluid, antifreeze, transmission fluid, and lubricant grease would be introduced through the construction of Alternative 1. The XLPE technology that would be used for Alternative 1, as described in Section B.4.1, would not require hazardous materials and other fluids to be contained within or around the underground cables. The same hazardous materials associated with construction and maintenance of the proposed Project would be associated with Alternative 1. However, the repair of underground facilities would require re-trenching and excavation, thus re-introducing the potential for the accidental release of hazardous materials during operation and maintenance activities. APMs HYD-4 through HYD-6 would help to ensure the protection of local surface waters and groundwater from contamination associated with accidental spills of potentially hazardous materials.

In order to strengthen APMs HYD-4 through HYD-6, the following mitigation measures would be implemented: Mitigation Measures PH-1a (Environmental Training and Monitoring Program), PH-1b (Hazardous Substance Control and Emergency Response Plan), PH-1c (Proper Disposal of Construction Waste), and PH-1d (Emergency Spill Supplies and Equipment). Mitigation Measures PH-1a through PH-1d is fully described in Section C.6 (Public Health and Safety). In addition to these mitigation measures from Section C.6, Mitigation Measure H-4 (Develop and Implement a Groundwater Remediation Plan) would also be recommended to protect groundwater resources during construction, operation, and/or maintenance of Alternative 1 and to reduce potential Impacts H-2 and H-3 for Alternative 1 to less-than-significant levels. Impact H-2 for Alternative 1 would be less than significant with mitigation incorporated (**Class II**). Impact H-3 for Alternative 1 would also be less than significant with mitigation incorporated (**Class II**).

### **Interference with groundwater supply and recharge (Criterion HYD2)**

Groundwater resources existing along the route for Alternative 1 could be disturbed by project-related excavation activities (Impact H-4) during installation of underground infrastructure. As described, the two groundwater basins that could be affected include the Antelope Valley Groundwater Basin and the Santa Clara Valley East Groundwater Basin. Compared to the proposed Project, Alternative 1 has a greater potential to affect the Santa Clara Valley East Groundwater Basin due to the overlying segment of underground transmission facilities in Santa Clarita (see Section C.8.6.1). Alternative 1 would include excavation activities for the overhead portions as well as the underground portions. Excavation activities associated with the overhead segments of Alternative 1 would consist primarily of drilling for the installation of new transmission line tower foundations and grading for expansion of Antelope Substation. Although it is unlikely that these excavation activities would interfere with the overall groundwater supply and recharge respective to the

underlying basins, there is the potential for some disturbance of existing groundwater resources through project-related excavation activities. Excavation activities associated with the underground segments of Alternative 1 include extensive trenching along Del Sur Ridge and within the City of Santa Clarita during construction as well as during operation and maintenance activities, as the replacement of underground infrastructure would require re-trenching and excavation.

Installation of underground infrastructure is highly invasive and could potentially result in disturbance of the underlying groundwater basins. Implementation of APMs HYD-2 through HYD-6 would help to minimize the effects of project-related excavation for Alternative 1. Furthermore, with the implementation of Mitigation Measure H-4 (Develop and Implement a Groundwater Remediation Plan), Impact H-4 for Alternative 1 would be less than significant (**Class II**).

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

The construction of Alternative 1 would introduce new impervious surfaces that could increase surface water runoff (Impact H-5). Whereas the proposed Project would only introduce new impervious areas associated with above-ground infrastructure, Alternative 1 would introduce new impervious areas associated with both above-ground infrastructure and underground infrastructure. New impervious areas would be created during construction of overhead transmission lines and substation modifications, as well as during the construction of underground infrastructure and associated above-ground facilities, including multiple transition stations and additional substation infrastructure that would not be required for overhead transmission lines.

Trenches would be dug along Del Sur Ridge and within Santa Clarita during installation of underground infrastructure. After the necessary cables, ductbanks, and splicing vaults are situated within a trench, the area would be re-filled using either the original materials or a thermal material, depending upon requirements of the specific infrastructure. In most cases, imported thermal fill material would be used. Trenches that are excavated within paved roadways, such as in the City of Santa Clarita, would be capped with the same material used for the roadway, which is most likely to be asphalt or concrete, both of which are impermeable materials. Compared to existing conditions, additional impervious areas would not be created within roadways. Along Del Sur Ridge, fill material would consist of the natural soils, permeable thermal material, or a mixture of the two.

At each end of the underground segments, a 2 to 3 acre transition station would be installed to convert the transmission lines from underground to overhead; a total of 4 transition stations or equivalent substation termination facilities would be required. Some areas of the transition stations would require the use of impermeable cap materials, such as tower pads that require concrete footings and/or foundations. Open areas of the transition stations would be covered with an untreated crushed rock material, which is permeable and would allow for drainage to the subsurface level, thus minimizing increased surface runoff.

With the incorporation of Mitigation Measure H-5 (Permeability of Ground Cover), Alternative 1 is not expected to significantly alter the drainage of local streams or increase surface runoff through the introduction of new impervious surfaces (Impact H-5). Therefore, Impact H-5 for Alternative 1 would be less than significant with mitigation incorporated (**Class II**).

#### ***Mitigation Measure for Impact H-5***

**H-5 Permeability of Ground Cover.** Untreated crushed rock or a comparable material will be used to maintain permeability to the subsurface and allow for infiltration in all areas where it is necessary to provide a cap over the natural or existing ground cover, including over trenches, graded access

roads<sup>2</sup>, underground transition stations, and substation additions or expansions, and excluding areas where it is necessary to use an impermeable material such as concrete.

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

As discussed with regard to Criterion HYD3, above, Alternative 1 would introduce some new, permanent impervious areas that are expected to cause a less than significant increase in surface water runoff. Increased runoff could potentially result in the overloading of a local stormwater drainage system (Impact H-6). The existing ground cover would also be affected by Alternative 1 due to vegetation removal and soil compaction. During underground construction along Del Sur Ridge, an 80-foot-wide swath would be cleared and leveled to accommodate construction equipment and activities. Existing vegetation would be removed and the entire area would be subject to soil compaction from use of construction equipment. However, Del Sur Ridge is located within the ANF, where there is not a stormwater drainage system in place. Underground construction would also take place within the City of Santa Clarita, where there is a stormwater drainage system in place. However, after Project construction, the existing ground cover would not change from pre-construction conditions. Alternative 1 would therefore be the same as the proposed Project with regards to the potential to overload a stormwater drainage system. Impact H-6 for Alternative 1 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)**

Alternative 1 would be the same as the proposed Project in terms of flood hazards created through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse (Impact H-7), as described in Section C.8.5. The proposed route for Alternative 1 would cross through four Flood Hazard Areas, including: Amargosa Creek, Bouquet Reservoir, Haskell Canyon Creek, and San Francisquito Creek. All transmission line towers and underground facilities associated with Alternative 1 would be designed and engineered to withstand any mechanical stresses that may result from flooding or erosion of the surrounding area. 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 Alternative 1 would be situated in a watercourse. As with the proposed Project, transmission towers spanning Bouquet Reservoir would be located on nearby hillsides and other land areas, and engineered to withstand any stresses associated with its proximity to the reservoir (Section C.8.5, Impact H-7). With the implementation of Mitigation Measure H-7 (Aboveground Structures Shall be Protected Against Flood and Erosion Damage), any potential impacts of the placement of structures related to Alternative 1 in Flood Hazard Areas such as those described in Section C.8.1 would be less than significant (Class II).

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

Alternative 1 would be the same as the proposed Project, as described in Section C.8.5, with regards to Criterion HYD6. No impact would occur from the exposure of people or structures by Alternative 1 to flooding as a result of failure of a levee or dam.

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<sup>2</sup> Does not apply to roads on NFS lands which are designated as an off-highway vehicle (OHV) route. Please see Section C.9 (Land Use and Public Recreation) for a discussion of the environmental impacts of OHV roads in relation to the proposed Project.

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

Alternative 1 would be the same as the proposed Project, as described in Section C.8.5, with regards to Criterion HYD7. No impacts or damage would occur from inundation by tsunami or seiche. However, heavy rains could result in potentially damaging mudflow events with Alternative 1. Thus, mudflow hazards could be created through the placement of permanent, aboveground structures (Impact H-8). The potential Impact H-8 for Alternative 1 would be reduced to a less-than-significant level with the implementation of Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~ H-1be (Maximum Road Gradient), H-1cd (Road Surface Treatment), ~~H-1d (Timing of Construction Activities)~~, H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris), and H-7a (Aboveground Structures shall be Protected Against Flood and Erosion Damage). Impact H-8 for Alternative 1 would be less than significant with mitigation incorporated (Class II).

## **C.8.7 Alternative 2: Antelope-Pardee East Mid-Slope**

### **C.8.7.1 Affected Environment**

The proposed route for Alternative 2 is generally the same as the proposed Project route, as described in Section C.8.1, except that this alternative includes the relocation of transmission towers from the top of Del Sur Ridge to eastern mid-slope locations for approximately 12.9 miles, between Mile 5.7 and Mile 18.6 of the Alternative 2 route. Downstream waterways and water bodies that could be affected by the construction of this mid-slope segment include: Bouquet Canyon Creek, Bouquet Canyon Reservoir, Mint Canyon Creek, and the Santa Clara river system (Upper and Lower Santa Clara River). In addition, approximately 20 mountain creeks would be crossed by Alternative 2 between Mile 5.7 and Mile 18.6, on the eastern mid-slope of Del Sur Ridge. These mountain creeks are very small, ephemeral waterways which are dry throughout most of the year. During precipitation events, runoff generated along the eastern slope of Del Sur Ridge would follow the path of these eastern mid-slope mountain creeks downstream to the waterways mentioned above.

### **C.8.7.2 Impacts and Mitigation Measures**

#### **Violation of a water quality or water discharge requirement (Criterion HYD1)**

Construction activities for Alternative 2 would include land disturbance expected to result in soil erosion and sedimentation with the potential to degrade water quality in the surrounding area (Impact H-1). From Mile 0.0 to Mile 5.7 and from Mile 18.6 to Mile 26.7 (proposed Project Mile 17.5 to Mile 25.6) construction activities for Alternative 2 would be the same as the proposed Project. The portion of Alternative 2 situated on the eastern mid-slope of Del Sur Ridge, from Mile 5.7 to Mile 18.6, would require the construction of eight more transmission towers than would be required by the proposed Project. As discussed in Section B.4.2, approximately 56 towers would be constructed in mid-slope locations. Thirty seven of these towers would be constructed using helicopters and foot-crews. Helicopter construction of these towers would avoid the need to install spur roads on the steep slopes east of Del Sur Ridge. During helicopter construction, ground crews would travel by foot from the existing ridge-top access road to tower locations on the mid-slope. For the 19 mid-slope towers which would not be constructed via helicopter, hillside construction requirements such as grading for tower assembly areas, construction areas, and spur roads would be accommodated. These 19 towers would require spur road access. As indicated by Table B.4-23 (Summary of Components of the Proposed Project and Alternatives), Alternative 2 would require 0.32 miles of new spur road construction on NFS lands. ~~None of the 56 transmission towers situated in mid-slope locations east of Del Sur Ridge would require graded~~

~~or leveled transmission tower pads.~~ Each hillside tower would be installed on four individual concrete footings, staggered as needed to accommodate the tower's position and size, as well as the slope severity and soil stability.

As indicated in Table B.4-10 (Estimates of Land Disturbance for Alternative 2), Alternative 2 would include the construction of 25 temporary pulling set-ups, eleven of which would be on NFS lands, in addition to 16 temporary splicing set-ups, twelve of which would be on NFS lands. Because pulling and splicing set-ups must be situated along the transmission line alignment, approximately nine or ten pulling set-ups and ten or eleven splicing set-ups would be constructed on the eastern mid-slope of Del Sur Ridge<sup>3</sup>. As discussed in Section C.5 (Geology and Paleontology) and described in Table C.5-11 (Major Soils along the Alternative 2 Route), the proposed alignment for Alternative 2 is dominated by four main soil types, all of which are categorized as having a Severe EHR. Although helicopter construction of approximately 66 percent of hillside towers would avoid the construction of some Project features such as material laydown areas, set-up areas, and spur roads on steep hillsides, the temporary construction of pulling and splicing set-ups along the hillside alignment would still be required. This is expected to result in soil erosion and sedimentation with the potential to degrade water quality in the surrounding area. In addition, construction of approximately 34 percent of hillside towers without the use of helicopters would require installation of spur roads and laydown or set-up areas in addition to temporary pulling and splicing set-ups along the hillside alignment. This is also expected to result in soil erosion and sedimentation with the potential to degrade water quality in the surrounding area.

In addition to the temporary construction impacts described above, permanent land disturbance that could affect water quality through soil erosion and sedimentation would occur along the length of Alternative 2. For the portion of Alternative 2 situated on the eastern mid-slope of Del Sur Ridge, land disturbance would include the installation of spur roads for permanent access to 19 hillside towers, in addition to the installation of four concrete tower footings for each of 56 transmission towers, or a total of 224 concrete footings. Other permanent land disturbance for Alternative 2 would be the same as the proposed Project. Although each transmission tower would be engineered and constructed to minimize erosion hazards, taking into consideration site-specific conditions, the entire mid-slope segment of Alternative 2 has an Erosion Hazard Ranking of Severe, as described above. The installation of permanent Project infrastructure (such as concrete footings) on steep hillside areas classified as Severe EHR would result in long-term erosion and sedimentation that could cause degradation of water quality in surrounding, or downstream, waterways.

In order to facilitate understanding of site-specific geologic conditions and to minimize erosion from construction, APMs GEO-2 and GEO-3 would be implemented. Mitigation Measures G-1 (Protect Against Slope Instability), G-2 (Minimization of Soil Erosion), and R-4 (Permanent Closure and Re-vegetation of Construction Roads) would also be implemented to further reduce potential impacts of soil erosion. In addition, APMs HYD-2 and HYD-3 would require a SWPPP and an erosion and sediment transport control plan, as described for the proposed Project in Section C.8.5. The following mitigation measures would also be implemented to strengthen the requirements of the SWPPP and to further address construction-related erosion and sedimentation concerns: Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~, H-1b (Maximum Road Gradient), H-1c (Road Surface Treatment), H-1d (Timing of Construction Activities), H-1e (Dispersion of Subsurface Drainage

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<sup>3</sup> As described in Section B.4.2, the proposed route for Alternative 2 would enter the ANF at Mile 5.7, exit the ANF at Mile 20.4, and be situated on the eastern mid-slope of Del Sur Ridge from Mile 5.7 to Mile 18.6, or approximately 88 percent of the transmission line route which is located within the ANF. Therefore, approximately 88 percent of pulling and splicing set-ups that would be located on NFS lands in the ANF would be located on the eastern mid-slope of Del Sur Ridge, along the proposed alignment.

from Slope Construction Areas), and H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris). Impact H-1 for Alternative 2 would be less than significant with mitigation incorporated (**Class II**).

The accidental spill or release of harmful materials used during construction of Alternative 2 could impact surface water quality and/or groundwater quality (Impact H-2) through direct contamination or through infiltration. As with the proposed Project, construction activities and required materials for Alternative 2 would have the potential to significantly degrade water quality through the accidental release of hazardous materials. Therefore, APMs HYD-4 through HYD-6 would be used to reduce the potential impact of accidentally spilled materials on water quality. In addition, a spill plan related to activities on NFS lands would be submitted to the Forest Service for approval and attached to the required Special Use authorization. In order to strengthen APMs HYD-4 through HYD-6, the following mitigation measures would also be implemented: Mitigation Measures PH-1a (Environmental Training and Monitoring Program), PH-1b (Hazardous Substance Control and Emergency Response Plan), PH-1c (Proper Disposal of Construction Waste), and PH-1d (Emergency Spill Supplies and Equipment). With the implementation of these mitigation measures, which are fully discussed in Section C.6 (Public Health and Safety), Impact H-2 for Alternative 2 would be less than significant (**Class II**).

The accidental spill or release of harmful materials used during operational and maintenance activities for Alternative 2 could also impact surface water quality and/or groundwater quality (Impact H-3) through direct contamination or through infiltration. In contrast with the requirements of construction activities, operational activities would be less invasive and therefore less hazardous than construction activities. Because the likelihood of an accidental release of hazardous materials would be less for operational activities, no mitigation measures are recommended. As with Impact H-2, described above, APMs HYD-4 through HYD-6 would be utilized to avoid and reduce the impact of accidentally released materials. In short, Impact H-3 for Alternative 2 would be less than significant with no mitigation recommended (**Class III**).

### **Interference with groundwater supply and recharge (Criterion HYD2)**

As with the proposed Project, groundwater resources in the vicinity of Alternative 2 could be disturbed by project-related excavation activities (Impact H-4). As discussed, the two groundwater basins underlying the proposed route include the Antelope Valley Groundwater Basin, for the first 7.0 miles of the route, and the Santa Clara Valley East Groundwater Basin, for the final 3.6 miles of the route. No hillside towers would be constructed over the Santa Clara Valley East Groundwater Basin, as these towers would be located along relatively level city streets. However, the construction of transmission line facilities in hillside locations, between Mile 5.7 and Mile 18.6 of Alternative 2, would result in more land disturbance such as grading, leveling, and filling, than the rest of the route. Approximately the first two miles of hillside construction (Mile 5.0 to Mile 7.0) would take place over the Antelope Valley Groundwater Basin. It is unlikely that excavation activities associated with Alternative 2 would interfere with the overall groundwater supply and recharge respective to the underlying basin. However, there is the potential for some disturbance of existing groundwater resources through project-related excavation, particularly with regards to the high degree of land disturbance potentially involved with hillside construction over the Antelope Valley Groundwater Basin.

Implementation of APMs HYD-2 through HYD-6 would help to minimize the effects of project-related excavation for Alternative 2, particularly with regards to the hillside towers overlying the Antelope Valley Groundwater Basin and the excavation activities that may occur with hillside construction. With the implementation of Mitigation Measure H-4 (Develop and Implement a Groundwater Remediation Plan) Impact H-4 for Alternative 2 would be reduced to a less-than-significant level (**Class II**).

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

The construction of Alternative 2 would introduce new impervious surfaces that could increase surface water runoff (Impact H-5). During construction of overhead transmission lines and substation modifications, activities such as grading and soil compaction would introduce new impervious areas. As described above, 19 of the 56 towers located on the eastern mid-slope of Del Sur Ridge would require spur road construction for access to each site. Spur roads located on steep slopes would be cut in a switchback pattern for safety purposes, but which also greatly increases the land disturbance and new impervious area, in comparison with spur roads that extend directly from the access road to the transmission tower site. As shown in Table B.4-10 (Estimates of Land Disturbance for Alternative 2), 0.32 miles of spur roads would be constructed ~~or improved~~ on NFS lands and 0.66 miles would be constructed ~~or improved~~ on non-NFS lands for Alternative 2. Similarly, 10.39 miles of access roads would be constructed or improved on NFS lands and 0.51 miles of access roads would be constructed or improved on non-NFS lands for Alternative 2. All new or improved roadways would be 16 feet wide and would introduce new impervious areas through grading and soil compaction. A comparison with the land disturbance tables provided in Section B for the proposed Project and other alternatives indicates that Alternative 2 would require the least amount of spur road construction and improvement. This is due to the use of helicopters for installation of 37 hillside towers, which would avoid the need for roadway access to these sites.

The transmission tower footings and roadways associated with Alternative 2, particularly for the steep mid-slope areas east of Del Sur Ridge, would be engineered and constructed to facilitate continuation of the existing drainage pattern. However, even with specialized design and engineering of hillside infrastructure, the increase in impervious areas attributable to Project-related infrastructure such as transmission tower footings, spur roads, access roads, and substation improvements would create new impermeable areas which would have the potential to increase surface water runoff. In addition, Alternative 2 would include construction of temporary pulling and splicing set-ups along the proposed route, as described above in the discussion for Impact H-1. These areas would temporarily decrease permeability of the ground cover through activities such as cutting, grading, and soil compaction. Therefore, construction of Alternative 2 would introduce both temporary and permanent impermeable areas that could increase surface water runoff and potentially alter the existing drainage pattern in the area.

Mitigation Measure H-5 (Permeability of Ground Cover) is recommended to facilitate infiltration of surface water runoff and to preserve the existing drainage pattern in the Project area. Where appropriate as determined by the final engineering design, this mitigation measure would be applied to permanent Project facilities such as roadways, as well as to temporary Project facilities such as pulling and splicing set-up locations in hillside areas. With the incorporation of Mitigation Measure H-5 (Permeability of Ground Cover), Alternative 2 is not expected to significantly alter the drainage of local streams or increase surface runoff through the introduction of new impervious surfaces. Therefore, Impact H-5 for Alternative 2 would be less than significant with mitigation incorporated (Class II).

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

Alternative 2 would create some new, permanent impervious areas that are expected to have a significant and unavoidable affect on surface water runoff, as described above for Criterion HYD4. Increased runoff could potentially result in the overloading of a local stormwater drainage system (Impact H-6). However, the mid-slope portion of Alternative 2, from Mile 5.7 to Mile 18.6, would be situated entirely within the ANF, where there is no stormwater drainage system in place. This is also the portion of the route which is expected to result in significant surface water runoff. However, because there is no stormwater drainage system in place along this

hillside segment, there would be no impact to such a system for this portion of the route. The portions of Alternative 2 that would be the same as the proposed Project, from Mile 0.0 to Mile 5.7 and from Mile 18.6 to Mile 26.7 (proposed Project Mile 17.5 to Mile 25.6), would have the same potential as the proposed Project to affect local stormwater drainage systems. Impact H-6 for Alternative 2 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)**

Alternative 2 would be the same as the proposed Project in terms of flood hazards created through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse (Impact H-7), as described in Section C.8.5. None of the infrastructure associated with Alternative 2 would be situated in a watercourse. Transmission towers spanning Bouquet Reservoir would be located on nearby hillsides and other land areas, and engineered to withstand any stresses associated with its proximity to the reservoir. With the implementation of Mitigation Measure H-7 (Aboveground Structures Shall be Protected Against Flood and Erosion Damage), any potential impacts of the placement of structures related to Alternative 2 in Flood Hazard Areas such as those described in Section C.8.1 would be less than significant (**Class II**).

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

Alternative 2 would be the same as the proposed Project, as described in Section C.8.5, with regards to Criterion HYD6. No impact would occur from the exposure of people or structures to flooding as a result of the failure of a levee or dam caused by Alternative 2.

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

Alternative 2 would be to the same as the proposed Project, as described in Section C.8.5, with regards to Criterion HYD7. No impacts or damage would occur from inundation by tsunami or seiche. However, as with the proposed Project, heavy rains could result in potentially damaging mudflow events with Alternative 2. Thus, mudflow hazards could be created through the placement of permanent, aboveground structures (Impact H-8). The potential Impact H-8 for Alternative 2 would be reduced to a less-than-significant level with the implementation of Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~, H-1be (Maximum Road Gradient), H-1cd (Road Surface Treatment), H-1d (Timing of Construction Activities), H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris), and H-7a (Aboveground Structures shall be Protected Against Flood and Erosion Damage). Impact H-8 for Alternative 2 would be less than significant with mitigation incorporated (**Class II**).

## **C.8.8 Alternative 3: Antelope-Pardee Single-Circuit 500-kV Towers between Haskell Canyon and Pardee Substation**

### **C.8.8.1 Affected Environment**

The affected hydrology and water quality environment for Alternative 3 would be the same as described for the proposed Project in Section C.8.1. Alternative 3 would follow the same route as the proposed Project.

### C.8.8.2 Impacts and Mitigation Measures

#### Violation of a water quality or water discharge requirement (Criterion HYD1)

Alternative 3 would be built in a currently vacant position within the Vincent-Pardee ROW for the 5.3 miles between Mile 20.3 (Haskell Canyon) and Mile 25.6 (Pardee Substation), thereby avoiding the removal of the existing single-circuit 500-kV transmission towers within the corridor; all existing infrastructure currently in this portion of the ROW would remain intact. Therefore, land disturbance that would result in soil erosion and sedimentation (Impact H-1) associated with Alternative 3 would not occur from demolition activities. With the exception of the 5.3-mile-long segment between Mile 20.3 and Mile 25.6, construction and operation of the rest of Alternative 3, from Mile 0.0 (Antelope Substation) to Mile 20.3 (Haskell Canyon) would be the same as the proposed Project. The following waterways could potentially be affected by construction-generated runoff: Amargosa Creek, Haskell Canyon Creek, San Francisquito Creek, Bouquet Canyon Creek, and Bouquet Reservoir, as well as the Santa Clara River system.

APMs GEO-2 and GEO-3 would be implemented to facilitate understanding of site-specific geologic conditions and to minimize erosion from construction. In order to strengthen these APMs from Section C.5 (Geology) and further reduce potential impacts of soil erosion, Mitigation Measures G-1 (Protect Against Slope Instability), G-2 (Minimization of Soil Erosion), and R-4 (Permanent Closure and Re-vegetation of Construction Roads) would also be implemented. Due to the known land disturbance that would occur for Alternative 3, APMs HYD-2 and HYD-3 would be implemented to require a SWPPP and an erosion and sediment transport control plan, which are described for the proposed Project in Section C.8.5. Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~, H-1b<sub>e</sub> (Maximum Road Gradient), H-1c<sub>d</sub> (Road Surface Treatment), ~~H-1d (Timing of Construction Activities)~~, H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), and H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris) would also be implemented to reduce Impact H-1 for Alternative 3 to a less-than-significant level (**Class II**).

Alternative 3 would be the same as the proposed Project with regards to the potential occurrence of an accidental spill or release of harmful materials during construction that could impact water quality (Impact H-2) through direct contamination or through infiltration. APMs HYD-4 through HYD-6 would be used to reduce the potential impact of accidentally spilled materials on water quality. In addition, a spill plan related to activities on NFS lands would be submitted to the Forest Service for approval and attached to the required Special Use authorization. To strengthen APMs HYD-4 through HYD-6, the following mitigation measures would also be implemented: Mitigation Measures PH-1a (Environmental Training and Monitoring Program), PH-1b (Hazardous Substance Control and Emergency Response Plan), PH-1c (Proper Disposal of Construction Waste), and PH-1d (Emergency Spill Supplies and Equipment). With the implementation of these mitigation measures, which are fully discussed in Section C.6 (Public Health and Safety), Impact H-2 for Alternative 3 would be less than significant (**Class II**).

Alternative 3 would also be the same as the proposed Project with regards to the potential occurrence of an accidental spill or release of harmful materials during operation and maintenance activities that could impact water quality (Impact H-3) through direct contamination or through infiltration. APMs HYD-4 through HYD-6 would be utilized. Impact H-3 for Alternative 3 would be less than significant with no mitigation recommended (**Class III**).

### **Interference with groundwater supply and recharge (Criterion HYD2)**

Groundwater resources along the route for Alternative 3 could potentially be disturbed by project-related excavation activities (Impact H-4). Impact H-4 for Alternative 3 would be the same as Impact H-4 for the proposed Project (Section C.8.5). APMs HYD-2 through HYD-6 would be incorporated into the project description and Mitigation Measures H-4a (Develop and Implement a Groundwater Remediation Plan) would also be implemented. Impact H-4 for Alternative 3 would be less than significant with mitigation incorporated (Class II).

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

The construction of Alternative 3 would introduce new impervious surfaces that may increase surface water runoff (Impact H-5). As described above, Alternative 3 would be the same as the proposed Project, with the exception of the segment between Mile 20.3 and Mile 25.6, where single-circuit towers would be installed instead of the double-circuit towers used for the proposed Project. With Alternative 3, because the existing infrastructure along this segment would be left intact, new impervious area would be introduced through the installation of a new set of transmission towers from Mile 20.3 to Mile 25.6, as opposed to use of or replacement of the existing transmission towers. In addition, activities such as grading and soil compaction during construction would introduce new impervious areas. Overall, Impact H-5 for Alternative 3 would be the same as Impact H-5 for the proposed Project, as described in Section C.8.5. Because the portion of Alternative 3 between Mile 20.3 and Mile 25.6 is already in use as a utility corridor and is therefore already characterized by impervious areas from transmission towers and access roads, the introduction of transmission towers along this segment for Alternative 3 would not cause a significant change in existing circumstances. Implementation of APMs HYD-2, HYD-3, and HYD-4 would include development of a SWPPP and erosion control plan to minimize any potential increases in surface runoff from new roads. Impact H-5 for Alternative 3 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)**

Alternative 3 would be the same as the proposed Project with regards to the potential to create new runoff which could overload a local stormwater drainage system (Impact H-6). As described above for Criterion HYD3, Alternative 3 would not introduce a significant new source of surface water runoff as a result of new impervious areas. Impact H-6 for Alternative 2 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)**

Alternative 3 would be the same as the proposed Project in terms of flood hazards created through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse (Impact H-7), as described in Section C.8.5. None of the infrastructure associated with Alternative 3 would be situated in a watercourse. Transmission towers spanning Bouquet Reservoir would be located on nearby hillsides and other land areas, and engineered to withstand any stresses associated with its proximity to the reservoir. With the implementation of Mitigation Measure H-7 (Aboveground Structures Shall be Protected Against Flood and Erosion Damage), any impacts of the placement of structures related to Alternative 3 in Flood Hazard Areas such as those described in Section C.8.1 would be less than significant (Class II).

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

Neither construction nor operation of Alternative 3 would have the potential to cause the failure of a levee or dam. No impact would occur from the exposure of people or structures to flooding as a result of the failure of a levee or dam caused by Alternative 3.

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

Alternative 3 would not result in damage from inundation by tsunami or seiche. However, as with the proposed Project, heavy rains could result in potentially damaging mudflow events with Alternative 3. Thus, mudflow hazards could be created through the placement of permanent, aboveground structures associated with Alternative 3 (Impact H-8). The potential Impact H-8 for Alternative 3 would be reduced to a less-than-significant level with the implementation of Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~, H-1~~b~~e (Maximum Road Gradient), H-1~~c~~d (Road Surface Treatment), ~~H-1d (Timing of Construction Activities)~~, H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris), and H-7a (Aboveground Structures shall be Protected Against Flood and Erosion Damage). Impact H-8 for Alternative 3 would be less than significant with mitigation incorporated (**Class II**).

## **C.8.9 Alternative 4: Antelope-Pardee Re-Routing of New Right-of-Way along Haskell Canyon.**

### **C.8.9.1 Affected Environment**

Alternative 4 includes a 3.1-mile re-route of the proposed Project route, between Mile 17.5 and Mile 20.3 of the proposed Project route, so that Alternative 4 diverts from the proposed route at Mile 17.5 and re-joins it at Alternative 4 Mile 20.6. The purpose of this re-route is to circumvent the Veluzat Motion Picture Ranch within the ANF. Alternative 4 is 0.3 miles longer than the proposed Project and would require 2.5 miles of new designated Utility Corridor through the ANF, of which one mile is on NFS lands, in addition to 1.1 mile of new ROW at Antelope Substation. The segment of transmission line affected by the re-route for this alternative would be located in the same general area as the proposed Project. Therefore, the same overall hydrologic features and distinctions are applicable to Alternative 4 as the proposed Project. Alternative 4 would have the same affected environment described for the proposed Project in Section C.8.1 and summarized in Section C.8.6.1.

### **C.8.9.2 Impacts and Mitigation Measures**

#### **Violation of a water quality or water discharge requirement (Criterion HYD1)**

Construction activities for Alternative 4 would include land disturbance expected to result in soil erosion and sedimentation with the potential to degrade water quality in the surrounding area (Impact H-1). As described in Section B.4.4, Alternative 4 follows the same route as the proposed Project except for a 3.1-mile segment between Mile 17.5 and Mile 20.3 of the proposed Project route. As indicated in Table B.4-23 (Summary of Components of the Proposed Project and Alternatives) Alternative 4 would require one additional transmission tower, 1.48 additional miles of new or improved spur roads, and 0.1 mile less of new or improved access roads than the proposed Project. In terms of total land disturbance, Alternative 4 would affect 3.7 more acres than the proposed Project, as a direct result of the 3.1-mile re-route. The overall topography, terrain, soil types, and EHR classifications found along the portion of Alternative 4 are the same as for the proposed Project. For

instance, Table C.5-2 (Major Soils along the Proposed Antelope-Pardee 500-kV Transmission Line Route) shows that along the proposed Project route within the ANF, there are three dominant soil types present which all are classified as Severe EHR: Lodo-Modesto, Calcixerollic Xerochrepts-Calleguas, and Trigo-Exchequer. In comparison, Table C.5-14 (Major Soils along the Alternative 4 Route) shows that along the portion of Alternative 4 which is different from the proposed Project, the dominant soil type is Calcixerollic Xerochrepts-Calleguas, which is consistent with the soil type and stability for this portion of the proposed Project. Therefore, soil erosion and sedimentation from construction activities for Alternative 4 would be the same as the proposed Project and would have the potential to degrade water quality in nearby or downstream waterways.

APMs GEO-2 and GEO-3 would be implemented to facilitate understanding of site-specific geologic conditions and to minimize erosion from construction. To strengthen these APMs from Section C.5 (Geology) and further reduce potential impacts of soil erosion, Mitigation Measures G-1 (Protect against Slope Instability), G-2 (Minimization of Soil Erosion), and R-4 (Permanent Closure and Re-vegetation of Construction Roads) would also be implemented. Due to the known land disturbance that would occur for Alternative 4, APMs HYD-2 and HYD-3 would be incorporated into the project description to require a SWPPP and an erosion and sediment transport control plan, which are described for the proposed Project in Section C.8.5. Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~, H-1b (Maximum Road Gradient), H-1c (Road Surface Treatment), ~~H-1d (Timing of Construction Activities)~~, H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), and H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris) would also be implemented to reduce Impact H-1 for Alternative 4 to a less-than-significant level (**Class II**).

Alternative 4 would be the same as the proposed Project with regards to the potential occurrence of an accidental spill or release of harmful materials during construction that could impact water quality (Impact H-2) through direct contamination or through infiltration. APMs HYD-4 through HYD-6 would be used to reduce the potential impact of accidentally spilled materials on water quality. In addition, a spill plan related to activities on NFS lands would be submitted to the Forest Service for approval and attached to the required Special Use authorization. To strengthen APMs HYD-4 through HYD-6, the following mitigation measures would also be implemented: Mitigation Measures PH-1a (Environmental Training and Monitoring Program), PH-1b (Hazardous Substance Control and Emergency Response Plan), PH-1c (Proper Disposal of Construction Waste), and PH-1d (Emergency Spill Supplies and Equipment). With the implementation of these mitigation measures, which are fully discussed in Section C.6 (Public Health and Safety), Impact H-2 for Alternative 4 would be less than significant (**Class II**).

Alternative 4 would also be the same as the proposed Project with regards to the potential occurrence of an accidental spill or release of harmful materials during operation and maintenance activities that could impact water quality (Impact H-3) through direct contamination or through infiltration. APMs HYD-4 through HYD-6 would be utilized. Impact H-3 for Alternative 2 would be less than significant with no mitigation recommended (**Class III**).

### **Interference with groundwater supply and recharge (Criterion HYD2)**

Excavation activities associated with construction and operation of Alternative 4 have the potential to disturb groundwater resources (Impact H-4) in the vicinity of the proposed route for Alternative 4. Due to the re-route of the transmission line for Alternative 4, this alternative is approximately 0.3 miles longer than the proposed Project. The re-routed segment of Alternative 4 would be situated in the same general vicinity of the proposed Project route, on the same type of topography, and with the same hydrologic characteristics. Therefore, despite the slightly increased length of Alternative 4 and due to its vast similarities with the proposed Project, Impact

H-4 would be the same as the proposed Project, described in Section C.5.8. APMs incorporated into the project description would help to minimize Impact H-4 for Alternative 4 (Section C.8.5, Impact H-4). Implementation of Mitigation Measure H-4 (Develop and Implement a Groundwater Remediation Plan) would reduce Impact H-4 for Alternative 4 to a less than significant level (**Class II**).

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

The construction of Alternative 4 would introduce new impervious surfaces that could increase surface water runoff (Impact H-5). As described above in the discussion for Impact H-1, the proposed route for Alternative 4 is situated in an area characterized by the same topography, terrain, soil types, and erosion hazards as the proposed Project route. As such, existing and natural surface water runoff patterns in the Project area are the same for Alternative 4 as for the proposed Project. In addition, the infrastructure associated with Alternative 4 is the same as the proposed Project, with the exception that Alternative 4 would require one additional single-circuit 500-kV transmission tower and 1.48 additional miles of new or improved spur roads than the proposed Project. The one additional tower would not affect the Project's potential effect of surface water runoff due to new impervious areas. Implementation of APMs HYD-2, HYD-3, and HYD-4 would include development of a SWPPP and erosion control plan to minimize any potential increases in surface runoff from new roads. Therefore, Alternative 4 would be the same as the proposed Project with regards to its potential to cause increased surface water runoff from the creation of new impervious areas. As discussed above for the proposed Project, construction and operation activities for Alternative 4 would not alter the existing drainage pattern or significantly increase surface runoff. ~~Implementation of APMs HYD 2, HYD 3, and HYD 4 would include development of a SWPPP and erosion control plan to minimize any potential increases in surface runoff from new roads.~~ Impact H-5 for Alternative 4 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)**

Alternative 4 would be the same as the proposed Project with regards to the potential to create new runoff which could overload a local stormwater drainage system (Impact H-6). As described above for Criterion HYD3, Alternative 4 would not introduce a significant new source of surface water runoff as a result of new impervious areas. Although 2.5 miles of the 3.1-mile re-route of Alternative 4 would be situated within a new designated Utility Corridor, the transmission towers would be located along the same terrain as the proposed Project and the same Project infrastructure would be used for Alternative 4 as for the proposed Project. Impact H-6 for Alternative 2 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)**

Alternative 4 would be to the same as the proposed Project with regards to flood hazards created through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse (Impact H-7). Implementation of the construction standards and approvals recommended by Mitigation Measure H-7 (Aboveground Structures shall be Protected Against Flood and Erosion Damage) would ensure that any potential impacts of the placement of transmission towers in Flood Hazard Areas such as those described in Section C.8.1 would be less than significant (**Class II**).

### **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 Alternative 4 would have the potential to cause the failure of a levee or dam. People and/or structures would not be exposed to flooding as a result of the failure of a levee or dam associated with Alternative 4. No impact would occur.

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

No impacts or damage would occur from inundation by tsunami or seiche. However, as with the proposed Project, heavy rains could result in potentially damaging mudflow events with Alternative 4. Thus, mudflow hazards could be created through the placement of permanent, aboveground structures (Impact H-8). The potential Impact H-8 for Alternative 4 would be reduced to a less-than-significant level with the implementation of Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), H-1b (Timing of Construction Activities), H-1bc (Maximum Road Gradient), H-1cd (Road Surface Treatment), H-1d (Timing of Construction Activities), H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris), and H-7a (Aboveground Structures shall be Protected Against Flood and Erosion Damage). Impact H-8 for Alternative 4 would be less than significant with mitigation incorporated (Class II).

## **C.8.10 Alternative 5: Antelope-Pardee Sierra Pelona Re-Route**

### **C.8.10.1 Affected Environment**

Alternative 5 diverts from the proposed Project route for all but the final few miles of the route. Upon leaving Antelope Substation, Alternative 5 would travel due-south, circumventing the ANF to the east. Alternative 5 would traverse approximately 0.5 miles of NFS lands in the ANF in Leona Valley. Alternative 5 would also cross through NFS lands located outside the ANF congressional boundary from approximately Mile 17.1 to Mile 17.4 and Mile 17.7 to Mile 18.4 of the proposed route. This alternative would travel south for approximately 18.8 miles before entering the Vincent-Pardee ROW and heading west, toward Pardee Substation. Within the Vincent-Pardee ROW, Alternative 5 would include the removal of an existing set of single-circuit transmission towers and the installation of double-circuit 500-kV towers in their place. The 500-kV transmission line from the removed set of towers and the 500-kV transmission line for Alternative 5 would both be strung on the new double-circuit towers for approximately 18.8 miles, ending at Pardee Substation. The final 5.3 miles of Alternative 5, just before Pardee Substation, would be the same as the proposed Project. As with the proposed Project and other alternatives, Alternative 5 would include the removal of 119 66-kV transmission towers (86 on NFS lands, 33 off NFS lands) and associated infrastructure currently occupying SCE's Saugus Del Sur utility corridor.

Alternative 5 would cross the California Aqueduct, Amargosa Creek, and the upper portion of Bouquet Canyon Creek within the Antelope Valley Watershed. The proposed route would enter the Santa Clara River Watershed around Mile 7.0 (Figure C.8-1) and remain in this watershed until the end of the route at Pardee Substation. After Alternative 5 turns west in the Vincent-Pardee ROW, the transmission line would cross Mint Canyon Creek, Bouquet Canyon Creek (for the second time), Haskell Canyon Creek, and the Los Angeles Aqueduct, before tying into Pardee Substation. Alternative 5 would cross over the Antelope Valley Groundwater Basin for approximately 7.0 miles after it leaves Antelope Substation and the Santa Clara Valley East Groundwater Basin for roughly 9.0 miles before it connects to Pardee Substation.

## C.8.10.2 Impacts and Mitigation Measures

### Violation of a water quality or water discharge requirement (Criterion HYD1)

Construction activities and associated land disturbance along the 37.2-mile proposed route for Alternative 5 are expected to create soil erosion and sedimentation which could result in the degradation of water quality in nearby and downstream waterways (Impact H-1). As described above and in Section B.4.5, the proposed route for Alternative 5 differs almost entirely from the proposed Project and other alternatives, with the exception of the two main substation facilities and the final 3.3 miles of the Alternative 5 route. Alternative 5 is approximately 11.6 miles longer than the proposed Project and would include construction of 56 more transmission towers than the proposed Project, as indicated in Table B.4-23 (Summary of Components of the Proposed Project and Alternatives).

The terrain along the proposed Alternative 5 route varies largely from flat, urban areas to potentially steep hillside areas. For instance, transmission towers would be constructed on generally flat land for roughly the first two miles, from Antelope Substation to the northern side of the Sierra Pelona Ridge. Transmission towers would be situated on hillsides where the proposed route traverses the Sierra Pelona Ridge between approximately Mile 2.5 and Mile 4.5. Some towers for Alternative 5 may also be situated on hillsides as the proposed route travels through rolling hills between the Leona Valley area (south of Sierra Pelona Ridge) and the existing Vincent-Pardee corridor. Within the existing Vincent-Pardee corridor, the terrain is largely flat or with a low gradient and some rolling hills. The construction of hillside towers increases the potential for soil erosion and sedimentation that could impact water quality.

As described in Section C.5 (Geology and Paleontology) and indicated in Table C.5-16 (Major Soils along Alternative 5), all of the soils present along the proposed route for Alternative 5 have an EHR of Moderate to Severe. A comparison of Table C.5-16 with the other soil type tables portrayed in Section C.5 indicates that the proposed route for Alternative 5 crosses through a greater variety of soil types than the proposed Project and other alternatives. However, EHR classifications along the route are consistent with the proposed Project and other alternatives and are expected to contribute to soil erosion and sedimentation during construction activities. These construction activities would include modifications to Antelope Substation and Pardee Substation, preparation of transmission tower, installation of transmission towers, and stringing of transmission line along the length of the route.

Construction of Alternative 5 would include both temporary and permanent land disturbance that is expected to cause soil erosion and sedimentation. For instance, as indicated in Table B.4-21 (Estimates of Land Disturbance for Alternative 5), 28 pulling set-ups and 22 splicing set-ups would be established on non-NFS lands; although these areas would be restored upon completion of construction, they would cause approximately 6.54 acres of temporary land disturbance. This land disturbance would occur along the length of the proposed route and is expected to cause soil erosion and sedimentation, depending on site-specific conditions. Also as indicated in Table B.4-21, Alternative 5 would introduce permanent land disturbance through the construction or improvement of 2.51 miles of spur roads (0.12 on NFS lands) and 9.48 miles of access roads (1.15 on NFS lands). Areas of temporary land disturbance would introduce short-term soil erosion and sedimentation, whereas areas of permanent land disturbance would potentially introduce ongoing soil erosion issues, with both aspects of land disturbance having the potential to degrade water quality.

As with the proposed Project and other alternatives, Alternative 5 would include the removal of 119 existing 66-kV towers from the Saugus-Del Sur utility corridor in the ANF. Since Alternative 5 follows an entirely different alignment than the proposed Project and other alternatives, this removal of existing infrastructure within the ANF (along the proposed Project alignment) would introduce potential impacts from Alternative 5 in

multiple locations. However, the removal of these 66-kV transmission towers would require minimally invasive construction activities and would not contribute to the potential for Impact H-1 to occur in association with Alternative 5. In addition, construction of Alternative 5 would include the replacement of 13.1 miles of existing single-circuit 500-kV transmission towers in the Vincent-Pardee corridor with double-circuit 500-kV transmission towers in the same corridor position. The construction activities required for replacement of these towers are not expected to cause significant soil erosion and sedimentation that could contribute to the degradation of water quality.

APMs GEO-2 and GEO-3 would be used to facilitate understanding of site-specific geologic conditions along the route. To strengthen these APMs from Section C.5 (Geology) and to reduce potential impacts of soil erosion, Mitigation Measures G-1 (Protect against Slope Instability), G-2 (Minimization of Soil Erosion), and R-4 (Permanent Closure and Re-vegetation of Construction Roads) would also be implemented. APMs HYD-2 and HYD-3 would be utilized to require a SWPPP and an erosion and sediment transport control plan, which are described for the proposed Project in Section C.8.5. Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~, H-1b (Maximum Road Gradient), H-1c (Road Surface Treatment), ~~H-1d (Timing of Construction Activities)~~, H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), and H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris) would also be implemented to strengthen the requirements of the SWPPP and further address construction-related erosion and sedimentation concerns. Therefore, with the incorporation of these mitigation measures, Impact H-1 for Alternative 5 would be less than significant (**Class II**).

The accidental spill or release of harmful materials used during construction of Alternative 5 could impact surface water quality and/or groundwater quality (Impact H-2) through direct contamination or through infiltration. As described above in Section C.8.11.1, the overhead transmission lines associated with Alternative 5 would traverse multiple waterways. In addition, Alternative 5 would cross an estimated 4 valley washes and 15 mountain streams along the length of its route, with “valley wash” referring to a dry streambed that may have only occasional flow and “mountain stream” referring to an unnamed stream, creek, or wash located in hilly or mountainous terrain. Any of these waterways could be directly or indirectly affected through the accidental release of potentially hazardous materials along the route for Alternative 5. Therefore, APMs HYD-4 through HYD-6 would be used to reduce the potential impact of accidentally spilled materials on water quality. In addition, a spill plan related to activities on NFS lands would be submitted to the Forest Service for approval and attached to the required Special Use authorization for the approximate one mile of Alternative 5 which would be situated on NFS lands. To strengthen APMs HYD-4 through HYD-6, the following mitigation measures would also be implemented: Mitigation Measures PH-1a (Environmental Training and Monitoring Program), PH-1b (Hazardous Substance Control and Emergency Response Plan), PH-1c (Proper Disposal of Construction Waste), and PH-1d (Emergency Spill Supplies and Equipment). With the implementation of these mitigation measures, which are fully discussed in Section C.6 (Public Health and Safety), Impact H-2 for Alternative 5 would be less than significant (**Class II**).

The accidental spill or release of harmful materials used during operational and maintenance activities for Alternative 5 could also impact surface water quality and/or groundwater quality (Impact H-3) through direct contamination or through infiltration. The same operational and maintenance activities would be associated with Alternative 5 as with the proposed Project. As described in Section B.2.3 (Facility Operations and Maintenance), operation and maintenance of the proposed Project would involve a periodic inspection (e.g., once per year) via helicopter and truck. Maintenance of the transmission lines would be performed on an as-needed basis, and would include maintenance of access roads and erosion/drainage control structures (SCE, 2004). As with Impact H-2, described above, APMs HYD-4 through HYD-6 would be utilized for Alternative

5. Impact H-3 for Alternative 5 would be the same as for the proposed Project, and this potential impact would be less than significant with no mitigation recommended (**Class III**).

### **Interference with groundwater supply and recharge (Criterion HYD2)**

There are two areas along the length of the route for Alternative 5 where project-related excavation activities could disturb existing groundwater resources (Impact H-4), subsequently introducing the potential to interfere with groundwater supply and recharge. Alternative 5 would be routed within the boundaries of the Antelope Valley Groundwater Basin for approximately the first 7.0 miles after leaving Antelope Substation, and within the boundaries of the Santa Clara Valley East Groundwater Basin for approximately the final 9.0 miles before its terminus at Pardee Substation. Excavation activities for Alternative 5 would consist of drilling for the installation of new transmission tower foundations and grading for expansion of Antelope Substation. It is unlikely that excavation activities associated with Alternative 5 would interfere with the overall groundwater supply and recharge of the underlying basins. However, there is the potential for some exposure of groundwater resources to occur, even during minimal excavation. Implementation of APMs HYD-2 through HYD-6, which is incorporated into the project description for Alternative 5, would minimize the potential for groundwater disturbance. With the implementation of Mitigation Measure H-4 (Develop and Implement a Groundwater Remediation Plan) Impact H-4 for Alternative 5 would be reduced to a less-than-significant level (**Class II**).

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

The construction of Alternative 5 would introduce new impervious surfaces which may increase surface water runoff (Impact H-5). During construction of overhead transmission lines and substation modifications, activities such as grading and soil compaction for the hillside towers and spur roads would introduce new impervious areas. As discussed in Section B.4.5, Alternative 5 would travel in a new utility ROW (designated Utility Corridor on NFS lands) from Antelope Substation to approximately Mile 18.8, at which point the transmission line would enter the existing Vincent-Pardee corridor and travel west, to Pardee Substation.

The new transmission line for Alternative 5 would traverse the Portal Ridge mountain range from just before Mile 3.0 to just after Mile 4.0. Transmission towers constructed on hillside locations may require the grading of level transmission tower pads. In addition, as indicated in Table B.4-21 (Estimates of Land Disturbance for Alternative 5), this alternative would introduce permanent land disturbance through the construction or improvement of 2.51 miles of spur roads (0.12 on NFS lands) and 9.48 miles of access roads (1.15 on NFS lands). Spur roads constructed on steep slopes would be cut in a switchback pattern, which greatly increases the land disturbance and new impervious area, in comparison with spur roads that extend directly from the access road to the transmission tower site. Although exact tower locations would be determined in the final engineering plan, it is possible that at least one transmission tower would be situated on a steep hillside within the portion of Alternative 5 that traverses the Sierra Pelona mountains.

Between Antelope Substation at Mile 0.0 and the Vincent-Pardee ROW (designated Utility Corridor on NFS lands) at Mile 18.8, Alternative 5 would introduce new impervious area through the construction of transmission towers and tower pads, some of which would be situated on hillside locations in the Sierra Pelona range, as the construction of new spur roads and improvement of existing roads. From Mile 18.8 to its terminus at Mile 37.2, Alternative 5 would replace existing infrastructure within the Vincent-Pardee corridor, stringing both an existing transmission line and the proposed line for Alternative 5 on one set of double-circuit towers and removing the existing set of single-circuit towers. In doing so, Alternative 5 would not create new impervious area for this portion of the route.

Alternative 5 would cause a significant increase in impervious areas attributable to the construction of new transmission line infrastructure in a new utility ROW (designated Utility Corridor on NFS lands) for 18.8 miles, from Mile 0.0 to Mile 18.8 of the route (Impact H-5). ~~Although~~ As described above, Alternative 5 would not cause ~~an significant~~ increase in impervious areas between Mile 18.8 and Mile 37.2 of the route due to the existing infrastructure. However, this alternative is still expected to increase surface water runoff due to the introduction of other new impervious areas ~~described above~~. Mitigation Measure H-5a (Permeability of Ground Cover) would be implemented in all areas where soil compaction or imported ground cover materials may be required; for instance, on spur roads leading to hillside tower locations and on leveled or graded transmission tower pads. The implementation of Mitigation Measure H-5 would reduce Impact H-5 for Alternative 5 to a less-than-significant (Class II) level.

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

As described above for Criterion HYD3, Alternative 5 would introduce some new impervious surfaces that would increase surface water runoff. Increased runoff could potentially result in the overloading of a local stormwater drainage system (Impact H-6). Surface water runoff is directly linked to the permeability of ground cover. The portion of Alternative 5 that is expected to cause increased surface runoff, between Mile 0.0 and Mile 18.8, as described above, is predominately characterized by undeveloped areas, which are not serviced by stormwater drainage systems. Stormwater drainage systems currently exist along several segments of this 18.8-mile portion of Alternative 5, for instance in the vicinity of Antelope Substation and the Ritter Ranch planned community. As discussed above for Criterion HYD3, Alternative 5 would not introduce a significant amount of new surface water runoff. Therefore, although runoff generated by Alternative 5 may enter an existing stormwater drainage system, such systems would not be overloaded in capacity from Project-related runoff. Impact H-6 for Alternative 5 ~~4~~ 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)**

Alternative 5 could create a flood hazard through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse (Impact H-7). None of the infrastructure associated with Alternative 5 would be situated in a watercourse. As described in the affected environment for Alternative 5, this alternative would cross through both the Antelope Valley Watershed and the Santa Clara River Watershed. Alternative 5 would cross Bouquet Canyon Creek north of Bouquet Reservoir, in the Antelope Valley Watershed, and again south of the reservoir, in the Santa Clara River Watershed. Alternative 5 would also cross Mint Canyon Creek roughly between Mile 24.5 and Mile 25.5. Additionally, Alternative 5 would run parallel to the Santa Clara River for the final 12.3 miles of the route, within approximately 2.0 miles of the waterway. Implementation of the construction standards and approvals recommended by Mitigation Measure H-7 (Aboveground Structures shall be Protected Against Flood and Erosion Damage) would ensure that any potential impacts associated with the placement of transmission towers in Flood Hazard Areas, such as those described in Section C.8.1, would be less than significant (Class II).

#### **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 Alternative 5 would have the potential to cause the failure of a levee or dam. People and/or structures would not be exposed to flooding as a result of the failure of a levee or dam associated with Alternative 5. No impact would occur.

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

Alternative 5 would not be the cause of damage occurring from inundation by tsunami or seiche. However, as with the proposed Project, heavy rains could result in potentially damaging mudflow events with Alternative 5. Thus, mudflow hazards could be created through the placement of permanent, aboveground structures (Impact H-8). Impact H-8 for Alternative 5 would be reduced to a less-than-significant level with the implementation of Mitigation Measures H-1a (Implementation of Erosion and Sediment Best Management Practices), ~~H-1b (Timing of Construction Activities)~~, H-1**c** (Maximum Road Gradient), H-1**d** (Road Surface Treatment), ~~H-1d (Timing of Construction Activities)~~, H-1e (Dispersion of Subsurface Drainage from Slope Construction Areas), H-1f (Control of Sidecast Material, Right-of-Way Debris and Roadway Debris), and H-7a (Aboveground Structures shall be Protected Against Flood and Erosion Damage). Impact H-8 for Alternative 5 would be less than significant with mitigation incorporated (Class II).

### C.8.11 No Project/No Action Alternative

Selection of the No Project/Action Alternative would mean that neither the Antelope-Pardee 500-kV Transmission Project, nor any of its alternatives, would be implemented. As such, none of the associated construction, operation, and maintenance activities would occur and none of the impacts described in Section C.8 would occur. However, selection of the No Project/No Action Alternative would still result in impacts to hydrology and water quality resources.

As described in Section B.4.8, a variety of activities may be reasonably expected to occur if the No Project/No Action Alternative is selected; many of these activities would have associated impacts to hydrology and/or water quality. Following is a list of actions that would reasonably occur under the No Project/No Action Alternative and that would have impacts to hydrology and water quality:

- Proponents of initial wind projects in the Tehachapi area would find alternate means to connect to SCE's transmission system without compromising system reliability.
- The California RPS goal of 20 percent renewables by 2010 would not be achieved using Tehachapi-area wind resources. Other renewable energy resources would need to be identified and transmission studies conducted to connect these other, currently unidentified, sources to the transmission grid.
- SCE would need to accommodate the power load by upgrading existing transmission infrastructure or building new transmission facilities along a different alignment.
- Developers of wind generation facilities would build their own transmission facilities to connect to the transmission grid.

Each of the actions described above would involve the construction of transmission infrastructure that should be expected to affect NFS lands as well as non-NFS lands. Because detailed descriptions of these actions are not available, it is not possible at this time to determine what specific impacts to hydrology and water quality would occur. As such, it is not possible to make assumptions about what site-specific impacts to hydrology and water quality would occur as a result of the construction of a new transmission line along a route that is different from the proposed Project and alternatives to the proposed Project. However, it can be reasonably assumed that because the actions listed above would involve transmission line construction, some of the impacts to hydrology and water quality would be the same as the proposed Project. It can also be reasonably assumed that additional, site-specific impacts which would not be introduced through the proposed Project or alternatives would be introduced through the actions listed above.

### C.8.12 Impact and Mitigation Summary

The following table (Table C.8-6) presents a summary of all impacts and associated significance classifications that would occur for the proposed Project and each of the alternatives to the proposed Project. Table C.8-6 also indicates the mitigation measures that would be implemented for each relevant impact. Only the mitigation measure numbers are displayed. Descriptions of the mitigation measures are provided in the preceding sections.

Impact	Impact Significance					
	Proposed Project	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
<b>H-1:</b> Soil erosion and sedimentation caused by construction activities would degrade water quality.	Class II G-1 - G-2*, R-4**, H-1a - H-1f	Class II G-1 - G-2*, R-4**, H-1a - H-1f				
<b>H-2:</b> Degradation of surface water or groundwater quality would occur from the accidental release of potentially harmful materials during construction activities.	Class II PH-1a – PH-1d***	Class II PH-1a – PH-1d***, H-4	Class II PH-1a – PH-1d***			
<b>H-3:</b> Degradation of surface water or groundwater quality would result from the accidental release of potentially harmful materials during operational activities.	Class III None	Class II PH-1a – PH-1d***, H-4a	Class III None	Class III None	Class III None	Class III None
<b>H-4:</b> Disturbance of existing groundwater resources through project-related excavation activities.	Class II H-4	Class II H-4	Class II H-4	Class II H-4	Class II H-4	Class II H-4
<b>H-5:</b> Increased runoff from the creation of new impervious areas.	Class III None	Class II H-5	Class II H-5	Class III None	Class III None	Class III H-5 <del>None</del>
<b>H-6:</b> Runoff introduced as a result of permanent Project features would cause the overloading of a local stormwater drainage system.	Class III None	Class III None	Class III None	Class III None	Class III None	Class III None
<b>H-7:</b> Flood hazards created through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse.	Class II H-7	Class II H-7	Class II H-7	Class II H-7	Class II H-7	Class II H-7
<b>H-8:</b> Mudflow hazards created through the placement of permanent aboveground structures.	Class II H-1a – H-1f	Class II H-1a – H-1f	Class II H-1a – H-1f	Class II H-1a – H-1f	Class II H-1a – H-1f	Class II H-1a – H-1f

**Class I** = Significant and unavoidable impact; **Class II** = Significant but mitigated to a less-than-significant level; **Class III** = Less-than-significant impact; **Class IV** = Beneficial impact.

\* Please see Section C.5.5, Geology, Soils, and Paleontology, Proposed Project/Action, Mitigation Measure G-1 (Protect against Slope Instability), G-2 (Minimization of Soil Erosion).

\*\* Please see Section C.9.5, Land Use, Proposed Project/Action, Mitigation Measure R-4 (Permanent Closure and Re-vegetation of Construction Roads).

\*\*\* Please see Section C6.5, Public Health and Safety, Proposed Project/Action, Mitigation Measure PH-1a (Environmental Training and Monitoring Program), PH-1b (Hazardous Substance Control and Emergency Response Plan), PH1-c (Proper Disposal of Construction Waste), PH1-d (Emergency Spill Supplies and Equipment).

## C.8.13 Cumulative Effects

### C.8.13.1 Geographic Extent

As discussed in Section C.8.1.2 (Surface Hydrology), the State of California uses a hierarchical naming and numbering convention to define watershed boundaries on multiple levels and to facilitate interagency planning efforts. The geographic scope of cumulative effects for hydrology and water quality includes the area encompassed by the combined boundaries of the Hydrologic Sub-Areas (HSAs), which are traversed by the proposed Project and alternatives, as listed below in Table C.8-7. As described in Table C.8-1 (State of California Watershed Hierarchy Naming Convention), HSAs are defined as a major segment of a Hydrologic Area (HA) with similar, significant geographical characteristics or hydrological homogeneity. As with sub-watersheds, HSAs are typically similar in geology and hydrology. HSA boundaries are appropriate to represent the geographic extent of this cumulative effects analysis because their combined area includes all major hydrologic features that would be directly affected by the proposed Project or any of the Project alternatives.

Table C.8-7 indicates that five HSAs are affected by the proposed Project and alternatives. See Figure C.8-4. One of these HSAs is located in the South Lahontan HR, the Antelope HU, and the Lancaster HA, while four of the HSAs are located in the South Coast HR, the Santa Clara-Calleguas HU, and the Upper Santa Clara HA. The entire area of this geographic scope is approximately 1,489 square miles or 951,617 acres.

HSA	State ID#	Sq. Miles	Acres	Hydrologic Area	Hydrologic Unit	Hydrologic Region
Lancaster	626.50	870	556,348	Lancaster	Antelope	South Lahontan
Bouquet	403.52	12	7,377	Upper Santa Clara	Santa Clara-Calleguas	South Coast
Sierra Pelona	403.54	16	10,046	Upper Santa Clara	Santa Clara-Calleguas	South Coast
Acton	403.55	138	88,189	Upper Santa Clara	Santa Clara-Calleguas	South Coast
Eastern	403.51	453	289,657	Upper Santa Clara	Santa Clara-Calleguas	South Coast

Sources: IWMC, 2004; CSUC, 2006

The Lancaster HSA includes Antelope Substation and the Eastern HSA includes Pardee Substation. The proposed Project route and the proposed routes for Alternatives 1 through 4 traverse the Lancaster HSA, the Bouquet HSA, and the Eastern HSA. The proposed route for Alternative 5 traverses the Lancaster HSA, the Mint Canyon HSA, the Sierra Pelona HSA, the Acton HSA, and the Eastern HSA. Although the underlying groundwater basins are only partially bounded by the HSAs described in Table C.8-7 and above, any potential impacts to groundwater resources will be fully considered in this cumulative effects discussion.

### C.8.13.2 Existing Cumulative Conditions

This section discusses the past projects that have occurred in the cumulative analysis area, in addition to ongoing and future projects on NFS lands and non-NFS lands in the area. A wide variety of past, present, and reasonably foreseeable future development projects contribute to the cumulative conditions for hydrology and water quality in the Project area. A discussion of cumulative projects in the Project area is provided in Section B.5 (Cumulative Impacts Scenario). Consideration of the projects identified in Section B was used to develop this analysis of cumulative effects on hydrology and water quality.

#### Past and Existing Projects

Population growth and urban sprawl on non-NFS lands have caused significant alterations to natural water systems in the Project area. Hydrology and water quality are affected by two main types of projects: 1) water projects such as dams and diversions for the purpose of generating supply; and 2) development projects, such as

homes, businesses, and roadways, which alter the physical features of an area. Rapid development in the north Los Angeles area, such as described in Table B.5-4, has introduced new demands for municipal water supply and both new non-point source and point source pollution, as discussed below.

Throughout southern California, water development projects have historically been introduced, accompanying the spread of development both locally and regionally. The SWP (see Section C.8.1.2) has affected California's natural hydrology State-wide and includes infrastructure in the proposed Project area, which contributes to the existing cumulative conditions. The SWP is a complex system of facilities, including pumping and power plants, reservoirs and storage tanks, canals, tunnels, and pipelines, which are used to deliver water to southern

California consumers. Many communities in southern California are completely reliant upon the SWP for their water supply. Two important water-conveyance features are the SWP's California Aqueduct and LADWP's Los Angeles Aqueduct. In the vicinity of the Project area, the former is contained within concrete channels and pipes and the latter is in pipes. The proposed Project and each of the alternatives would cross both the California Aqueduct and the Los Angeles Aqueduct. The California Aqueduct is 444 miles long and transports water south for both the State Water Project and the federal Central Valley Project. The Los Angeles Aqueduct is 223 miles long and transports water to the southern California market from the Owens Valley, to the north.

In addition to the California Aqueduct and the Los Angeles Aqueduct, other major water development projects in the area include Lake Palmdale (Lancaster HSA), Bouquet Reservoir (Bouquet HSA), Castaic Lake (Eastern HSA), and a variety of other dams, reservoirs, and diversion projects throughout the five watershed areas shown in Table C.8-7. Bouquet Reservoir and Castaic Lake are both located on NFS lands, as described in Section B.5.4 (Cumulative Projects on NFS Lands). The Santa Clara River, which runs through both NFS lands and non-NFS lands in the Lancaster HSA, the Acton HSA, and the Eastern HSA, is one of only two free-flowing natural river systems remaining in southern California (FSCR, 2005). The Santa Clara River was selected by American Rivers, a national non-profit organization, as one of the nation's most endangered rivers. Other waterways, rivers, and creeks in the Project area are described in Section C.8.1.

A list of existing projects within five miles of the proposed Project route is found in Table B.5-1 (Cumulative Projects List) and the corresponding location of these projects is shown on Figures B.5-1a and B.5-1b. Although a five mile radius around the proposed route does not cover the entire cumulative effects area for hydrology and water quality, as defined by the HSAs in Table C.8-7, the projects identified in this list are representative of the ongoing project type and density throughout the cumulative effects area (on non-NFS lands). For instance, Table B.5-1 indicates that the vast majority of ongoing projects are residential developments and Figures B.5-1a and B.5-1b show that the projects listed in Table B.5-1 are concentrated in and around community developments, such as Lancaster and Santa Clarita. Furthermore, the population growth estimates portrayed in Figure B.5-4 indicate that rapid population growth has not only occurred in the past, but it is ongoing and expected to continue into the future. Therefore, it is reasonably assumed that ongoing projects not within five miles of the proposed Project are concentrated in and around community areas and are characterized primarily by residential developments.

The past and existing projects discussed above have multiple impacts hydrology and water quality, including the following:

- Introduction of a new demand for municipal water supply
- Alteration of the landscape and therefore surface water runoff rates and volumes
- Alteration of the hydrological characteristics of surface water and groundwater features through the introduction of underground and above-ground infrastructure related to development

- Contribution to the degradation of surface water quality and groundwater quality through encroachment on waterways, generation of residential and commercial waste, and introduction of potentially hazardous substances to stormwater runoff

Water quality concerns largely stem from past and present non-point sources of pollution, which include activities related to construction, agriculture (particularly livestock grazing), and stormwater runoff, such as from roadways. Stormwater runoff carries sediment and a variety of contaminants from non-point sources into the surrounding surface waterways. The Upper Santa Clara River in the Santa Clara River Watershed is on the 2002 Section 303(d) list for the following contaminants: chloride, coliform, nitrate, and nitrite. These water quality problems are dominantly attributable to the cumulative impacts of agricultural runoff and increasing development, such as in the City of Santa Clarita.

Groundwater quality in both the Antelope Valley Groundwater Basin and the Santa Clara Valley East Groundwater Basin has been cumulatively impacted by inorganic compounds and pesticides, generated through the spread of development and agriculture. Groundwater in both basins exceeds the Maximum Contaminant Levels for multiple constituents. Pollutants in these groundwater basins reach the water table via infiltration through the alluvial fan systems located at the base of surrounding mountains and hills. Groundwater in the area is withdrawn for municipal, industrial, and irrigation purposes. Groundwater levels in the Santa Clara Valley East Groundwater Basin remained relatively steady between 1970 and 2000 (DWR, 2006). In contrast, groundwater level trends in the Antelope Valley Groundwater Basin changed from an increase of 84 feet in 1975 to a decrease of 66 feet in 1998 (DWR, 2004). This change was likely due to over-use of the groundwater resources, possibly combined with declining recharge rates.

In contrast with projects on non-NFS lands, which are dominated by housing and community developments, development on NFS lands is characterized by non-housing projects, such as communication and utility infrastructure, roadways, water storage, and recreational facilities such as trails and campgrounds. Section B.5.4 (Cumulative Projects on NFS Lands) describes the past and existing projects that have contributed to cumulative conditions on NFS lands. Several major water projects including Bouquet Reservoir, Castaic Lake, and Pyramid Lake, which are all man-made reservoirs, have significantly impacted the area's hydrology by creating new water storage areas and causing alterations in drainage patterns both upstream and downstream from these storage areas. Past roadway projects on NFS lands have also had significant impacts to hydrology. All past roadways in the area are listed in Section B.5.4 and include Bouquet Canyon Road, Interstate 5, and Sierra Highway, among others.

The projects on NFS lands have altered hydrology by increasing surface water runoff in their immediate vicinity and subsequently disrupting drainage patterns. Improperly placed and sized culverts also affect stream geomorphology by encouraging aggradation upstream of the crossings or degradation of the channel below the crossings. Aggradation refers to the build-up of the land surface due to deposition of sediment and other solid materials, whereas degradation refers to the general lowering of the land surface due to erosion and weathering.

Roadway projects have also contributed to water quality degradation through the aforementioned increased surface runoff, as well as the introduction of foreign substances, such as asphalt, tar, oil, and gasoline, among others. Similarly, mining operations such as the Bouquet Canyon Stone Company have impacted both hydrology and water quality through excavation activities, including associated erosion and sedimentation impacts.

### **Future Projects**

As discussed above and demonstrated by Table B.5-1, ongoing development throughout the cumulative effects area for hydrology and water quality is dominated by residential developments, clustered in and around community developments on non-NFS lands. This trend in residential development is also representative of

reasonably foreseeable future projects in the cumulative effects area, as supported by the aggressive population growth forecast shown in Table B.5-4. Therefore, the impacts to hydrology and water quality from past and ongoing projects, as described above, are expected to continue and increase in the future.

Table B.5-3 (Recent and Future Projects on NFS Lands) lists ongoing and proposed projects on NFS lands in the Santa Clara/Mojave Rivers Ranger District, north of Highway 14. As with the future non-NFS projects, the past and ongoing NFS projects are representative of future NFS projects. Table B.5-3 indicates that most of these projects are focused on repairs, re-establishment, or rehabilitation of existing facilities. As with past NFS developments, any projects requiring grading and earth movement activities, such as roadway improvements, would be expected to impact hydrology and water quality. Any potential impacts to hydrology and water quality associated with future projects on NFS lands are expected to be minimized through the application of the specific BMPs discussed in the NFS Pacific Southwest Region guidelines document entitled “Water Quality Management for Forest System Lands in California: Best Management Practices” (USDA, 2000).

### **C.8.13.3 Cumulative Impact Analysis**

The past, present, and reasonably foreseeable future residential projects discussed above range in size from several family units, to hundreds or even thousands of units, to entire community developments, including parks, schools, stores, and roadways. These projects, among others, have the potential to affect hydrology and water quality through activities related to construction and/or operation and maintenance. Multiple projects are situated along the tributaries to the Santa Clara River, including Haskell Canyon Creek and Bouquet Canyon Creek, in Santa Clarita. Multiple projects are also situated over the Antelope Valley Groundwater Basin and the Santa Clara Valley East Groundwater Basin. The impact and mitigation summary table for hydrology and water quality (Table C.8-5) indicates that the proposed Project and each alternative would have seven distinct impacts to hydrology and water quality. In order to determine which, if any, of these impacts would be cumulatively considerable, the incremental impacts of the Project and alternatives are considered in combination with the existing cumulative conditions, including past, present, and reasonably foreseeable projects, as described above.

Neither the proposed Project nor any Project alternatives would change or alter the existing channel or drainage pattern of any waterway or water body. In addition, they would not impact the California Aqueduct, Los Angeles Aqueduct, or other water development projects in the cumulative effects area. The Pardee Substation, which is the terminus for the proposed Project and all alternatives, is located within one mile of the Upper Santa Clara River. There are no known projects within the geographic extent of this analysis that would alter the present free-flowing characteristics of the Santa Clara River. Neither the proposed Project nor any Project alternatives would directly alter the existing hydrology or overall drainage patterns of any of the five Hydrologic Sub-Areas discussed above in Section C.8.14.1 (Geographic Extent). However, cumulative effects may have the potential to affect the hydrology and water quality within these HSAs. Below is a discussion of potential impacts that may be cumulatively considerable with regards hydrology and water quality.

- **Soil erosion and sedimentation caused by construction activities could degrade water quality (Impact H-1).** Land-disturbing activities, such as grading, excavation, and trenching, have the potential to degrade water quality through soil erosion and sedimentation. The proposed Project is expected to cause soil erosion and sedimentation that could degrade water quality but would be mitigable to a less-than-significant level. Each of the alternatives is also expected to cause soil erosion and sedimentation that could degrade water quality but would be mitigable to a less-than-significant level. When considered cumulatively with other proposed or ongoing projects, such as those described in Table B.5-1, it is possible that incremental effects of the proposed Project or alternatives could combine with similar impacts of multiple other projects in the area. This combination of impacts would occur if it is known or reasonably foreseeable that at least one other project would introduce the same impact as described by Impact H-1 and that additional impact would affect the same waterway as the proposed Project or alternative. As

indicated by Table B.5-1 and Figure B.5-1b, a Draft EIR is currently<sup>4</sup> being prepared for the Meadow Peak Project (#3 on Figure B.5-1), which is located along Haskell Canyon Creek and the proposed Project alignment. This portion of the proposed Project alignment would be the same for Alternatives 1, 2, and 3. Alternatives 4 and 5 would circumvent this particular segment of Haskell Canyon Creek, but they would both introduce Impact H-1 to other segments of Haskell Canyon Creek. As described in Table B.5-1, the Meadow Peak Project is a community development that includes 479 single-family residential lots, an elementary school, public and private park areas, public streets, and one water tank lot, which would accommodate two 1 million gallon water tanks. The construction of this proposed development would include land-disturbing activities, such as grading that would cause soil erosion and sedimentation. Furthermore, it is reasonably assumed that the soil erosion and sedimentation generated through construction of the Meadow Peak Project would have a potentially significant impact through the degradation of water quality in Haskell Canyon Creek. When combined with the same impact from the proposed Project or an alternative, the cumulative effect of soil erosion and sedimentation from construction activities could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.

- **Degradation of surface water or groundwater quality could occur from the accidental release of potentially harmful materials during construction activities (Impact H-2).** Any construction activities that involve the use of potentially hazardous materials have the potential to cause the accidental release of those materials through a spill, improper handling or storage, or equipment malfunction, among other circumstances. Potentially hazardous materials include diesel fuel, gasoline, lubricant oils, hydraulic fluid, antifreeze, transmission fluid, lubricant grease, and other fluids, all of which are commonly used during basic construction activities, such as the operation of tractors. If accidentally released, hazardous substances could contaminate surface water through direct runoff and groundwater through infiltration. Impact H-2 would be introduced and mitigated to a less-than-significant level for the proposed Project and each of the alternatives. This impact would be considered cumulatively significant if at least one other ongoing or reasonably foreseeable future project that would require use of any of the potentially hazardous substances described above could affect one of the same waterways as the proposed Project and alternatives, in the case of an accidental spill during construction. As indicated by Table B.5-1 and shown on Figures B.5-1a and B.5-1b, multiple proposed and ongoing residential projects are clustered in the Lancaster area and the Santa Clarita area. Because the construction of a residential development would include the use of heavy machinery that would require the use of potentially hazardous materials, there is a possibility that any one of the projects shown in Figures B.5-1a and B.5-1b could cause the accidental spill of potentially hazardous materials during construction, which could subsequently degrade water quality in the same waterways that are affected by the proposed Project and alternatives. In addition, due to the currently compromised condition of water quality in the area, as described in Section C.8.1.4, any action that further degrades water quality should be considered significant. Therefore, the cumulative affect of Impact H-2, as described above, could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.
- **Degradation of surface water or groundwater quality could occur from the accidental release of potentially harmful materials used during operational activities (Impact H-3).** This impact is essentially the same as the preceding, with the exception that this impact addresses accidental spills that occur during operations and maintenance activities rather than construction activities. In general, operations and maintenance activities are less disruptive than construction activities because they require less land disturbance and less use of heavy machinery, if at all. Impact H-3 for the proposed Project and Alternatives 2 through 5 would be less than significant without mitigation, and Impact H-3 for Alternative 1 would be less than significant with mitigation recommended, due to the more invasive nature of maintenance on underground transmission lines. This impact would be considered cumulatively significant if at least one other ongoing or reasonably foreseeable future project that would require use of any of the potentially hazardous substances described above could affect one of the same waterways as the proposed Project and alternatives, in the case of an accidental spill during operations and maintenance activities. As described above for Impact H-2, multiple proposed and ongoing residential projects are clustered in the Lancaster area and the Santa Clarita area. Although operational and maintenance activities associated with these projects would likely require different types of equipment than construction activities, it is reasonably foreseeable that some maintenance activities could require the use of heavy machinery, for instance in re-paving roadways or driveways, digging a swimming pool, or grading a yard, among others. In addition, as mentioned above, any action that further degrades water quality in areas where it is already compromised, such as in Lancaster and Santa Clarita (see Section C.8.1.4), should be considered significant. Therefore, the cumulative effect of Impact H-3, as described above, would be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.

<sup>4</sup> The cumulative projects list was updated in October of 2005.

- **Disturbance of existing groundwater resources through project-related excavation activities (Impact H-4).** The proposed Project and each of the alternatives overlie two separate groundwater basins: the Antelope Valley Groundwater Basin and the Santa Clara Valley East Groundwater Sub-basin. The potential for the proposed Project and alternatives to disturb existing groundwater resources through excavation would be mitigated to a less-than-significant level. As discussed in Section B.8.5, excavation activities, such as drilling and grading for tower installation, have the potential to disturb existing groundwater resources; although the potential to interfere with overall groundwater supply and recharge is not likely. This impact would be considered cumulatively significant if at least one other ongoing or reasonably foreseeable future project is located over the Antelope Valley Groundwater Basin or the Santa Clara Valley East Groundwater Sub-basin and would require excavation activities, such as drilling, which could potentially disturb the underlying groundwater resources. As shown on Figure B.5-1a, approximately 50 proposed or ongoing projects are located in the City of Lancaster, which overlies the Antelope Valley Groundwater Basin, as shown on Figure B.8-3. Consideration of Table B.5-1 reveals that most of these projects in Lancaster are residential developments, with some exceptions, including industrial developments. It is reasonably assumed that at least one of these 50 projects overlying the Antelope Valley Groundwater Basin would involve some sort of excavation activity, such as for the installation of building foundations. Furthermore, as discussed in Section B.8.1.4 (Water Quality) and shown in Table B.8-3 (Water Quality in Public Supply Wells), groundwater in the Antelope Valley Groundwater Basin exceeds MCLs for five categories of pollutants, with 12 percent of all wells sampled being in excess of the recommended MCL for inorganic compounds. Because the quality of water in this groundwater basin is already compromised, any action that would further disturb the groundwater resource should be considered significant. Therefore, the cumulative effect of Impact H-4, as discussed above, would be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.
- **Increased runoff from the creation of new impervious areas (Impact H-5).** As shown in Table C.8-6, the proposed Project and Alternatives 3, 4, and 5 would have a less-than-significant impact on runoff from the creation of new impervious areas. This impact for Alternative 1 would be mitigated to a less-than-significant level, and for Alternative 2, it would be significant and unavoidable due to the grading and cutting requirements of hillside towers. This impact would be considered cumulatively significant if at least one other ongoing or reasonably foreseeable future project would introduce new impervious areas that could increase runoff into the same waterways affected by the proposed Project and alternatives. Table B.5-1 indicates that approximately 95 new projects are planned or ongoing within five miles of the proposed Project route, with the vast majority of these projects being residential developments, which would require the introduction of new impervious areas. Specifically, Project #9 on Figure B.5-1b is situated in Santa Clarita, along Haskell Canyon Creek, which is traversed by the proposed Project and all alternatives. As described in Table B.5-1, this project is currently under construction and includes 421 single-family units, 13 multi-family units, and one open space lot on 163 acres. These new buildings will introduce new impervious areas that are expected to increase surface water runoff to local waterways. Therefore, the cumulative effect of Impact H-5 could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.
- **Runoff introduced as a result of permanent Project features would cause the overloading of a local stormwater drainage system (Impact H-6).** The proposed Project and all alternatives would have a less than significant impact to local stormwater drainage systems, with no mitigation recommended. As discussed, there is no stormwater drainage system in place on NFS lands in the ANF and therefore no opportunity to overload such a system. On non-NFS lands, existing stormwater drainage systems may be affected through the introduction of increased runoff due to new impervious areas such as transmission tower footings. Stormwater drainage systems are expected to be in place in community areas such as within Lancaster, Palmdale, Santa Clarita, Acton, and Agua Dulce. It is reasonably assumed that any new housing developments would include the installation of stormwater drainage features. Since the majority of ongoing and future cumulative projects within the analysis area are characterized as residential or community developments, it is reasonably assumed that ongoing and future cumulative projects would be constructed with stormwater drainage systems in place and such systems would be designed with sufficient capacity to accommodate stormwater runoff caused by the particular project. Therefore, the cumulative effect of Impact H-6 resulting from the proposed Project or an alternative would be less than significant with no mitigation recommended (**Class III**).
- **Flood hazards created through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse (Impact H-7).** After mitigation, the proposed Project and alternatives would have a less than significant effect on the creation of flood hazards due to the placement of permanent project infrastructure. As discussed above in Sections C.8.5 through C.8.11, neither the proposed Project nor any alternatives would site permanent infrastructure within a known watercourse. However, infrastructure would be

situated within known existing floodplains and FEMA-designated flood hazard areas, which are shown on Figure C.8-2. This figure indicates that the proposed Project and all alternatives would cross through FEMA-designated 100-year flood zones (flood hazard areas) at Haskell Canyon Creek and San Francisquito Canyon Creek. As previously described, infrastructure required for the proposed Project and alternatives would be engineered to withstand mechanical stresses from potential flooding in these areas, thus mitigating this impact to a less-than-significant level. However, this impact would be considered cumulatively significant if at least one other ongoing or reasonably foreseeable future project would introduce permanent, aboveground infrastructure in a floodplain, a flood hazard area, or a watercourse which is already affected by the proposed Project and alternatives. Figure B.5-1b shows that multiple planned and ongoing projects are situated along San Francisquito Canyon Creek, within the same 100-year flood hazard area that is traversed by the proposed Project and alternatives. Some of these projects include the following: #17, a residential development with 60 single-family homes; #79, a commercial center, #80, a self-storage facility; #81, a commercial center; and #84, a research and development facility. Because each of these projects would introduce permanent, aboveground structures into a flood hazard area affected by the proposed Project and alternatives, the cumulative effect of Impact H-7 could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.

- **Mudflow hazards created through the placement of permanent aboveground structures (Impact H-8).** As described in Section C.8.5, mudflow events may be triggered due to heavy rains, particularly in mountainous areas, which cause soil instability. The proposed Project and all alternatives would require construction of infrastructure in areas that could potentially experience mudflow events. This impact for the proposed Project and alternatives would be less than significant with mitigation incorporated. Cumulatively, this impact would be significant if at least one other ongoing or reasonably foreseeable future project would introduce permanent aboveground infrastructure in an area that could experience mudflow events. As described above in Section C.8.14.2 (Existing Cumulative Conditions), past, present, and reasonably foreseeable future projects in the cumulative effects area for hydrology and water quality are dominated by residential development clustered in and around existing community areas. Mudflow events require heavy precipitation on exposed soil in hilly or mountainous areas. Therefore, within this cumulative effects area, the regions that could be at risk for a mudflow event include hillsides within the ANF (applicable to the proposed Project and Alternatives 1 through 4) and hillsides along Portal Ridge (applicable to Alternative 5). Cumulative effects on NFS lands, including within the ANF, are discussed below in Section C.8.14.4. One cumulative project that is currently proposed to traverse Portal Ridge to the east and south of where Alternative 5 would cross the ridge is Segment 2 of the Antelope Transmission Project, as shown on Figure B.5-1a (Project #1) and described in Table B.5-1. This is a transmission line project that would introduce the same type of infrastructure as the proposed Project and alternatives. There is a potential that if the Segment 2 project installs permanent, aboveground infrastructure on hillsides along Portal Ridge hazards could be introduced in the case of a mudflow event. Therefore, the cumulative effect of Impact H-8 could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.

There are no additional feasible mitigation measures that could be imposed on the proposed Project, or Project Alternatives to further reduce its contribution to cumulative hydrological effects. All feasible mitigation measures have been recommended to mitigate Impacts H-1 through H-5, H-7, and H-8. However, as identified for the proposed Project, implementation of recommended Mitigation Measures G-1, G-2, H-1a through H-1f, R-4, H-2, PH-1a through PH-1d, H-4, H-5, and H-7 could be applied to the cumulative projects identified above. For example Mitigation measure H-1a provides erosion and sediment best management practices to reduce erosion. Mitigation measures such as these applied to other construction projects in the area would help reduce cumulative impacts to hydrological resources.

#### **C.8.13.4 Cumulative Effects on National Forest System Lands**

Past, present, and reasonably foreseeable projects located on NFS lands within the cumulative effects area for hydrology and water quality are described in Section B.5.4 (Cumulative Projects on NFS Lands) and listed in Table B.5-3 (Recent and Future Projects on NFS Lands). This section addresses the potential impacts to hydrology and water quality which are summarized in Section C.8.13 (Impact and Mitigation Summary) and discussed above in Section C.8.14.3 (Cumulative Impact Analysis) in terms of what their cumulative effects would be specifically on NFS lands. In order to determine which, if any, of these impacts would be cumulatively considerable on NFS lands, the incremental impacts of the proposed Project and alternatives are

considered in combination with the existing cumulative conditions, including past, present, and reasonably foreseeable projects on NFS lands, as described in Section B.5.4. Below is a discussion of potential impacts that may be cumulatively considerable with regards to hydrology and water quality on NFS lands within the cumulative effects area.

- **Soil erosion and sedimentation caused by construction activities could degrade water quality (Impact H-1).** A brief summary of Impact H-1 is provided above in Section C.8.14.3. This impact would be cumulatively significant if it is known or reasonably foreseeable that at least one other project would degrade water quality through soil erosion and sedimentation on NFS lands, impacts the same waterways as the proposed Project and alternatives. Multiple projects discussed in Section B.5.4, such as maintenance of roads, recreational facilities, and fuelbreak areas, have the potential to cause soil erosion and sedimentation on NFS lands. One such project that is identified in Table B.5-3 and currently in progress is called the Santa Clara/Mojave River Ranger District Fuelbreak Reestablishment Project. This project includes the clearing of areas that could provide fuel for wildland fires. Some of the methods used to clear land involve the use of heavy machinery to disc or masticate the surface materials. Both the use of heavy machinery and the disturbance of surface materials have the potential to cause soil erosion and sedimentation. Furthermore, because fuelbreak reestablishment and maintenance occurs throughout NFS lands for the purpose of wildland fire safety, it is reasonably assumed that these activities would have the potential to affect some of the same waterways as the proposed Project and alternatives. Although Alternative 5 avoids crossing through the ANF, with the exception of approximately one-half mile along the eastern border, it would traverse several waterways that drain through the ANF, including San Francisquito Canyon Creek, Haskell Canyon Creek, and Bouquet Canyon Creek. Alternative 5 would also traverse Escondido Canyon Creek on NFS lands located outside the ANF. The cumulative effect of water quality degradation through soil erosion and sedimentation from construction activities on NFS lands would be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.
- **Degradation of surface water or groundwater quality could occur from the accidental release of potentially harmful materials during construction activities (Impact H-2).** A brief summary of Impact H-2 is provided above in Section C.8.14.3. This impact would be cumulatively significant if at least one other ongoing or reasonably foreseeable future project that would require use of potentially hazardous substances could affect one of the same waterways as the proposed Project and alternatives, in the case of an accidental spill during construction. Potentially hazardous substances include diesel fuel, gasoline, lubricant oils, hydraulic fluid, antifreeze, transmission fluid, lubricant grease, and other fluids. As described in Section B.5.4, past cumulative projects include the construction of multiple campgrounds, trails, roadways, water projects, and utility infrastructure. All of these projects require the use of vehicles and/or heavy machinery, which use potentially hazardous substances. In addition, Table B.5-3 list multiple ongoing and future projects that would require the use of heavy machinery and potentially hazardous substances, including the installation of Bouquet Canyon mailboxes, paving of Dry Gulch Road, LADWP power fence construction, and the Pastoria to Pardee transmission line reconducting project. As discussed in Section C.8.14.3, even very simple construction activities could cause the accidental release of potentially hazardous substances. Therefore, Impact H-2 on NFS lands could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.
- **Degradation of surface water or groundwater quality could occur from the accidental release of potentially harmful materials used during operational activities (Impact H-3).** This impact is essentially the same as the preceding, with the exception that this impact addresses accidental spills that occur during operations and maintenance activities rather than construction activities. Impact H-3 would be cumulatively significant if at least one other ongoing or reasonably foreseeable future project that would require use of potentially hazardous substances could affect one of the same waterways as the proposed Project and alternatives, in the case of an accidental spill during operations and maintenance activities on NFS lands. As described in Section B.5.4, there are multiple roadways existing on NFS lands in the ANF, including major roadways such as Interstate 5, Bouquet Canyon Road, and Sierra Highway, among others. It is reasonably foreseeable that these roadways will need to be maintained and improved over time, due to damage from weather events and regular use. Such maintenance could require the use of heavy machinery, for instance with re-paving, which would use potentially hazardous substances in the vicinity of waterways that are affected by the proposed Project and alternatives. Therefore, Impact H-3 on NFS lands could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.
- **Disturbance of existing groundwater resources through project-related excavation activities (Impact H-4).** A brief summary of Impact H-4 is provided above in Section C.8.14.3. This impact would be considered

cumulatively significant if at least one other ongoing or reasonably foreseeable future project is located over the Antelope Valley Groundwater Basin or the Santa Clara Valley East Groundwater Sub-basin and would require excavation activities such as drilling, which could potentially disturb the underlying groundwater resources. The Pacific Pipeline Storm Relocation Project and Access Road Repairs, as described in Table B.5-3, would include land disturbance activities that could disturb underlying groundwater resources. Because the quality of groundwater in the cumulative effects area is already compromised, as discussed in Section C.8.1.4 (Water Quality), any action that disturbs local groundwater resources would be significant. Impact H-4 on NFS lands could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.

- **Increased runoff from the creation of new impervious areas (Impact H-5).** A brief summary of Impact H-5 is provided above in Section C.8.14.3. This impact would be considered cumulatively significant if at least one other ongoing or reasonably foreseeable future project would introduce new impervious areas that could increase runoff into the same waterways affected by the proposed Project and alternatives. Reasonably foreseeable projects on NFS lands that could introduce new impervious areas include the construction or improvement of roadways, trails, campgrounds, and utility facilities. Due to the currently compromised condition of multiple waterways in the cumulative effects area, as described in Section C.8.1.4 (Water Quality), any amount of increased runoff resulting from new impervious areas that could further degrade surrounding water quality would be significant. Impact H-5 on NFS lands could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives..
- **Flood hazards created through the placement of permanent aboveground structures in a flood hazard area, a floodplain, or a watercourse (Impact H-7).** A brief summary of Impact H-7 is provided above in Section C.8.14.3. This impact would be considered cumulatively significant if at least one other ongoing or reasonably foreseeable future project on NFS lands would introduce permanent, aboveground infrastructure in a floodplain, a flood hazard area, or a watercourse, which is already affected by the proposed Project and alternatives. It is not expected that projects on NFS lands would involve the placement of infrastructure within an existing watercourse. However, it is reasonably foreseeable that structures would be placed in an existing floodplain or flood hazard areas, which are indicated on Figure C.8-2. For instance, Table B.5-3 indicates that the LA DWP is in the progress of installing a chain link fence along the eastside of Bouquet Reservoir which, as indicated by Figure C.8-2, would be inundated by a 100-year flood event. Impact H-7 on NFS lands could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives..
- **Mudflow hazards created through the placement of permanent aboveground structures (Impact H-8).** A brief summary of Impact H-8 is provided above in Section C.8.14.3. This impact would be considered cumulatively significant if at least one other ongoing or reasonably foreseeable future project would introduce permanent aboveground infrastructure in an area that could experience mudflow events. As described in Section C.8.5, mudflow events could be triggered due to heavy rains, particularly in mountainous areas, which cause soil instability. It is reasonably foreseeable that future projects on NFS lands could place infrastructure in areas that may experience mudflow events. Such projects include the installation of recreational facilities, such as cabins and campground restrooms, or the installation of utility and telecommunication infrastructure within existing utility corridors. Impact H-8 on NFS lands could be significant and unavoidable (**Class I**) for the proposed Project and all alternatives.

There are no additional feasible mitigation measures that could be imposed on the proposed Project, or Project Alternatives to further reduce its contribution to cumulative hydrological effects on NFS lands. All feasible mitigation measures have been recommended to mitigate Impacts H-1 through H-5, H-7, and H-8. However, as identified for the proposed Project, implementation of recommended Mitigation Measures G-1, G-2, H-1a through H-1f, R-4, H-2, PH-1a through PH-1d, H-4, H-5, and H-7 could be applied to the cumulative projects on NFS lands identified above. For example Mitigation measure H-1a provides erosion and sediment best management practices to reduce erosion. Mitigation measures such as these applied to other construction projects in the area would help reduce cumulative impacts to hydrological resources.