4.6 Geology, Soils, and Mineral Resources

This section describes the environmental and regulatory setting and discusses impacts associated with the construction and operation of the Santa Barbara County Reliability Project (proposed project) with respect to geology, soils, and mineral resources. A comment received during scoping expressed concern that the proposed project is located in a seismically active area.

4.6.1 Environmental Setting

4.6.1.1 Geological Resources Studies Conducted in the Project Area

Southern California Edison (SCE, or the applicant) conducted 4 field investigations of the soil and geologic conditions in the project area between June 2000 and December 2001. The results of these studies are included in Appendix F and summarized in Table 4.6-1.

Table 4.6-1 Summary of Previous Field Investigations

Segment / Report Title	Date	Description
Segment 1: *Foundation Design Recommendations, Santa Clara-Carpinteria 66 kV T/L, Santa Clara Substation to Casitas Substation, Ventura County, California*	June 29, 2000	The field investigation consisted of a site visit to each proposed pole location between May 15 and May 18, 2000. The report also includes a review of previously prepared reports for the project area and the local geology.
Segment 2: *Foundation Design Recommendations, Santa Clara-Carpinteria 66 kV T/L, Proposed TSP Sites Located Within 5 Miles West From Casitas Substation, Existing Towers M0T2 to M4T1, Ventura County, California*	May 30, 2001	The geological and geotechnical evaluations consisted of a site visit to each proposed pole location on May 2, 2001, to evaluate any visible conditions and verify the recommendations of previous reports.
Segment 3B: *Foundation Design Recommendations From East Casitas Pass to Rincon Road SR-150, Existing Towers M4Tw to M9T1, Santa Clara-Carpinteria 66 kV T/L, Ventura County, California*	July 3, 2001	The geological and geotechnical evaluations consisted of a site visit to each proposed pole location on May 23 and 24, 2001, to evaluate any visible conditions and to estimate the subsurface soil parameters. No additional field and laboratory soil testing was conducted.
Segment 4: *Foundation Design Recommendations (Phase IV) From East Casitas Pass to Carpinteria Substation, Existing Towers M13T2 to Carpinteria Substation, Santa Clara-Carpinteria 66 kV T/L, Ventura and Santa Barbara Counties, California*	December 20, 2001	The field investigation of the soil and geologic conditions of the proposed pole locations was conducted on September 26 and 27, 2001, and October 4, 2001. The report also includes a review of previously prepared reports in the project area and the local geology.

Sources: SCE 2000; SCE 2001a,b,c
Key:
kV kilovolt
T/L transmission line

4.6.1.2 Geology

Topography

The project area is located within the geomorphic province known as the Transverse Ranges. The Transverse Ranges consist of steeply sloped, east-west trending mountain ranges and valleys bounded on the north by the Santa Ynez fault, on the east by the San Gabriel Mountains, on the south by the Transverse Ranges frontal fault zone, and on the west by the Pacific Ocean. The Transverse Ranges intersect the California coastline at an oblique angle and continue offshore to include the San Miguel, Santa Rosa, and Santa Cruz islands. The topography in the project area is heavily dissected by washes, streams, and rivers. Elevations in the project area range from approximately 1,750 feet above mean sea level (amsl) near Rincon Mountain to 50 feet amsl near Carpinteria, California.

Geologic Setting

The project area is located in a tectonically active area known as the Santa Barbara Fold Belt (SBFB). The SBFB consists of a northwest-southeast linear zone of folds and blind thrust faults (Keller 2000; Minor et al. 2009; Tan et al. 2004a, 2004b, 2003a, 2003b). The surficial geology consists of Holocene and Pleistocene age alluvium, alluvial terraces, and landslide deposits. The bedrock geology consists of marine terraces composed of mudstones, sandstones, and conglomerates ranging in age from Eocene (56 million years before present (BP)) through Pleistocene (2.6 million years BP) (Table 4.6-2).

Table 4.6-2 Bedrock Geology in the Project Area

Segment(s)	Formation Name [age]	Description
1	Santa Barbara Formation [Pleistocene]	Folded claystones
1	Undivided Pico Formation [Pliocene]	Locally pebbly, claystones, siltstones, and sandstones
1, 3B, 4	Monterey Formation [Miocene]	Siliceous and diatomaceous shales and sandstones and limestones
1, 2, 3B, 4	Rincon Shale [Miocene]	Shales and siltstones
1, 2	Vaqueros Sandstone [Early Miocene]	Locally calcareous sandstones
2, 4	Sespe Formation [Oligocene]	Locally pebbly sandstones
3A	Casitas Formation [Pleistocene]	Poorly consolidated sandstones and siltstones
4	Coldwater Sandstone [mid- to late Eocene]	Bedded arkosic sandstones with siltstones and shale interbeds

Sources: Keller 2000; Minor et al. 2009; Tan et al. 2004a, 2004b, 2003a, 2003b

Soils

The Natural Resources Conservation Service (NRCS) maintains an online database of soil survey data for most U.S. counties. Soil surveys describe the types of soils that exist in an area, their locations on the landscape, and their suitability for various uses. Soils of a similar type are grouped into soil map units, and each soil map unit differs in some respect from all others in a survey area (NRCS 2011). The major soil map unit types within the project area are presented in Table 4.6-3. Soils in the project area are generally loamy, well drained, and have high runoff rates.

Table 4.6-3 Soil Map Units within the Project Area

Soil Name	Project Component	Description/ Soil Texture (USDA)	Shrink-Swell Potential[a]	Erosion Hazard[b]	Wind Erodibility Group[c]	Hydric Rating
Rincon-Modesto-Los Osos families association	Segment 4	30 to 60 percent slopes	Moderate	Severe	8	No
Anacapa	Segment 3B	Sandy loam, 2 to 9 percent slopes	Low	Moderate	3	No
Arnold	Substation, Segment 1	Sand, 9 to 50 percent slopes	Low	Severe	1	No
Badland	Segment 1	-	NA	Severe	-	No
Botella Variant	Segment 4	Clay loam, 2 to 9 percent slopes, Eroded	Moderate	Moderate	7	No
Botella Variant	Segment 4	Clay Loam, 9 to 15 percent slopes, eroded	Moderate	Moderate	7	No
Calleguas	Segments 1, 3B, and 4	Shaly loam, 30 to 50 percent slopes	Low	Severe	7	No
Camarillo, Variant	Substation, Segments 3A and 4	Fine sandy loam	Moderate	Slight	3	Yes
Calleguas-Arnold complex	Substation	30 to 50 percent slopes, eroded	NA	NA	7	No
Castaic-Balcom complex	Segment 1	30 to 50 percent slopes, eroded	Moderate	Severe	7	No
Cropley	Segment 1	Clay, 2 to 9 percent slopes	High	Moderate	7	No
Diablo	Substation	Clay, 9 to 15 percent slopes	NA	NA	7	No
Diablo	Segment 1	Clay, 9 to 15 percent slopes	High	Severe	7	No
Diablo	Segments 1 and 3B	Clay, 15 to 30 percent slopes	High	Severe	7	No
Diablo	Substation, Segments 1 and 3B	Clay, 30 to 50 percent slopes	High	Severe	7	No
Elder	Segments 3B and 4	Sandy loam, 2 to 9 percent slopes	Low	Moderate	-	No
Garretson	Substation	loam, 2 to 9 percent slopes	NA	NA	5	No
Gaviota-Rock Outcrop Complex	Segment 4	50 to 75 percent slopes	Low	Severe	3	No
Goleta	Substation, Segments 3A and 4	Fine sandy loam, 0 to 2 percent slopes	NA	NA	3	No
Landslides	Segment 1	-	NA	Severe	-	No

Table 4.6-3 Soil Map Units within the Project Area

Soil Name	Project Component	Description/ Soil Texture (USDA)	Shrink-Swell Potential[a]	Erosion Hazard[b]	Wind Erodibility Group[c]	Hydric Rating
Lodo-Rock Outcrop Complex	Segment 4	50 to 75 percent slopes	Moderate	Severe	5	No
Lodo-Sespe Complex	Segment 4	50 to 75 percent slopes	Moderate	Severe	5	No
Linne	Segments 1 and 3B	Silty clay loam, 30 to 50 percent slopes, eroded	Moderate	Severe	4L	No
Lodo	Segment 3B	Rocky loam, 30 to 50 percent slopes	Low	Severe	6	No
Los Osos	Segment 3B and 4	Clay loam, 9 to 15 percent slopes, eroded	High	Moderate	6	No
Los Osos	Segment 3B	Clay loam, 15 to 30 percent slopes, eroded	High	Severe	6	No
Los Osos	Segments 2, 3B and 4	Clay loam, 30 to 50 percent slopes	High	Severe	6	No
Malibu	Segment 3B	Loam, 30 to 50 percent slopes	Moderate	Severe	6	No
Metz	Segment 3A	Loamy sand	Low	Slight	-	No
Milpitas	Segment 3A	Stony fine sandy loam, 15 to 30 percent slopes	Moderate	Moderate	5	No
Milpitas	Segment 3A	Stony fine sandy loam, 30 to 50 percent Slopes	Moderate	Severe	5	No
Milpitas-Positas	Segment 3A	Fine sandy loams, 2 to 9 percent Slopes	Moderate	Moderate	3	No
Milpitas-Positas	Segment 4	Fine sandy loam, 9 to 15 percent slopes, eroded	Moderate	Severe	3	No
Milpitas-Positas	Segment 3A	Fine sandy loams, 15 to 30 percent slopes, eroded	Moderate	Severe	3	No
Milpitas-Positas	Segment 4	Fine sandy loams, 30 to 50 percent slopes, eroded	Moderate	Severe	3	No
Millsholm	Segments 1 and 4	Loam, 15 to 50 percent slopes	Low	Severe	6	No

Table 4.6-3 Soil Map Units within the Project Area

Soil Name	Project Component	Description/ Soil Texture (USDA)	Shrink-Swell Potential[a]	Erosion Hazard[b]	Wind Erodibility Group[c]	Hydric Rating
Millsholm-Malibu Complex	Segments 2, 3B and 4	30 to 50 percent slopes, eroded	Moderate	Severe	6	No
Mocho	Segments 1 and 3B	Loam, 2 to 9 percent slopes	Moderate	Moderate	6	No
Nacimiento	Segment 1	silty clay loam, 9 to 15 percent slopes, eroded	Moderate	Severe	7	No
Nacimiento	Segment 1	Silty clay loam, 15 to 30 percent slopes, eroded	Moderate	Severe	7	No
Nacimiento	Segments 1 and 3B	Silty clay loam, 30 to 50 percent slopes	Moderate	Severe	7	No
Nacimiento	Segment 1	Silty clay loam, 50 to 75 percent slopes	Moderate	Severe	7	No
Orthents	Segments 3A, 3B and 4	50 to 75 percent Slopes	NA	Severe	-	No
Ojai	Segment 2	Stony fine sandy loam, 2 to 15 percent slopes, eroded	Moderate	Moderate	-	No
Riverwash	Segments 1, 2 and 3B	-	Low	Slight	1	Yes
San Benito	Segment 1	Clay loam, 15 to 30 percent slopes, eroded	Moderate	Severe	6	No
San Benito	Substation and Segment 1	Clay loam, 30 to 50 percent slopes, eroded	Moderate	Severe	6	No
San Benito	Segment 4	Clay loam, 50 to 75 percent slopes	Moderate	Severe	6	No
Santa Lucia	Segment 3B	Shaly silty clay loam, 30 to 50 percent slopes	Low	Severe	8	No
Sespe	Segments 2, 3B and 4	Clay loam, 15 to 30 percent slopes, eroded	Moderate	Severe	6	No
Sespe	Segments 2, 3B and 4	Clay loam, 30 to 50 percent slopes	Moderate	Severe	6	No

Table 4.6-3 Soil Map Units within the Project Area

Soil Name	Project Component	Description/ Soil Texture (USDA)	Shrink-Swell Potential[a]	Erosion Hazard[b]	Wind Erodibility Group[c]	Hydric Rating
Soper	Segment 1 and 2	Gravelly loam, 30 to 50 percent slopes, eroded	Moderate	Severe	7	No
Sorrento	Segment 2	Sorrento loam, 0 to 2 percent slopes	Moderate	Slight	6	No
Sorrento	Segments 2 and 4	Clay loam, heavy variant, 2 to 9 percent slopes	Low	Moderate	6	No
Sorrento	Substation, Segments 3B and 4	Clay loam, heavy variant, 9 to 15 percent slopes	High	Moderate	6	No
Todos	Segment 4	Loam, 15 to 30 percent slopes, eroded	High	Severe	4	No
Todos-Lodo Complex	Segment 4	30 to 50 percent slopes, eroded	High	Severe	4	No
Water	Segment 1	Water	NA	NA	-	No

Source: NRCS 2011
Key:
NA not assessed
USDA United States Department of Agriculture
Notes:
[a] Linear extensibility of less than 3 percent = low shrink-swell potential; 3 to 6 percent = moderate potential; 6 to 9 percent = high potential; greater than 9 percent = very high potential.
[b] Erosion hazard interpreted by NRCS for unsurfaced roads and trails.
[c] Soils are assigned to wind erodibility groups based on their susceptibility to wind erosion. Soils assigned to Group 1 are the most susceptible; soils assigned to Group 8 are the least susceptible. Sources: NRCS 2008a; NRCS 2008b; NRCS 2008c; SSS 2012.

4.6.1.3 Geologic Hazards

Faulting and Seismicity

The Alquist–Priolo Earthquake Fault Zoning Act (Pub. Res. Cod. Div. 7, Ch. 2.5) requires the delineation of earthquake faults for the purpose of protecting public safety. Faults included in the Alquist–Priolo Earthquake Fault Zoning Program are classified by activity:

- Faults classified as "active" are those that have been determined to be "sufficiently active and well defined," with evidence of movement within Holocene time (CGS 2007).
- Faults classified as "potentially active" have shown geologic evidence of movement during Quaternary time (CGS 2007).
- Faults considered "inactive" have not moved in the last 1.6 million years (CGS 2007).

Many active and potentially active faults are present in the vicinity of the project area as shown in Figure 4.6-1. Alquist-Priolo Earthquake Fault Zones (A-P Zones) are designated areas within 500 feet of a known active fault trace. The Red Mountain and Pitas Point-Ventura faults are the closest mapped A-P Zones to the proposed project (approximately 1.5 and 3.6 miles south of the proposed project, respectively). No A-P Zones or other active faults cross the proposed project; however, the project is crossed by a number of potentially active faults (Table 4.6-4).

Table 4.6-4 Potentially Active Faults in the Immediate Vicinity of the Proposed Project

Fault Name	Segment Crossed	Approximate Location	Potential Earthquake Magnitude
Arroyo Parida fault	4	Western portion of Segment 4, north of the City of Carpinteria	6.5-7.3(b)
Carpinteria fault	N/A	One tenth of a mile south of Segments 3A and 3B	4.5+(b)
Mesa-Rincon Creek fault	3A, 3B	Shepard Mesa area; eastern half of Segment 3A and western end of Segment 3B	6.0 – 7.0
Red Mountain fault	1	Three quarters of a mile east of Casitas Substation	6.0-6.8
Rincon Creek fault	3B	Western end of Segment 3B near SR-150	6.0 – 7.0(a)
Oak Ridge fault	1	Eastern end of Segment 1 near Santa Clara Substation	6.5-7.5
Unnamed	1	One tenth of a mile west of the Getty Tap	N/A

Sources: SCEDC 2013a, b, c, d; Cao et al. 2003; Santa Barbara County 2010
Notes:
(a) Maximum moment magnitude (Cao et al. 2003). The moment magnitude is a measure of the size of an earthquake in terms of energy released.
(b) Maximum Credible Earthquake (Santa Barbara County 2010). The Maximum Credible Earthquake refers to the maximum earthquake potentially capable of occurring under the currently known tectonic framework.
N/A = not applicable.

Faults generally produce damage in two ways: ground shaking and surface rupture. Seismically induced ground shaking covers a wide area and is greatly influenced by the distance to the seismic source, soil conditions, and groundwater depth. Surface rupture is limited to the areas closest to the faults. Other potential hazards associated with seismically induced ground shaking include earthquake-triggered landslides and tsunamis.

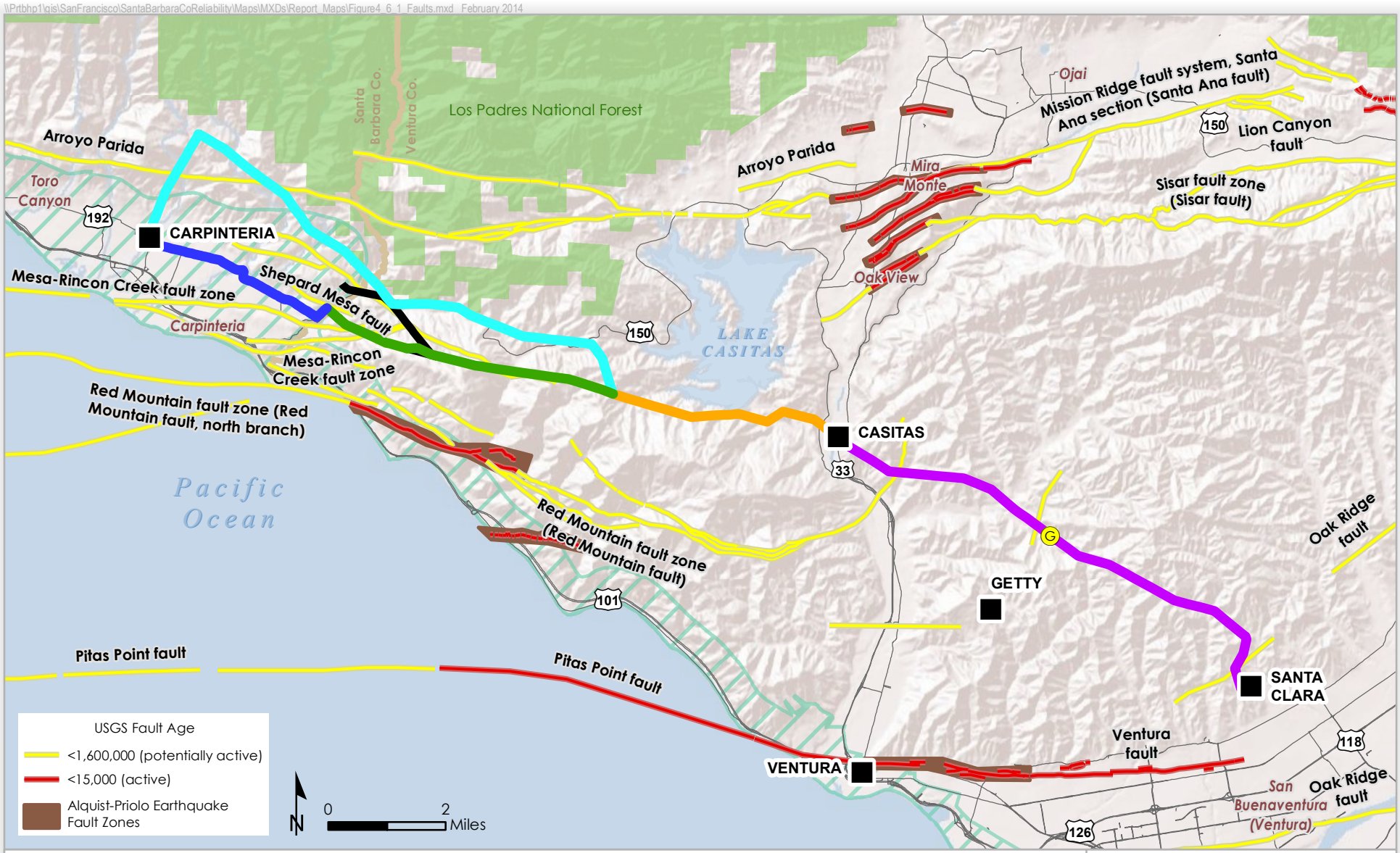

Figure 4.6-1
Faults and Alquist-Priolo Earthquake Fault Zones in the Vicinity of the Proposed Project
Santa Barbara County Reliability Project
Santa Barbara and Ventura Counties California

Seismic hazards in a region are estimated using statistics of earthquake occurrence to estimate the level of potential ground motion. A common parameter used for estimating ground motion at a particular location is the peak ground acceleration (PGA). PGA is a measure of earthquake intensity; it is a measure of how hard the earth shakes at a given geographic location during the course of an earthquake (USGS 2007). PGA values are typically expressed as a percentage of acceleration due to gravity: the higher the PGA value, the more intense the ground shaking.[1] Using a web tool, PGA values were calculated for a location near the center of the project area, where Segments 2, 3B, and 4 intersect (USGS 2012a) (Table 4.6-5). PGA values vary throughout the project area and would be assessed as part of a site-specific geotechnical analysis. The assessed PGA values would be used to ensure that the project is designed in compliance with applicable building codes.

Table 4.6-5 Peak Ground Acceleration Values near the Center of the Project Area

Return Period[(a)] (Years)	Peak Ground Acceleration (g)[(b)]
30	0.08937
72	0.1733
144	0.2673
475	0.4956
1485	0.8144
2475	0.9836
4950	1.2394
9900	1.5077

Notes:
(a) The return period is an indicator of the probability that the reported PGA will be exceeded at the modeled location in a given year. For example, there is a 1/144 chance that an earthquake will occur at the modeled location in a given year that has a PGA value of 0.2673g, which is roughly equal to a 10% probability of being exceeded in 14.4 years. For comparison, the Morocco earthquake of 2004 had a PGA of 0.24g (USGS 2009).
(b) PGA values were calculated for latitude 34.372317°N, longitude 119.376457°W using USGS 2008 Interactive Deaggregations (Beta) Tool (USGS 2012a). Average shear wave velocity in the upper 30 meters (VS30) value of 489 meters per second was used to calculate PGA values based on Kalkan et al. (2010).

Erosion

Water and wind are the strongest mechanisms to cause erosion to soils in the project area. Increased erosion could occur in the project area where surface disturbing activities are planned to occur. The NRCS assigns soils to Wind Erodibility Groups (WEGs) and determines an Erosion Hazard rating. The susceptibility of the soils in the project area to wind erosion ranges from WEG 1 (most highly erodible) to WEG 8 (not susceptible), with the majority of the soils being in WEG 6 and 7. Erosion hazard ratings for soils in the project area range from slight to severe with the majority of the soils having a severe rating.

Landslides

Landslides are a hazard throughout the project area. The majority of the project area within Ventura County is located within a State of California Earthquake-Induced Landslide Hazard Zone (CGS 2003a, 2003b). Santa Barbara County does not have published CGS Seismic Hazards Maps.

[1] The acceleration due to gravity is relatively constant at the earth's surface: 980 centimeters per second per second (cm/sec/sec). An acceleration of 16 feet per second is 16*12*2.54 = 487 cm/sec/sec. Therefore, an acceleration of 16 feet per second = 487/980 = .50 g.

However, due to similar geologic, topographic, and seismic conditions as in Ventura County, similar hazards of landslides exist throughout the project area in Santa Barbara County. The only portions of the proposed project that would not be at risk of seismically induced landslides are those located in the flat, lowland parts of the project area.

The applicant has conducted a number of field investigations in the recent past to assess geologic and soil conditions throughout the project area. During each of the field investigations (Table 4.6-1), the applicant observed evidence of landslides along the project right-of-way (ROW) (Appendix F):

- In the report prepared for Segment 1, the applicant noted that shallow landslides of less than 20-foot depths are common along the ROW. The applicant also noted that the area where the poles would be constructed is historically prone to landsliding and that many of the sites were damaged in 1969, 1978, 1983, and 1998 (SCE 2000).
- In the report prepared for Segment 2, the applicant noted that most of the Rincon Shale is very susceptible to landsliding. Most of the structure sites along the ROW were not located in areas that showed evidence of landsliding or slope instability, with the exception of five structure sites. In addition, an area adjacent to one of the structure sites had been noted in prior reports to be an area of major slope instability, but there was no indication that a landslide in this area would impact the structure site itself (SCE 2001a).
- In the report prepared for Segment 3B, the applicant noted that three of the proposed subtransmission structure sites showed evidence of past landsliding. Approximately 3 miles of this portion of the line lies within the Rincon Shale, and past geologic reports noted several large landslides in this area. Immediately west of West Casitas Pass, there is an active landslide that is about 1 mile in length and half a mile in width that tends to move, at least in part, each year (SCE 2001b).
- In the report prepared for Segment 4, the applicant noted that at most of the proposed structure sites there is no indication of the existence or likelihood of future landsliding, with the exception of an area of active soil slumping between two of structure sites. In addition, the applicant noted that a portion of the corridor passes north of an active landslide (SCE 2001c).

In addition, the applicant recently removed four structures on the idle Santa Clara-San Marcos 66-kilovolt Subtransmission Line. One structure was removed due to concerns that an exposed footing could lead to structure failure, and the other three structures were removed due to unstable ground or because the towers were located in unsuitable locations to terminate the conductor (SCE 2013).

Liquefaction

Liquefaction occurs when saturated sandy soil loses strength and cohesion due to ground shaking during an earthquake. Portions of the project area within the Ventura River Valley and along Coyote Creek are located in a State of California Liquefaction Seismic Hazard Zone (CGS 2003b). Within the Carpinteria Valley, portions of Segments 3A and 4 would be located within an area at moderate risk of liquefaction (City of Carpinteria 2003; Santa Barbara County 2010).

Subsidence

Ground subsidence has not been observed in the vicinity or within the project area. However, ground subsidence has been observed about 8 miles southeast of the project area within the Oxnard

Plain of Ventura County (Santa Barbara County 2010; Ventura County 2011a; City of Carpinteria 2003).

Expansive and Collapsible Soils

Some soils contain certain clay minerals that may cause them to swell when moist and shrink as the soil dries. These soils are known as "expansive soils." Expansive soils have the potential to disturb building foundations, walls, and roads and are found occasionally throughout the project area. In areas where soils have moderate to high shrink-swell potential, project components may require special design features to prevent damage (Table 4.6-3).

4.6.1.4 Mineral Resources

The project area is located in a region that has been used for oil exploration and production since the mid-1800s. Portions of the Ventura (approximately 2,380 wells) and Rincon (approximately 640 wells) oil fields are located less than 1 mile south of portions of Segments 1 and 2 and the Casitas Substation. There are no producing oil or gas wells within the project ROW (CDC 2013).

In addition to oil and gas, a number of other resources have been mined in the vicinity of the project area. Aggregate and clay resources are currently mined in the vicinity of the project area (USGS 2012b). The Los Prietos mercury deposits northwest of the City of Carpinteria have been intermittently mined since 1860, but mining was not active as of 2010 (USDI 1965; Santa Barbara County 2010). Uranium has been identified north of the project area. However, no active mines are known to exist within the project area; the nearest mineral resources to the proposed project are aggregate resources currently mined at the Santa Barbara Portable Plant in Casitas Springs and at a number of pits located along the Santa Clara River to the south of the Santa Clara Substation in Ventura County (USGS 2012b).

4.6.2 Regulatory Setting

This subsection summarizes federal, state, and local laws, regulations, and standards that govern geology, soils, and mineral resources in the project area.

4.6.2.1 Federal

1997 Uniform Building Code

The 1997 Uniform Building Code (UBC) specifies acceptable design criteria for structures with respect to seismic design and load-bearing capacity. Seismic Risk Zones have been developed based on the known distribution of historic earthquake events and frequency of earthquakes in a given area. These zones are generally classified on a scale from I (least hazard) to IV (most hazard). These values are used to determine the strengths of various components of a building required to resist earthquake damage. Based on the UBC Seismic Zone Maps of the United States, and because of the number of active faults in southern California, the proposed project would be located in the highest seismic risk zone defined by the UBC standard: UBC Zone IV. The state has adopted these provisions in the California Building Code (CBC).

Clean Water Act of 1972, as amended in 2002

The Clean Water Act (CWA; 33 U. S. Code §1251 et seq.) requires states to set standards to protect water quality, including the regulation of storm water and wastewater discharge during

construction and operation of a facility. This includes the creation of the National Pollutant Discharge Elimination System (NPDES), a system that requires states to establish discharge standards specific to water bodies and that regulates storm water discharge from construction sites through the implementation of a Storm Water Pollution Prevention Plan (SWPPP). Erosion and sedimentation control measures are fundamental components of SWPPPs. In California, the NPDES permit program is implemented and administered by Regional Water Quality Control Boards. Refer to Section 4.9, "Hydrology and Water Quality," for further information.

As authorized by Section 402 of the CWA, the California State Water Resources Control Board administers the NPDES General Permit for Discharges of Storm Water Associated with Construction Activity (General Construction Activity NPDES Storm Water Permit, 2009-0009-DWQ and 2010-0014-DWQ) that covers a variety of construction activities that could result in wastewater discharges. Under this General Permit, the state issues a construction permit for projects that disturb more than one acre of land. To obtain the permit, applicants must notify the State Water Resources Control Board of the construction activity by providing a Notice of Intent, develop a SWPPP, and implement water quality monitoring activities as required. The purpose of a SWPPP is to ensure the design, implementation, management, and maintenance of Best Management Practices (BMPs) aimed at reducing the amount of sediment and other pollutants in storm water discharges associated with the land disturbance activities.

4.6.2.2 State

Alquist-Priolo Earthquake Fault Zoning Act

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act of 1972 is to regulate development near active faults to minimize the hazards associated with a surface fault rupture. This act requires disclosure to potential real estate buyers and a 50-foot setback for new occupied buildings. While the act does not specifically regulate overhead power lines, it helps define areas where fault rupture is most likely to occur. The act defines an active fault as one that exhibits evidence of surface rupture within the last 11,000 years (i.e., Holocene activity). The state has identified active faults within California and has delineated "earthquake fault zones" along active faults.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 provides a statewide seismic hazard mapping and technical advisory program to assist cities and counties in fulfilling their responsibilities for protecting public health and safety from the effects of strong ground shaking, liquefaction, landslides, or other ground failure and seismic hazards caused by earthquakes. Mapping and other information generated pursuant to the Seismic Hazards Mapping Act is to be made available to local governments for planning and development purposes. The state requires that (1) local governments incorporate site-specific geotechnical hazard investigations and associated hazard mitigation as part of the local construction permit approval process; and that (2) the agent for a property seller, or the seller if acting without an agent, must disclose to any prospective buyer if the property is located within a Seismic Hazard Zone. The State Geologist is responsible for compiling seismic hazard zone maps.

California Building Code

The 2013 CBC was adopted by the California Building Standards Commission and became effective January 1, 2014. The CBC is contained in Title 24 of the California Code of Regulations, California

Building Standards Code and is a compilation of three types of building standards from three different origins:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes.
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions.
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes that have been adopted to address particular California concerns.

The code includes grading and other geotechnical issues, building specifications, and non-building structures. The proposed project would include these types of improvements, and therefore, the building code would be applicable.

4.6.2.3 Regional and Local

Santa Barbara County

Santa Barbara County's geologic and seismic protection standards are outlined in the Seismic Safety & Safety Element of Santa Barbara County's General Plan (Santa Barbara County 2010). The geologic and seismic protection standards outlined in the general plan are designed to demonstrate compliance with California State laws. The standards are in place to protect the community from geologic and seismic hazards originating from natural or anthropogenic sources. The Seismic Safety & Safety Element provides important data regarding geologic, soil, seismic, fire, and flood hazards that is intended to guide land use planning. The Seismic Safety & Safety Element also includes the Safety Element supplement, which describes land use planning measures to reduce the risk of public exposure to acutely hazardous materials associated with oil and gas pipelines and fixed facilities. Applicable Santa Barbara County General Plan policies regarding geology, soils, and minerals include:

- **Geologic and Seismic Protection Policy 1**: The County shall minimize the potential effects of geologic, soil and seismic hazards through the development review process
- **Geologic and Seismic Protection Policy 2:** To maintain consistency, the County shall refer to the California Building Code, the Land Use Development Code, County Ordinances, the Coastal Land Use Plan, and the Comprehensive General Plan when considering the siting and construction of structures in seismically hazardous areas.
- **Geologic and Seismic Protection Policy 5:** Pursuant to County Code Section 21-7(d)(4) and (5), the County shall require a preliminary soil report prepared by a qualified civil engineer be submitted at the time a tentative map is submitted. This requirement may be waived by the Planning Director if he/she determines that no preliminary analysis is necessary. A preliminary geological report prepared by a qualified engineering geologist may also be required by the Planning Director.
- **Geologic and Seismic Protection Policy 6:** The County should reference the Santa Barbara County Multi-Jurisdiction Hazard Mitigation Plan when considering measures to reduce potential harm from seismic activity to property and lives.

- **Geologic and Seismic Ongoing Implementation measure**: **5. Maintain and Enforce County Code Chapter 14-Grading, Erosion and Sediment Control:** Continue maintenance and enforcement of County Code Chapter 14-Grading, Erosion and Sediment Control whose regulations, conditions and provisions constitute minimum standards and procedures necessary to protect and preserve life, limb, health, property and public welfare. The Chapter regulates new grading (excavations, i.e. cuts, fills, borrow pits, stockpiling, and compaction of fill) where the transported amount of materials exceeds 50 cubic yards or the cut or fill exceeds 3 feet in vertical distance to the natural contour of the land.

Ventura County

The Hazard appendix of the Ventura County General Plan provides background information and technical details regarding individual hazards addressed in the General Plan Goals, Policies and Programs. The physical, social and other effects of the hazards are discussed, and more detailed information is provided regarding the location of hazards zones and areas (Ventura County 2011a). A number of policies presented in the Hazards chapter of the Ventura County's General Plan Goals, Policies, and Program Element are directed at reducing geology and soils hazards (Ventura County 2011a), including the following applicable policies:

- **Policy 2.4.2:** Prior to the issuance of building or grading permits for essential facilities, special occupancy structures, two-story single family residences, or hazardous materials storage facilities located within areas prone to liquefaction, a geotechnical report that includes a seismic analysis and evaluation of liquefaction in accordance with the State of California Guidelines shall be prepared in order to assess the liquefaction potential and provide recommendations for mitigation.
- **Policy 2.7.2:** 1.) Development in mapped landslide/mudslide hazard areas shall not be permitted unless adequate geotechnical engineering investigations are performed, and appropriate and sufficient safeguards are incorporated into the project design. 2.) In landslide/mudslide hazard areas, there shall be no alteration of the land which is likely to increase the hazard, including concentration of water through drainage, irrigation or septic systems, removal of vegetative cover, and no undercutting of the bases of slopes or other improper grading methods. 3.) Drainage plans that direct runoff and drainage away from slopes shall be required for construction in hillside areas.
- **Policy 2.8.2:** 2.) A geotechnical report, prepared by a registered civil engineer and based upon adequate soil testing of the materials to be encountered at the sub-grade elevation, shall be submitted to the County Surveyor, Environmental Health Division, and Building and Safety for every applicable subdivision and Building Permit application (as required by the California Building Code).

Ventura County's Initial Study Assessment Guidelines present threshold criteria and standard methods used to determine whether a project could have a significant effect on the environment (Ventura County 2011b). Threshold criteria and standard methods applicable to assessment of geology and soils include the following:

- **Fault Rupture:** If the project is located within any of the following areas:
    - State of California designated Alquist-Priolo Special Fault Study Zone,
    - County of Ventura designated Fault Hazard Area.

- **Liquefaction:** The State of California Seismic Hazard Zones Maps are utilized for all determinations for liquefaction potential. A proposed project will expose people or structures to potential adverse effects, including the risk of loss, injury, or death involving liquefaction if it is located within a Seismic Hazards Zone.
- **Landslide/Mudflow:** The threshold for landslide/mudflow hazard is determined by the Public Works Agency Certified Engineering Geologist based on the location of the site or project within, or outside of mapped landslides, potential earthquake induced landslide zones, and geomorphology of hillside terrain.
- **Expansive Soils:** The determination of a significant soils expansion effect shall be based upon an inquiry of whether a proposed project will expose people or structures to potential adverse effects, including the risk of loss, injury, or death involving soil expansion if it is located within a soils expansive hazard zone or where soils with an expansion index greater than 20 are present.
- **Subsidence:** The determination of a significant subsidence effect shall be based upon an inquiry of whether a proposed project will expose people or structures to potential adverse effects, including the risk of loss, injury, or death involving subsidence if it is located within a subsidence hazard zone.

City of Carpinteria

The Safety Element and the Open Space, Recreation, and Conservation Element of the Carpinteria General Plan and Local Coastal Program presents the long-term objectives, policies, and implementation measures applicable to the assessment of geology and soils including, soil erosion, faults, seismic and slope stability hazards, and soil hazards. The applicable policy includes:

- **OSC-9c.** Minimize soil erosion and polluted runoff during construction and operation of the land use.

4.6.3 Impact Analysis

4.6.3.1 Methodology and Significance Criteria

Information and data from available published resources—including journals, maps, and government websites—were collected and reviewed. The results of previous field investigations contained within Appendix F were also considered. This information was evaluated within the context of applicable federal, state, and local laws, regulations, standards, and policies.

The following significance criteria were defined based on the checklist items in Appendix G of the California Environmental Quality Act (CEQA) Guidelines. An impact is considered significant if the project would:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

   i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. Refer to Division of Mines and Geology Special Publication 42;

ii. Strong seismic ground shaking;

iii. Seismic-related ground failure, including liquefaction; or

iv. Landslides.

b) Result in substantial soil erosion or the loss of topsoil;

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;

d) Be located on expansive soil, as defined in Table 18-1-B of the UBC (1994), creating substantial risks to life or property;

e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater;

f) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or

g) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

Significance criteria (e), (f), and (g) do not apply to the proposed project. Septic tanks would not be constructed as part of the proposed project; therefore, significance criterion (e) is not applicable. No producing oil/gas wells or active mines are located within areas that would be temporarily or permanently disturbed during construction or operation of the project. The proposed project would be located in the vicinity of the Ventura and Rincon oil fields, but the nearest wells to any of the project features are about 1 mile south. There are several active sand and gravel mines in the vicinity of the proposed project, but the construction of the proposed project would not restrict access or otherwise impede development of these resources. No other mineral resources of value to the region or residents of California, or locally important mineral resource recovery sites, are known to occur within the vicinity of the proposed project. Therefore, significance criteria (f) and (g) are not applicable.

4.6.3.2 Applicant Proposed Measures

The applicant has committed to the following applicant proposed measure (APM) as part of the design of the proposed project:

APM GEO-1: Based on the findings of the geotechnical analysis, the applicant would design project components to minimize the potential for landslides, lateral spreading, subsidence, liquefaction, or collapse. Measures that may be used to minimize impacts could include, but are not limited to, stabilization fills, retaining walls, slope coverings, removal of unstable materials, avoidance of highly unstable areas, construction of pile foundations, ground improvements of liquefiable zones, installation of flexible bus connections, and incorporation of slack in cables.

4.6.3.3 Environmental Impacts

Impact GEO-1: Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault.
LESS THAN SIGNIFICANT

There are no proposed project components within an A-P Zone. The nearest A-P Zone in relation to proposed project components is approximately 1.5 miles south of the location where Segments 3A and 3B meet (Figure 4.6-1). Although there are seven potentially active faults in the immediate vicinity of the project (As shown in Table 4.6-4), none of these faults show evidence of displacement within the last 15,000 years. Additionally, no proposed project components are within County of Ventura designated Fault Hazard Area (Ventura County 2013). As required by the Seismic Hazards Mapping Act, geotechnical investigations were prepared by a certified engineering geologist with competence in the field of seismic hazard evaluation and mitigation (SCE 2000; 2001a-c). The geotechnical report contains site-specific evaluations of the seismic hazard(s) affecting the proposed project. The geotechnical report also includes information on the potential for rupture of a known earthquake fault. With the implementation of APM GEO-1, final design criteria would reduce any impacts related to earthquake fault ruptures during construction and operation of the proposed project. Accordingly, any impact under this criterion would be less than significant.

Impact GEO-2: Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking.
LESS THAN SIGNIFICANT

The proposed project would be located in a seismically active area, in close proximity to active and potentially active fault zones. Therefore, the project could experience moderate to high levels of earthquake-induced ground shaking. However, with the exception of the westernmost and easternmost portions of the proposed project, most of the proposed project components would be located in sparsely populated areas, and none of the proposed project components would be used for human occupancy. The subtransmission structures would be designed in accordance with CPUC GO 95, which requires overhead line construction to be capable of withstanding wind, temperature, and wire tension loads. Accounting for these factors would contribute to a design adequate to withstand expected seismic loading. In addition, the results of the geotechnical investigation and geotechnical soil borings would be used to inform the design of project components and ensure compliance with applicable CBC standards, which require structures and permanently attached nonstructural components be designed and built to resist the effects of earthquakes. With the implementation of APM GEO-1, final design criteria would reduce any impacts related to strong seismic ground shaking during construction and operation of the proposed project. Therefore, impacts under this criterion would be less than significant.

Impact GEO-3: Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction.
LESS THAN SIGNIFICANT

Liquefaction hazards are considered to be low in all areas of the proposed project except in portions of Segments 1 and 2 along Coyote Creek and within the Ventura River Valley and along portions of Segments 3A and 4 within the Carpinteria Valley. The short portions of Segments 1 and 2 along Coyote Creek would be located within a State of California Liquefaction Seismic Hazard Zone (CGS

2003b); however, the work to be performed in these areas includes foundation removal and the addition of telecommunications cable. No new structures would be constructed in these areas. Approximately 0.4 miles of the westernmost portion of Segment 4 and approximately 2.8 miles of the westernmost portion of Segment 3A within the Carpinteria Valley would be within an area with a moderate risk of liquefaction (City of Carpinteria 2003; Santa Barbara County 2010). However, based on the results of the past geotechnical investigation, and as part of additional geotechnical investigations that would be implemented under APM GEO-1, the applicant would design project components to minimize potential for liquefaction and incorporate ground improvements in liquefiable zones. Therefore, impacts under this criterion would be less than significant without mitigation.

Impact GEO-4: Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.

LESS THAN SIGNIFICANT WITH MITIGATION

The majority of the project components would be located in areas with rugged topography, steep slopes, and highly unstable bedrock. As a result, landslides (seismically induced or otherwise) are a potential hazard throughout most of the project area. Portions of Segments 3A, 3B, and 4 would be located in a part of the project area with the highest potential for landslide to occur. As noted in Section 4.6.1.2, numerous landslides have been documented throughout the project area during past geotechnical field investigations conducted by the applicant. Prior to construction, the applicant would conduct additional site-specific geotechnical investigations and use the results to inform grading plans, the location of subtransmission structures, and the design of subtransmission structure foundations. In areas with high potential for landslides to occur, the subtransmission structures would be located to reduce the potential for a landslide to compromise the structure foundation. ~~down the ridge line, instead of at the peak of the ridge, to reduce the potential for a landslide to compromise the structure foundation. The subtransmission structure foundations would be designed to withstand lateral loads greater than the anticipated lateral loads that may result from a landslide at each structure location.~~

Current project designs include a number of new retaining walls to be constructed along existing access roads and new spur roads. In addition, based on the results of the geotechnical investigation and as part of implementing APM GEO-1, the applicant would design the project to avoid highly unstable areas, remove unstable materials, and incorporate design features such as stabilization fills, retaining walls, and slope coverings to avoid potential adverse effects to people or structures resulting from a landslide or reduce the potential for a landslide to occur.

Due to the potential of a landslide to occur during the operational life of the proposed project, Mitigation Measure (MM) GEO-1 would be required. MM GEO-1 describes specific maintenance reporting procedures. During operations, the implementation of MM GEO-1 would minimize potential impacts resulting from landslides by pro-actively identifying areas that exhibit characteristics of slope instability. Therefore, impacts under this criterion would be less than significant with mitigation.

Impact GEO-5: Result in substantial soil erosion or the loss of topsoil.

LESS THAN SIGNIFICANT

Soils in the project area are generally loamy with varying proportions of clay, silt, sand, and gravel/cobbles/stones. Most of the soils within the project area have an erosion hazard rating of

severe. However, the applicant would use information about the physical properties of subsurface soils, soil resistivity, and slope stability data from the geotechnical study to inform development of a SWPPP. The SWPPP would include a variety of erosion and sediment controls to reduce the potential for increased erosion and sedimentation that could result from construction or operation of the project. Erosion controls consist of source control measures that are designed to prevent soil particles from detaching and being transported in storm water runoff. The SWPPP would require the applicant to schedule major grading operations during non-rainy periods, preserve existing vegetation to the maximum extent feasible, and apply soil binders, where appropriate, to areas that would remain disturbed for more than two weeks. The SWPPP would also require the applicant to install erosion control devices, where appropriate, such as straw mulch, geotextiles and mats, earth dikes and drainage swales, velocity dissipation devices (at culvert outlets), slope drains, and streambank stabilization to reduce erosion potential during construction.

In addition to the erosion controls, the SWPPP would require the applicant to implement sediment controls, which are structural measures intended to complement and enhance the selected erosion control measures and reduce sediment discharges from active construction areas. Examples of sediment control measures include silt fences, sediment traps, check dams, fiber rolls, gravel bag berms, street sweeping and vacuuming, and sandbag barriers. These measures would be implemented at appropriate locations throughout the project area.

During operations, long-term use of access roads may lead to rutting, which could concentrate runoff and increase rill erosion. However, the applicant would regularly maintain water bars and other erosion control features that would be implemented as part of the SWPPP during operations.

The BMPs and measures identified in the SWPPP would be employed during all land-disturbing activities resulting from construction and/or operation of the proposed project. Therefore, impacts under this criterion would be less than significant without mitigation.

Impact GEO-6: Be located on a geologic unit or soil that is unstable, or would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.

LESS THAN SIGNIFICANT WITH MITIGATION

The project area is located predominantly within a State of California Earthquake-Induced Landslide Hazard Zone or in areas where similar geologic, topographic, and seismic conditions indicate a high risk of landslides. The only portions of the project area where new structures would be installed that would not be at risk of seismically induced landslides are portions along Segments 3A and 4 in the flat, lowland areas of the Carpinteria Valley. While these portions of the proposed project would be located within an area at moderate risk of liquefaction and lateral spreading (City of Carpinteria 2003; Santa Barbara County 2010), there are no known historic occurrences of liquefaction within Santa Barbara County (Santa Barbara County 2010). The project area is also devoid of any areas known to have a risk of subsidence or soil collapse.

The majority of the project components would be sited on naturally unstable geologic units and soils with high erosion potential. Areas where the natural slope is over-steepened by the construction of access roads, subtransmission structure foundations, or other excavated areas would have increased landslide susceptibility. However, current project designs include retaining walls and erosion control devices (e.g., water bars) to combat slope instability and erosion. The SWPPP would require additional site-specific erosion control measures. In addition, based on the

results of the geotechnical investigation and as part of implementing APM GEO-1, the applicant would design the project to avoid highly unstable areas, remove unstable materials, and incorporate design features such as stabilization fills, retaining walls, and slope coverings to avoid potential adverse effects to people or structures resulting from a landslide or reduce the potential for a landslide to occur. During operations, the applicant's implementation of MM GEO-1 would minimize potential impacts resulting from landslides by pro-actively identifying areas that exhibit characteristics of slope instability.

Liquefaction and lateral spreading could result in lowland areas where saturated sandy soil loses strength and cohesion due to ground shaking during an earthquake. In these areas, based on the results of the geotechnical investigation and as part of implementing APM GEO-1, the applicant would design project components to minimize potential for liquefaction and incorporate ground improvements in liquefiable zones.

With the incorporation of project design features, implementation of the SWPPP, and the incorporation of APM GEO-1, as well as the incorporation of MM GEO-1, construction and operational impacts associated with landslides, liquefaction, and/or lateral spreading would be less than significant. Because no areas of subsidence or soil collapse are known or expected to occur within the project area, construction or operation impacts associated with the risk of subsidence and soil collapse would be less than significant with mitigation.

Impact GEO-7: Be located on expansive soil, creating substantial risks to life or property. LESS THAN SIGNIFICANT

Expansive soils (e.g., those with high-plasticity clay content) can cause structural failure of foundations such as those associated with the proposed project components. The shrink-swell potential is an indicator of the potential for encountering expansive soil within a soil map unit (Table 4.6-2). The shrink-swell potential of soil map units throughout the project area varies, but the shrink-swell potential of most soil map units is moderate.

The applicant would use the results of the geotechnical investigation (as described in APM GEO-1) to inform the final engineering designs of foundations and other structures that may be impacted by expansive soils. The project would also be required to comply with all applicable building codes. Therefore, impacts under this criterion would be less than significant without mitigation.

4.6.4 Mitigation Measures

MM GEO-1: During operations, the applicant will conduct annual, or more often as needed, maintenance patrols to identify areas of active slope instability and submit an annual report to the CPUC. Any areas of slope instability that could potentially affect project facilities (e.g., access roads, subtransmission structures, etc.) will be addressed on a case-by-case basis to minimize on- and off-site impacts.