4.6 Geology, Soils, and Mineral Resources

This section describes the environmental and regulatory settings and discusses impacts associated with construction and operation of the proposed Valley–Ivyglen 115-kilovolt (kV) Subtransmission Line Project (proposed Valley–Ivyglen Project) and the proposed Alberhill System Project (proposed Alberhill Project) with respect to geology, soils, and mineral resources. During scoping, commenters expressed concern about the proposed projects being sited in a seismically active area where the project components would be subject to strong ground shaking. This section addresses faults and potential earthquakes in the area of the proposed projects.

The proposed Alberhill Project would include the installation of three microwave antennas on existing structures at the Santiago Peak Communication Site in the U.S. Forest Service Cleveland National Forest as well as at the Serrano Substation in the City of Orange. Installation of these components would not impact geology, soils, or mineral resources; therefore, this section does not address these components of the proposed Alberhill Project.

4.6.1 Environmental Setting

4.6.1.1 Geology

Topography

The topography in the proposed project area ranges from gently sloping low-lying areas in valley and drainage bottoms to relatively steep hillslopes and mountains. Elevations range from 1,248 to 2,374 feet in the areas associated with the 500-kV transmission lines and 115-kV subtransmission line segments and from 1,179 to 1,215 feet in the vicinity of the proposed Alberhill Substation site.

The proposed Alberhill Substation site and 115-kV Segments ASP1 and ASP1.5 would be located in a relatively flat area within Temescal Canyon, a depression formed by the Elsinore Fault. Steep hillsides flank the canyon, which trends from southeast to northwest along the Elsinore Fault. These hills are located to the north and east of the proposed Alberhill Substation site. The proposed 500-kV transmission lines, which would connect the proposed substation to the existing Serrano-Valley 500-kV Transmission Line, would traverse steep hills along their northeasterly route.

Proposed 115-kV Segment ASP2 would continue from 115-kV Segments ASP1 at the proposed Alberhill Substation site southeasterly through gentle rolling hills, generally following the path of Temescal Wash (Figure 4.9-2, near Ivyglen Substation) through Temescal Canyon. The Santa Ana Mountains and the lower Elsinore Mountains are generally west of the proposed Alberhill Substation site. Proposed 115-kV Segment ASP3 would be located on mostly flat or gently sloping terrain, and 115-kV Segment ASP4 would traverse gentle rolling hills. Proposed 115-kV Segment ASP5 would be located on relatively flat-lying topography along its western section, moderately steep hills in the middle third section, and gently rolling hills along its eastern section. Proposed 115-kV Segments ASP6, ASP7, and ASP8 would cross generally flat terrain with a few gentle rolling hills.

Proposed 115-kV Segment VIG1 would traverse a flat to gently rolling alluvial plain formed by the San Jacinto River (Figure 4.9-2, near 115-kV Segment 4) with some small hills as the route approaches State Route 74 and the start of 115-kV Segment VIG2. The proposed 115-kV Valley–Ivyglen Subtransmission Line route would continue south and then west through hilly areas just north of the City of Lake Elsinore and then would generally follow the path of Temescal Wash through Temescal Canyon. The Santa Ana Mountains and the lower Elsinore Mountains lie to the west of Ivyglen Substation where the proposed Valley–Ivyglen 115-kV line would terminate.

Geomorphic Setting

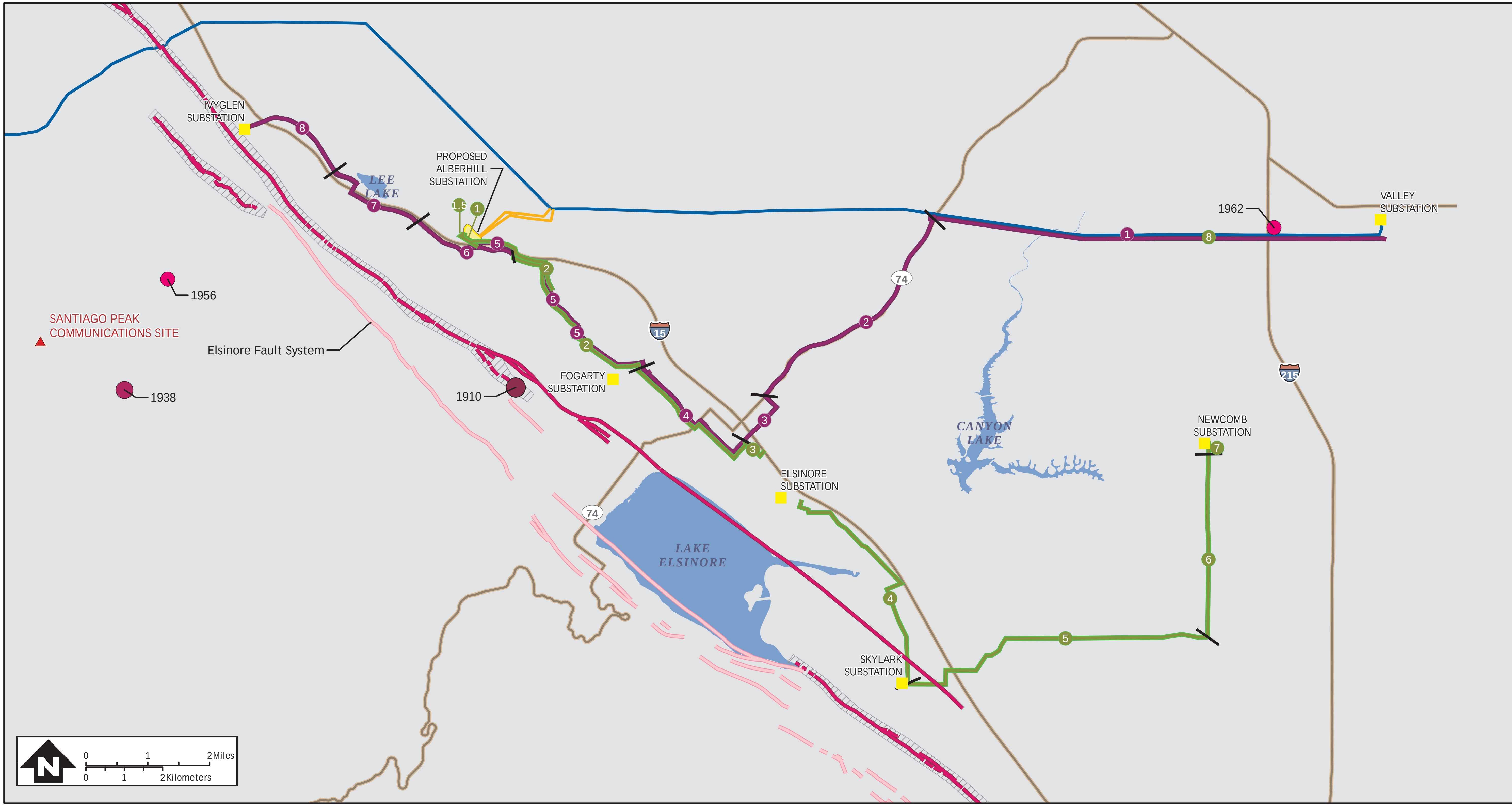
The proposed project area lies within the central portion of the Peninsular Ranges geomorphic province, which is bound to the north by the Transverse Ranges and to the east by the Colorado Desert geomorphic provinces (CGS 2002). A series of northwest/southeast trending alignments of mountains, hills, and intervening valleys, reflecting the influence of northwest trending major faults (San Andreas and San Jacinto) characterize the Peninsular Ranges province. The proposed projects would be located in the Lake Elsinore basin (Elsinore Valley) in Southern California, south and east of the City of Los Angeles. The northwest trending Elsinore Fault system influences the topography of the Elsinore Valley (Figure 4.6-1).

Geologic Units

The rocks exposed in the proposed project area include igneous, metasedimentary, and sedimentary rock and alluvium deposits (deposits left by flowing water). The Elsinore Valley floor, which makes up about two-thirds of the area traversed by components of the proposed projects, is composed of unconsolidated Pleistocene and Holocene sand, silt, and clay. The western half of the proposed project area, including the proposed Alberhill Substation site, is composed of alluvium deposits near Temescal Wash, volcanic rocks in the hills to the east, and granitic rock. Deposits of lacustrine (lake) origin are exposed in the Lake Elsinore basin. Table 4.6-1 lists the geologic units within the proposed project area.

Soils

The range of soil types and qualities found in the proposed project area are summarized in Table 4.6-2. Soils at the Alberhill Substation site are well drained and consist of loam, sandy loam, and rocky loam. The soils have relatively low ability to host vegetation due to the dry climate and lack of substantial organic material. Table 4.6-3, list the soil types along the proposed 500-kV transmission line routes and 115-kV subtransmission line and fiber optic line routes. Generally well-drained soils consisting of loam with various amounts of sand, gravel, and rock are found along the proposed 500-kV transmission line, 115-kV subtransmission line, and fiber optic routes.



Source: California Geological Survey 2002, U.S. Geological Survey 2006, ESRI 2010, SCE 2011, 2013

1 VIG1
2 VIG2
3 VIG3
4 VIG4
5 VIG5
6 VIG6
7 VIG7
8 VIG8

1 ASP1
1.5 ASP1.5
2 ASP2
3 ASP3
4 ASP4
5 ASP5
6 ASP6
7 ASP7
8 ASP8

Existing Substations
Proposed Alberhill Substation
Proposed 500-kV transmission lines
500-kV Serrano Valley Transmission Line
Segment begin / end

Earthquake Magnitude
4.0 - 4.9
5.0 - 5.9
> 6
Holocene (<15,000)
Late Quaternary (<130,000)
Alquist-Priolo Fault Zone

Figure 4.6-1

Regional Faults and Earthquake Epicenters

Alberhill and Valley–Ivyglen Projects

Riverside County, California

Table 4.6-1 Geologic Units within the Proposed Project Area

Component	Formation Description and Age
Valley – Ivyglen Project	
Segment VIG1	Gabbro, Peninsular Ranges batholith, massive-textured, tonalite, Gavilan ring complex, phyllite, quartz-rich rocks, Mesozoic metasedimentary rocks (undifferentiated), old alluvial fan deposits (arenaceous), young and very old axial channel deposits, gravel, very old alluvial fan deposits, arenaceous gravel, wash deposits
Segment VIG2	Massive-textured, tonalite, Gavilan ring complex, Peninsular range batholith, quartz-rich rocks, Mesozoic metasedimentary rocks (undifferentiated), young and very old alluvial fan deposits
Segment VIG3	Young axial channel alluvial deposits, young alluvial fan deposits
Segment VIG4	Young axial channel alluvial deposits, Silverado Formation (coal seams and clay deposits)
Segment VIG5	Estelle Mountain volcanic rocks, Mesozoic metasedimentary rocks (undifferentiated), artificial fill, old channel alluvial deposits, young and very old axial channel deposits, young alluvial fan deposits, young alluvial valley deposits, young alluvial wash deposits, Silverado Formation (coal seams and clay deposits)
Segment VIG6	Old channel alluvial deposits, young and very old axial channel deposits, very old alluvial channel deposits, young alluvial fan deposits, young alluvial wash deposits
Segment VIG7	Old channel alluvial deposits, old and young alluvial fan deposits, gravel, very old alluvial channel deposits, young axial channel alluvial deposits, young alluvial wash deposits
Segment VIG8	Estelle Mountain volcanic rocks, old alluvial fan deposits, gravel, young axial channel alluvial deposits, alluvial valley deposits, Silverado Formation (coal seams and clay deposits)
Alberhill Project	
Alberhill Substation	Old channel alluvial deposits, young alluvial wash deposits
500-kV transmission lines	Estelle Mountain volcanic rocks
Segment ASP1	Old channel alluvial deposits, young alluvial wash deposits
Segment ASP1.5	Old channel alluvial deposits, young alluvial wash deposits
Segment ASP2	Very old alluvial fan deposits, young axial channel alluvial deposits, young alluvial valley deposits, young alluvial wash deposits, Silverado Formation (coal seams and clay deposits)
Segment ASP3	Young axial channel alluvial deposits
Segment ASP4	Heterogeneous granitic rocks, quartz-rich rocks, lacustrine (lake) deposits, young alluvial fan deposits
Segment ASP5	Granodiorite to tonalite of Deomenigoni Valley, monzonite to granodiorite, quartz-rich rocks, lacustrine (lake) deposits, very old alluvial fan deposits, young axial channel alluvial deposits
Segment ASP6	Granodiorite to tonalite of Deomenigoni Valley, very old alluvial fan deposits
Segment ASP7	Granodiorite to tonalite of Deomenigoni Valley
Segment ASP8	Young alluvial valley deposits (silty sand)

Sources: USGS 2004, 2007

Table 4.6-2 Range of Soil Types and Soil Characteristics in Proposed Project Area

Component	Soil Types	Drainage	Percent Slope (average)	Erosion Potential[a]	Shrink-Swell Potential
Valley–Ivyglen Project					
Segment VIG1[b]	Clay, sandy loam, rocky loam	Well drained, somewhat excessively drained	1 to 38	Wind: M Water: M Roads: M, L	L, M, S
Segment VIG2[b]	Coarse sandy loam, rocky sandy loam, clay, fine sandy loam, gravelly loam, rocky	Well drained, somewhat excessively drained	5 to 38	Wind: N, M, L Water: M Roads: M, S	M, S

Table 4.6-2 Range of Soil Types and Soil Characteristics in Proposed Project Area

Component	Soil Types	Drainage	Percent Slope (average)	Erosion Potential[a]	Shrink-Swell Potential
	loam, loam				
Segment VIG3	Gravelly loam, gravelly very fine sandy loam	Well drained	1 to 5	Wind: L, M Water: M, H Roads: L, M	L, M
Segment VIG4 [b]	Silty clay, cobbly clay, fine sandy loam, loamy fine sand	Poorly drained, moderately well drained, well drained	1 to 22	Wind: N, M, H Water: M Roads: L, M, S	L, M, S
Segment VIG5 [b]	Sandy loam, cobbly clay, loamy sand, coarse sandy loam	Well drained, somewhat excessively drained	4 to 53	Wind: N, M, H Water: M Roads: M, S	M, S
Segment VIG6 [b]	Sandy loam, loamy sand, cobbly coarse sandy loam	Well drained, somewhat excessively drained	4 to 53	Wind: M, H Water: M Roads: M	M, S
Segment VIG7 [b]	Gravelly coarse sandy loam, riverwash, rocky loam	Well drained, somewhat excessively drained, excessively drained	4 to 53	Wind: N, M, H Water: M Roads: L, M, S	L, M, S
Segment VIG8 [b]	Loamy sand, gravelly loamy sand	Somewhat excessively drained	4 to 53	Wind: M, H Water: M Roads: M	M
Alberhill Project					
Alberhill Substation	Sandy loam, loam, loamy sand, cobbly sandy loam	Well drained, somewhat excessively drained	4 to 12	Wind: M, H Water: M Roads: M, S	L
500-kV transmission lines	Rocky loam, sandy loam, loam	Well drained	5 to 33	Wind: M Water: M Roads: M, S	L
Segment ASP1, Segment ASP 1.5	Loamy sand, sandy loam, loam	Well drained, somewhat excessively drained	4 to 5	Wind: M, H Water: M Roads: M	L
Segment ASP2 [b]	Cobbly loam, sandy loam, cobbly clay, fine sandy loam, silty clay, fine sandy loam, loamy sand, coarse sandy loam	Poorly drained, moderately well drained, well drained, somewhat excessively drained	1 to 53	Wind: L, M, H Water: M Roads: L, M, S	L, H
Segment ASP3	Gravelly loam, gravelly coarse sandy loam, very fine sandy loam, gravelly very fine sandy loam	Well drained, somewhat excessively drained	1 to 20	Wind: L, M Water: M, M–H Roads: L, M, S	L
Segment ASP4 [b]	Sandy loam, very fine sandy loam, coarse sandy loam, sandy loam, loam, rocky loam	Well drained	4 to 33	Wind: L, M Water: M, MH, H Roads: L, M, S	L
Segment ASP5	Rocky fine sandy loam, sandy loam, coarse sandy loam	Well drained	5 to 23	Wind: M Water: M Roads: M, S	L

Table 4.6-2 Range of Soil Types and Soil Characteristics in Proposed Project Area

Component	Soil Types	Drainage	Percent Slope (average)	Erosion Potential[a]	Shrink-Swell Potential
Segment ASP6[b]	Sandy loam, fine sandy loam, rocky fine sandy loam, rocky sandy loam	Well drained, somewhat excessively drained	5 to 33	Wind: M Water: M Roads: M, S	—
Segment ASP7	Sandy loam, silt loam, fine sandy loam	Moderately well drained, well drained	4 to 7	Wind: L, M Water: M, VH Roads: M, S	L, H
Segment ASP8	Clay	Well drained	5	Wind: L Water: M Roads: M	M

Sources: NRCS 2003, 2008
Key: N= Negligible, L = Low, M = Moderate, H = High, S = Severe
Note:
[a] Wind erosion levels were determined according to wind erodibility group classifications of High (1–2), Moderate (3–4), Low (5–6), and Negligible (7–8). Water erosion levels were determined according to Kf factors of Low (0.02–0.1875), Moderate (0.1876–0.3351), High (0.3552–0.5227), and Very High (0.5228–0.69). K factor levels do not account for the effect of slope on erosion. Steeper slopes may indicate increased erosion potential depending on soil type. Roadway erosion levels were determined based on qualitative database values regarding the potential risk for erosion along unsurfaced roads and trails (Low to Severe) (NRCS 1998).
[b] Ssoils covering 5 percent or more of route shown

Table 4.6-3 Maximum Credible Earthquake and Slip Rate for Southern California Faults in Proximity to the Proposed Project Area

Fault System	Age of Faults within Fault System	Distance to Proposed Alberhill Substation Site	Maximum Magnitude[a.]
Elsinore	Historic and Holocene	1.5 miles south, southeast	6.8–7.0
San Jacinto	Historic and Holocene	20 miles northeast	6.6–7.2
Newport-Inglewood	Holocene	30 miles west	7.1
San Andreas	Holocene	30 northeast	6.2–7.5
Sierra Madre	Holocene	30 miles north	6.7–7.2

Sources: CGS 2003; USGS 2015b
Note:
[a] The maximum magnitude is expressed based on the Moment Magnitude scale, which is used to measure the size of earthquakes according to the amount of energy released.

4.6.1.2 Geologic Hazards

Faulting and Seismicity

Significant earthquakes and moderate tremors are common in Southern California. The proposed project area is a seismically active area with several active and potentially active faults[1] that generate earthquakes (Figure 4.6-1). A number of Holocene faults (movement within the past 11,500 years) and potentially active Quaternary faults (movement within the past 1.8 million years) are present within 50 miles of the proposed project area. The faults are primarily strike-slip (horizontal side-to-side motion).

[1] *Faults* are fractures or lines of weakness in the Earth's crust.

The major fault along the proposed 115-kV routes is the Elsinore Fault (Figure 4.6-1). Studies indicate that the Elsinore Fault, a surface fault exhibiting horizontal movement, is capable of generating earthquakes with local magnitudes (ML) in the range of 6.5 to 7.5, with a recurrence interval of approximately 250 years between major events.[2] Smaller events may occur more frequently. The entire project area is likely to experience repeated moderate to strong ground shaking generated by the Elsinore Fault in the foreseeable future. The main trace of the Elsinore fault zone has seen one historical event greater than magnitude 5.2, the magnitude six earthquake of 1910 near Temescal Valley (California Institute of Technology 2011). This earthquake produced no known surface rupture and caused little damage. The Elsinore Fault system[3] contains several parallel to sub-parallel fault segments, and characteristically occupies a trough-like depression. The nearest major faults to the proposed projects are the Glen Ivy North sections of the northwest-trending Elsinore Fault system. Glen Ivy North fault sections cross beneath 115-kV Segments ASP4 and ASP5. Studies indicate that this fault zone is capable of generating earthquakes with magnitudes in the range of 6.8 to 7.0 and a recurrence interval of approximately 250 years between major events. The most recent major event was in 1910 and had a Richter-scale magnitude of 6 (California Institute of Technology 2011).

Table 4.6-3 lists fault systems with historic occurrences (within the past 150 years) and Holocene faults (within the past 11,500 years) in proximity to the proposed project area. The proposed project area is likely to experience moderate to strong ground shaking generated by the Elsinore Fault Zone and other active faults in the region.

Fault Surface Ruptures. Fault surface ruptures generally occur along preexisting active faults when movement along a fault line breaks through to the surface. Surface ruptures may occur suddenly along with a large earthquake or slowly in the form of fault creep. The Elsinore Fault system exhibits horizontal movement and has sections with surface ruptures. Certain sections within the system are designated as active fault rupture zones under the California Alquist-Priolo Earthquake Fault Zoning Act (see Figure 4.6-1 and Section 4.6.2, “Regulatory Setting”). For the purposes of the Alquist-Priolo Earthquake Fault Zoning Act, active faults are those that have caused surface displacement within the last 11,000 years, and potentially active faults are those that have caused surface displacement within the last 1.6 million years. Only the existing Serrano–Valley 500-kV Transmission Line crosses an active fault rupture zone as defined under the California Alquist-Priolo Earthquake Fault Zoning Act.

Ground Shaking. The intensity of the seismic shaking, or strong ground motion, during an earthquake is dependent on the distance to the earthquake’s epicenter (point at the earth’s surface directly above the initial movement of the fault at depth), the magnitude (seismic energy released), and the geologic conditions underlying and surrounding the affected area. Strong earthquakes occurring along the faults closest to components of the proposed project would generate the greatest amount of ground shaking. Earthquakes occurring in more distant areas or small, local earthquakes could cause intense ground shaking in areas underlain by thick, loose, unconsolidated, and water-saturated sediments.

[2] Charles Richter developed the ML scale for moderate-size (between 3 and 7 ML) earthquakes in southern California. The ML scale is often called the Richter scale. All of the currently used methods for measuring earthquake magnitude (e.g., moment magnitude M) yield results that are consistent with ML (USGS 2002).

[3] A *fault system* is a system of related faults that are commonly braided and parallel but may also be branching and divergent.

The U.S. Geological Survey provides a uniform estimate of the intensity (i.e., strength, not to be confused with magnitude) of earthquake-induced ground motion based on an up-to-date assessment of potential earthquake faults or other sources. A commonly used benchmark is peak horizontal ground acceleration, which is represented as a fraction (a percent) of the acceleration of gravity (e.g., 0.2g or 20 percent of gravity). There is a 2 percent chance in 50 years that the proposed project area would experience peak horizontal ground accelerations of between 60 and 120 percent of gravity (violent perceived shaking) and a 10 percent chance of experiencing between 30 and 60 percent of gravity (severe perceived shaking) (USGS 2008).[4]

Erosion

The soils at the proposed Alberhill Substation site and along the 500-kV transmission line and 115-kV subtransmission line routes are prone to mostly moderate erosion (Tables 4.6-3). High levels of erosion have occurred and would likely continue to occur along sloped areas. Wind erosion occurs primarily during the summer and fall when weather is hot and windy. Soils lose moisture and cohesiveness under hot dry conditions. The winter and spring are associated with greater levels of water erosion caused by precipitation and stormwater runoff.

During demolition activities on the Alberhill Substation site that occurred in 2011 (refer to Section 2.4.4.1, “Demolition of Horse Ranch Facilities and Weed Abatement), Southern California Edison (the applicant) implemented a number of best management practices (BMPs) specified by the California Stormwater Quality Association to control soil erosion and loss of topsoil. BMPs included, among others, scheduling (the sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking weather into consideration), preservation of existing vegetation, and wind erosion control. A complete list of BMPs for demolition activities at the proposed Alberhill Substation site is provided in Appendix G.

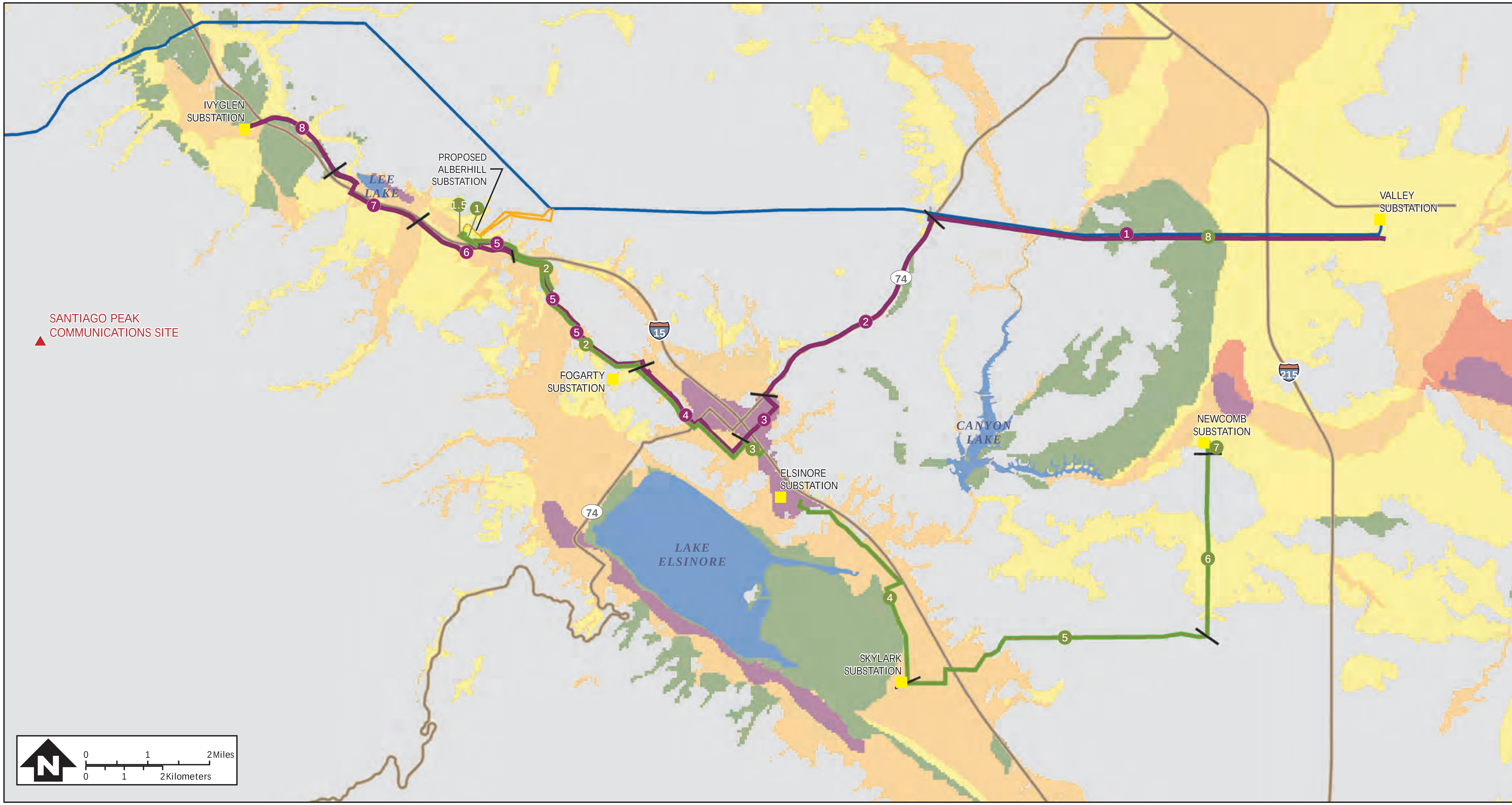
Landslides

The proposed 500-kV and 115-kV lines would traverse hills and slopes that may be susceptible to landslides induced by seismic activity or other factors, such as rainfall. Landslides and rock falls occur most often on steep or compromised slopes. Factors controlling the stability of slopes include: slope height and steepness, characteristics of the earth materials comprising the slope, and intensity of ground shaking (CGS 2011; County of Riverside 2003; USGS 2015a, 2003).

Liquefaction

Liquefaction is a risk primarily when saturated, loose, fine- to medium-grained soils are present in areas where the groundwater table is within at least approximately 50 feet of the ground surface. Liquefaction occurs when soils temporarily lose their shear strength during strong ground shaking events and can include loss of bearing strength (the ability to support a load such as a building foundation), lateral spreading (the flow of soil down a slope due to liquefaction), and subsidence. Figure 4.6-2 shows liquefaction susceptibility in the proposed project area.

[4] Peak acceleration is the maximum acceleration experienced by a particle during the course of the earthquake motion. In general, perceived shaking from a peak acceleration of less than 9 percent of gravity is considered moderate and greater than 9 percent is considered strong (USGS 2011).



Source: Riverside County 2012, ESRI 2010, SCE 2011, 2013

1 VIG1
2 VIG2
3 VIG3
4 VIG4
5 VIG5
6 VIG6
7 VIG7
8 VIG8

1 ASP1
1.5 ASP1.5
2 ASP2
3 ASP3
4 ASP4
5 ASP5
6 ASP6
7 ASP7
8 ASP8

Existing Substations
Proposed Alberhill Substation
Proposed 500-kV transmission lines
500-kV Serrano Valley Transmission Line
Segment begin / end

Liquefaction Susceptibility
Very High
High
Moderate
Low
Very low

Figure 4.6-2

Liquefaction Susceptibility in the Project Areas

Alberhill and Valley–Ivyglen Projects

Riverside County, California

Subsidence

Subsidence is the settling of the ground surface due to compaction (consolidation) of underlying unconsolidated (loosely packed) sediments. Subsidence is most common in uncompacted soil, thick unconsolidated alluvial material, and improperly constructed artificial fill. Subsidence can result from earthquakes or fluid withdrawal (e.g., extraction of groundwater) from compressible sediments resulting in the settling or sinking of the ground surface over a regional area. The Riverside County General Plan identifies sections of the proposed project as being susceptible to subsidence, but no subsidence has been documented (County of Riverside 2003, 2008b). In addition, continued groundwater deficits that have been recorded annually around Lake Elsinore could lead to subsidence, although there has been no distinct evidence of subsidence (City of Lake Elsinore 2006).

Collapsible Soil

Soil collapse typically occurs in Holocene (within the last 11,500 years) soils deposited in an arid or semi-arid environment. These soils typically contain minute pores and voids. The soil particles may be partially supported by clay or silt or chemically cemented with carbonates. When saturated, water removes the cohesive material and rapid, substantial settlement results. An increase in surface water infiltration (e.g., from irrigation or a rise in the groundwater table) combined with the weight of a building or structure can initiate settlement and cause foundations and walls to crack. In the County of Riverside, collapsible soils occur predominantly at the base of mountains, where Holocene-age alluvial fan and wash sediments were deposited during rapid runoff events (County of Riverside 2008b). It is likely that collapsible soils are present in the proposed project area, given that portions of the proposed projects would be located on such sediments.

Expansive Soil

Expansive soils shrink or swell with changes in moisture content. This characteristic is typically associated with high clay-mineral content in soils. Changes in soil moisture could result from a number of factors, including rainfall, landscape irrigation, utility leakage, and/or perched groundwater. Expansive soils are typically very fine-grained, with high to very high percentages of clay. Soils in the proposed project area generally exhibit a low shrink-swell (expansive) potential (NRCS 2008); however, some soils formed on the older alluvium can be clay-rich and have moderate to very high expansion potential. Soils with clay contents and the shrink-swell potential of soils at the proposed Alberhill Substation site and along the proposed 500-kV transmission and 115-kV subtransmission line routes are presented in Table 4.6-2.

4.6.1.3 Minerals

Riverside County has extensive deposits of clay, limestone, iron, sand, and aggregates. In recent years, clay deposits from the Alberhill area and construction aggregate have been the most important mineral commodities, but the City of Lake Elsinore and surrounding areas have historically been mined for a number of resources, including asbestos and coal (City of Lake Elsinore 2011).

Geothermal resources exist in the area but have not been developed for power production; the Riverside County General Plan identifies some potential for such development (County of Riverside 2008a). No oil or gas reserves are located within 15 miles of components of the proposed project (DOC 2001).

The State Mining and Geology Board oversees classification of land with mineral resource deposits in California. The Board has established Mineral Resources Zones (MRZs) to designate lands that contain mineral deposits pursuant to the Surface Mining and Reclamation Act as follows (County of Riverside (2008a):

- MRZ-1: Areas where the available geologic information indicates no significant mineral deposits or a minimal likelihood of significant mineral deposits.
- MRZ-2a: Areas where the available geologic information indicates that there are significant mineral deposits.
- MRZ-2b: Areas where the available geologic information indicates that there is a likelihood of significant mineral deposits.
- MRZ-3: Areas where the available geologic information indicates that mineral deposits are likely to exist, but the significance of the deposit undetermined.
- MRZ-4: Areas where there is not enough information available to determine the presence or absence of mineral deposits.

Socioeconomic factors such as market conditions and urban development patterns contribute to the determination of the MRZs. Most of the proposed projects' subtransmission line route is located in areas designated MRZ-3. However, areas along the Interstate 15 (I-15) corridor north of Lake Elsinore are classified MRZ-2 due to clay deposits. These include portions of the proposed 115-kV Segment ASP2, VIG5, and VIG8.

4.6.2 Regulatory Setting

4.6.2.1 Federal

Clean Water Act

Under the Clean Water Act of 1972 (33 United States Code §1251 et seq.), the U.S. Environmental Protection Agency has 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 a system that requires states to establish discharge standards specific to water bodies, known as the National Pollutant Discharge Elimination System (NPDES), which 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 Regional Water Quality Control Boards implement and administer the NPDES permit program. Refer to Section 4.9, "Hydrology and Water Quality," for further information.

4.6.2.2 State

Seismic Hazards Mapping Act/Seismic Hazards Zonation Program

The Seismic Hazards Mapping Act directs the California Geological Survey (CGS; previously called the California Department of Conservation, Division of Mines and Geology) to delineate Seismic Hazard Zones. The purpose of this act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards. It directs California state, county, and city agencies to use Seismic Hazard Zone maps developed by CGS in their land-use planning and permitting processes.

In accordance with the provisions of the Seismic Hazards Mapping Act, Article 10 of the California Code of Regulations (CGS Seismic Hazards Zonation Program) requires performance of site-specific geotechnical investigations prior to permitting projects within Seismic Hazard Zones. A registered civil engineer or certified engineering geologist with competence in the field of seismic hazard evaluation and mitigation must prepare the geotechnical report. The geotechnical report must contain site-specific evaluations of the seismic hazard affecting the project and identify portions of the project site containing seismic hazards. The report must also identify any known offsite seismic hazards that could adversely affect the site in the event of an earthquake.

Alquist-Priolo Earthquake Fault Zoning Act

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act is to regulate development near active faults to mitigate the hazard of surface fault rupture. This act requires disclosure of proximity of the active fault to potential real estate buyers and requires a 50-foot setback from the active fault for new occupied buildings.

California Building Code/Seismic Zones

The California Building Code (California Code of Regulations, Title 24) defines minimum building requirements based on a region's seismic hazard potential. There are four types of Seismic Zones, with Zone 1 having the lowest seismic potential and Zone 4 having the highest. The proposed projects would be located within Seismic Zone 4 and subject to the building standards listed for Seismic Zone 4.

Surface Mining and Reclamation Act

The intent of the Surface Mining and Reclamation Act is to promote production and conservation of mineral resources, minimize environmental effects of mining, and ensure that mined lands are reclaimed to conditions suitable for alternative uses. It requires that the State Geologist classify land according to the presence or absence of significant mineral deposits. It gives local jurisdictions the authority to permit or restrict mining operations in accordance with its specifications. Classification of land within California takes place according to a priority list established in 1982 or when the State Mining and Geology Board is petitioned to classify a specific area. Once classification of an area has taken place, the Board transmits the information to the appropriate lead agencies for mandated incorporation into their land use planning processes.

4.6.2.3 Regional and Local

Santa Ana Regional Water Quality Control Board

The Santa Ana Regional Water Quality Control Board manages water quality for the jurisdictions traversed by components of the proposed projects. The applicant would be required to obtain a NPDES permit from the Board because construction of the proposed projects would disturb a surface area greater than 1 acre. To acquire this permit, the applicant would prepare a SWPPP that would include information about the proposed projects; monitoring and reporting procedures; and BMPs, including those for erosion, sedimentation, and stormwater runoff control. The SWPPP would be based on final engineering design and would include all components of the proposed project.

County of Riverside General Plan

The following policies from the Riverside County General Plan, listed in relevant part, are pertinent to geologic resources and the proposed projects:

- ***Policy S 2.1:*** *Minimize fault rupture hazards through enforcement of Alquist-Priolo Earthquake Fault Zoning Act provisions and the following policies:*
  - *Require geologic studies or analyses for critical structures, and lifeline, high-occupancy, schools, and high-risk structures, within 0.5 miles of all Quaternary to historic faults shown on the Earthquake Fault Studies Zones map.*
  - *Require geologic trenching studies within all designated Earthquake Fault Studies Zones, unless adequate evidence, as determined and accepted by the County Engineering Geologist, is presented. The County may require geologic trenching of non-zoned faults for especially critical or vulnerable structures or lifelines*
  - *Require that lifelines are designed to resist, without failure, their crossing of a fault, should fault rupture occur.*
- ***Policy S 2.2:*** *Require geological and geotechnical investigations in areas with potential for earthquake-induced liquefaction, landsliding or settlement as part of the environmental and development review process, for any structure proposed for human occupancy, and any structure whose damage would cause harm.*
- ***Policy S 2.3:*** *Require that a State-licensed professional investigate the potential for liquefaction in areas designated as underlain by "Susceptible Sediments" and "Shallow Ground Water" for all general construction projects.*
- ***Policy S 2.5:*** *Require that engineered slopes be designed to resist seismically-induced failure.*
- ***Policy S 2.7:*** *Require a 100 % maximum variation of fill depths beneath structures to mitigate the potential of seismically-induced differential settlement.*
- ***Policy S 3.1:*** *Require the following in landslide potential hazard management zones, or when deemed necessary by CEQA:*
  - *Preliminary geotechnical and geologic investigations*
  - *Evaluations of site stability, including any possible impact on adjacent properties, before final project design is approved.*
  - *Consultant reports investigations, and design recommendations required for grading permits, building permits, and subdivision applications be prepared by State-licensed professionals.*
- ***Policy S 3.4:*** *Require adequate mitigation of potential impacts from erosion, slope instability, or other hazardous slope conditions, or from loss of aesthetic resources for development occurring on slope and hillside areas.*
- ***Policy S 3.6:*** *Require grading plans, environmental assessments, engineering and geologic technical reports, irrigation and landscaping plans, including ecological restoration and revegetation plans, as appropriate, in order to assure the adequate demonstration of a project's ability to mitigate the potential impacts of slope and erosion hazards and loss of native vegetation.*

- ***Policy S 3.8:*** *Require geotechnical studies within documented subsidence zones, as well as zones that may be susceptible to subsidence prior to the issuance of development permits.*

City of Lake Elsinore General Plan

The following goal from the City of Lake Elsinore General Plan is relevant to geologic resources:

- ***Goal 6:*** *Minimize the risk of loss of life, injury, property damage, and economic and social displacement due to seismic and geological hazards resulting from earthquakes and geological constraints.*

City of Menifee

The following goals and policy from the City of Menifee General Plan are relevant to geologic resources:

- ***Goal S-1:*** *A community that is minimally impacted by seismic shaking and earthquake-induced or other geologic hazards.*
- ***Goal S-2:*** *A community that has used engineering solutions to reduce or eliminate the potential for injury, loss of life, property damage, and economic and social disruption caused by geologic hazards such as slope instability; compressible, collapsible, expansive or corrosive soils; and subsidence due to groundwater withdrawal.*
- ***Policy S-2.3****: Minimize grading and modifications to the natural topography to prevent the potential for man-induced slope failures.*

City of Wildomar

At the time of preparation of this document, the City of Wildomar had not adopted a general plan. Wildomar was incorporated in 2008 and adopted all County of Riverside ordinances at that time. County ordinances remain in effect until the City enacts ordinances to supersede them. Policies listed above under the Riverside County General Plan as applicable to the proposed Alberhill Project also apply to the City of Wildomar. No components of the Valley-Ivyglen Project are located within the City of Wildomar.

City of Perris

The following policy and implementation measures from the City of Perris General Plan are relevant to geologic resources:

- ***Policy I.E:*** *All development will be required to include adequate protection from damage due to seismic incidents.*
  - ***Implementation Measure I.E.1:*** *Require geological and geotechnical investigations by State-licensed professionals, in areas with potential for earthquake-induced liquefaction, landsliding, other slope instability, or settlement as part of the environmental and development review process.*
  - ***Implementation Measure I.E.2:*** *Require implementation of mitigation measures identified in such investigations mentioned above, prior to the issuance of grading and building permits.*
  - ***Implementation Measure I.E.3:*** *Require engineered slopes to be designed to resist seismically induced failure, in accordance with state-of-the-art engineering parameters and analytical methods.*

- ***Implementation Measure I.E.7:*** *Geotechnical studies will be required for all projects to determine the potential for damage from expansive soils, and to define appropriate mitigation measures to address the damage potential that is identified.*

4.6.3 Methodology and Significance Criteria

Information and data from available published resources including journals, maps, and government websites were collected and reviewed. This information was evaluated within the context of applicable federal, state, and local laws, regulations, standards, and policies. Potential impacts on geology, soils, and mineral resources and from geologic hazards were evaluated according to the following significance criteria. The criteria were defined based on the checklist items presented in Appendix G of the California Environmental Quality Act Guidelines. The proposed projects would cause a significant impact if they 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 offsite landslide, lateral spreading, subsidence, liquefaction or collapse;

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

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

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.

4.6.4 Environmental Impacts and Mitigation Measures (Valley–Ivyglen Project)

4.6.4.1 Project Commitments (Valley–Ivyglen Project)

The applicant has committed to the following as part of the design of the proposed Valley–Ivyglen Project. See Section 2.6, “Project Commitments,” for a complete description of each project commitment.

- **Project Commitment D: Habitat Restoration and Revegetation Plan.** With input from the appropriate resource agencies, the applicant would develop and implement a Habitat Restoration and Revegetation Plan to restore areas where construction of the projects would be unable to avoid impacts on native vegetation and sensitive resources, such as wetlands, wetland buffer areas, riparian habitat, and other sensitive natural communities. The applicant would restore all areas disturbed during construction of the projects, including staging areas and pull, tension, and splicing sites, to as close to pre-construction conditions as possible, or to the conditions agreed upon between the applicant and landowner. Replanting and reseeding would be conducted under the direction the applicant or contract biologists. If revegetation would occur on private property, revegetation conditions would be part of the agreement between the applicant and the landowner.
- **Project Commitment E: Grading Plan.** The Riverside County Flood Control and Water Conservation District shall be consulted regarding grading plans for construction and operation of the proposed projects. The County will review and approved final grading (and drainage) plans prior to start of construction. Storm water improvement sections of the plans shall be designed to maintain a discharge of storm water runoff consistent with the characteristics of storm water runoff presently discharged from project areas including the Alberhill Substation site. Measures included in the plans shall minimize adverse effects on existing or planned storm water drainage systems. Ground surface improvements installed at the site pursuant to the plans shall be designed to minimize discharge of materials that would contribute to a violation of water quality standards or waste discharge requirements. The final grading design shall include features that would minimize erosion and siltation both onsite and offsite. In addition, the final grading (and drainage) design shall be based on the results of the geotechnical study and soil evaluation for the substation site (Project Commitment F).
- **Project Commitment F: Geotechnical Study, Soil Testing, and Seismic Design Standards.** Prior to the start of construction, the applicant shall conduct geotechnical and hydrologic studies and field investigations of the Alberhill Substation site, 500-kV transmission line routes, all 115-kV subtransmission line routes, and all telecommunications line routes. The studies shall include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils, soil resistivity, and slope stability (landslide susceptibility). The studies shall include soil boring and laboratory testing to determine the engineering properties of soils, would characterize soils and underlying bedrock units, characterize groundwater conditions, and evaluate faulting and seismicity risk. Soil samples shall be collected and analyzed for common contaminants and the presence of hazardous materials. If chemicals are detected in the soil samples at concentrations above action levels, the applicant shall avoid the contaminated soil or work with the property owner to remove the contaminated soil. The results of this study shall be applied to final engineering designs for the projects. The information collected shall be used to determine final tubular steel pole foundation designs. In addition, the applicant shall design Alberhill Substation consistent with the Institute of Electrical and Electronic Engineers 693 Standard, *Recommended Practices for Seismic Design of Substations*.

4.6.4.2 Impacts Analysis (Valley–Ivyglen Project)

Impact GE-1 (VIG): Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving 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); strong seismic ground shaking; seismic-related ground failure including liquefaction; or landslides.
LESS THAN SIGNIFICANT WITH MITIGATION

Fault rupture is most likely to occur on known fault traces. No known faults traverse the project components, so no fault rupture is expected to occur in the project area. Refer to Impact GE-3 (VIG) for discussion of liquefaction and landslides.

The proposed Valley–Ivyglen 115-kV Subtransmission Line would, however, be constructed within a Seismic Hazard Zone as specified by the California Seismic Hazards Mapping Act. The centerline of the Elsinore Fault system is located approximately 1.5 miles southwest of 115-kV Segment VIG5. Proposed 115-kV Segment VIG8 (near Ivyglen Substation) would be installed within approximately 0.25 miles of a designated Alquist-Priolo Hazard Zone for the Glen Ivy North Fault (Figure 4.6-1), and seismic-related ground failure could occur during construction and during the operational lifetime of the proposed Valley–Ivyglen Project. As previously described, the project area is likely to experience moderate to intense ground shaking generated by the Elsinore Fault system or other active faults in the region (Table 4.6-3).

Construction

Although there is a risk of an earthquake occurring in the area, the chance of an earthquake occurring during the 27-month construction period is low. However, such an event would expose construction workers onsite to seismic hazards. This impact would be potentially significant. MM GE-1 would ensure that, prior to start of construction, construction personnel receive training about seismic risks and the applicant’s safety guidelines in the event of an earthquake and that workers follow the guidelines during construction. Impacts would be less than significant with implementation of MM GE-1.

Operation and Maintenance

Strong seismic ground shaking could cause damage to certain project components. Underground and aboveground components of the telecommunications system and transmission system would be subject to ground shaking. Ground shaking could cause poles to topple over and underground conduit to crack, potentially causing harm to people and damage to property. This impact would be significant. Project Commitment F would require the applicant to complete a geotechnical study and incorporate recommendations from the study into final engineering designs. With implementation of Project Commitment F, impacts would be less than significant.

Mitigation Measure

MM GE-1: Seismic Safety Training. The applicant shall ensure that all construction personnel adhere to the applicant’s worker safety guidelines and policies to avoid additional adverse effects to health and safety in the event of an earthquake during construction. These guidelines and policies shall be communicated to construction personnel during a pre-construction Worker Environmental Awareness

Program (to be implemented under Project Commitment B), which shall highlight seismic activity as a potential hazard during onsite construction.

Impact GE-2 (VIG): Result in substantial soil erosion or the loss of topsoil.
LESS THAN SIGNIFICANT WITH MITIGATION

The proposed Valley–Ivyglen 115-kV Subtransmission Line would traverse areas with slopes that range from 1 to 53 percent (Table 4.6-2). Moderate to high levels of erosion have occurred and are expected to continue in sloped areas (15 to 50 percent slope) with sandy, rocky loam, or clay soils (e.g., along sections of 115-kV Segments VIG 1, VIG2, VIG4, VIG5, VIG7, and VIG8). Substantial erosion would not occur in staging areas, which are flat areas that would not be graded and would be covered with gravel or crushed rock.

Construction

During construction, erosion would occur from soil disturbance during grading and excavation associated with subtransmission line and fiber optic line construction. Soil disturbance would be distributed along the entire alignment, such that the amount of erosion or loss of topsoil at any one location would be minor. As a whole, however, construction of the proposed project could result in substantial soil erosion. This impact would be potentially significant. The applicant would implement Project Commitment D, which would require restoration of temporarily disturbed areas and prevent erosion after construction. Project Commitment E would require preparation of a grading plan that would in part aim to reduce erosion. Project Commitment D would not address impacts during construction, and Project Commitment E would address erosion only from grading activities. However, impacts would remain significant. MM BR-15 would require implementation of certain erosion BMPs during construction as part of the SWPPP developed for the proposed project. Impacts would be less than significant after implementation of MM BR-15.

Operation and Maintenance

No additional ground disturbance would occur during operation of the proposed project. There would be no impact related to soil erosion or loss of topsoil.

Mitigation Measure

MM BR-15: Stormwater Pollution Prevention Plan (SWPPP) Best Management Practices (BMPs).

Impact GE-3 (VIG): 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 offsite landslide, lateral spreading, subsidence, liquefaction or collapse.
LESS THAN SIGNIFICANT

Low to moderate landslide susceptibility is expected along 115-kV Segments VIG2 through VIG8, depending on the steepness of slopes (CGS 2011; County of Riverside 2003; USGS 2015a, 2003). Liquefaction susceptibility ranges from low to moderate along most of the proposed 115-kV segments but is identified as very high along 115-kV Segments VIG3 and VIG4 (Figure 4.6-2). Lateral spreading may occur in sloped areas prone to liquefaction or subsidence.

Within the greater Lake Elsinore area, no clear evidence of subsidence has been identified, although continued groundwater deficits, which have been recorded annually in the Lake Elsinore area (see Section 4.9, "Hydrology and Water Quality"), could lead to subsidence (City of Lake Elsinore 2006).

The Riverside County General Plan identifies sections of 115-kV Segments VIG1 through VIG8 as being susceptible to subsidence, but no documented areas of subsidence have been identified (County of Riverside 2003, 2008b). Sections of 115-kV Segments VIG1 through VIG8 would be constructed on recent alluvial deposits (Table 4.6-1) that may collapse when hydrated and are subject to varying levels of liquefaction risk (Figure 4.6-2). In addition, sections of the proposed 115-kV subtransmission line segments would be located at the base of hills, where collapsible soils may be present.

The proposed project would be located in areas with potential for landslides, liquefaction, and soil collapse. Subsidence may also occur, but the potential for subsidence is low. These various forms of soil instability could lead to damage to project components such as poles and conduit and may cause harm to people nearby should, for example, a pole topple or a slope become destabilized during construction activities. This would be a significant impact. Project Commitment F would require the applicant to complete a geotechnical study and incorporate recommendations from the study into final engineering designs. Impacts would be less than significant.

Impact GE-4 (VIG): Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.
LESS THAN SIGNIFICANT

The shrink-swell potential along the proposed Valley–Ivyglen 115-kV line segments is generally low except for areas with higher clay concentrations along sections of 115-kV Segments VIG1, VIG2, and VIG4 through VIG8 (Table 4.6-2). Expansive soils (e.g., those with high-plasticity clay content) can cause structural failure of foundations such as those associated with the proposed subtransmission line structures. This would be a significant impact. The presence of expansive soils along the proposed 115-kV line segments would be identified during the geotechnical study conducted prior to start of construction (Project Commitment F). If identified, the geotechnical report would offer site-specific design and construction recommendations to minimize effects due to the presence of expansive soils. The results of the study would be applied to final engineering designs. Impacts would be less than significant.

Impact GE-5 (VIG): Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.
NO IMPACT

Construction and operation of the proposed Valley–Ivyglen Project do not require septic tanks or alternative wastewater disposal systems. Wastewater generated during construction would be minimal, and portable toilets would be used. Therefore, there would be no impact under this criterion.

Impact GE-6 (VIG): 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.
LESS THAN SIGNIFICANT

The proposed project area includes areas with economically viable deposits of clay, sand, gravel, and stone products. Most of the proposed project area and western Riverside County are classified MRZ-3 (undetermined mineral resource significance), but areas along the I-15 corridor north of Lake Elsinore are classified MRZ-2 (areas where there are or there is a significant likelihood of significant mineral deposits). Sections of proposed 115-kV Segments VIG5 and VIG8 traverse areas designated MRZ-2.

Proposed 115-kV Segment VIG5 and the western portion of 115-kV Segment VIG8 would traverse land classified MRZ-2. Ground-disturbing activities and structure (pole and conduit) placement along 115-kV

Segments VIG5 and the western portion of 115-kV Segment VIG8 would be limited, however, to areas where 115-kV poles would be erected along Lake Street and Temescal Canyon Road and where conduit would be placed along Temescal Canyon Road. These activities and structures would occur close to existing roadways, where mineral resource recovery is unlikely to occur. Construction activities and structures would therefore not conflict with existing mineral resource recovery activities. Therefore, impacts would be less than significant.

Impact GE-7 (VIG): 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.
LESS THAN SIGNIFICANT

The Riverside County General Plan and City of Lake Elsinore General Plan discuss mineral resources in terms of the areas classified by the State of California using the MRZ classification system. Impacts to areas designated MRZ-2 are discussed under Impact GE-6 (VIG) and would be less than significant.

4.6.5 Environmental Impacts and Mitigation Measures (Alberhill Project)

4.6.5.1 Project Commitments (Alberhill Project)

The applicant has committed to the following as part of the design of the proposed Alberhill Project. See Section 2.6, "Project Commitments," for a complete description of each project commitment.

- **Project Commitment A: Landscaping and Irrigation Plan.** For the Alberhill Project, prior to the start of construction, the applicant would develop a Landscaping and Irrigation Plan for Alberhill Substation that is consistent with surrounding community standards. The applicant would consult with Riverside County about the Plan and incorporate applicable County recommendations to the extent possible. Landscaping would be designed to filter views from the surrounding community and other potential sensitive receptors near the proposed substation and be consistent with the surrounding community. The landscape plan would include a plant species list and installation and construction requirements. The applicant would contract a landscape architect to complete the landscaping plan during final engineering for the Alberhill Project. Irrigation and landscaping installation would occur after construction of the substation perimeter wall and water service has been established. During operations, the applicant would maintain the substation site pursuant to the Landscaping and Irrigation Plan and be responsible for upkeep as long as the applicant owns the property.
- **Project Commitment D: Habitat Restoration and Revegetation Plan.** With input from the appropriate resource agencies, the applicant would develop and implement a Habitat Restoration and Revegetation Plan to restore areas where construction of the projects would be unable to avoid impacts on native vegetation and sensitive resources, such as wetlands, wetland buffer areas, riparian habitat, and other sensitive natural communities. The applicant would restore all areas disturbed during construction of the projects, including staging areas and pull, tension, and splicing sites, to as close to pre-construction conditions as possible, or to the conditions agreed upon between the applicant and landowner. Replanting and reseeding would be conducted under the direction the applicant or contract biologists. If revegetation would occur on private property, revegetation conditions would be part of the agreement between the applicant and the landowner.
- **Project Commitment E: Grading Plan.** The Riverside County Flood Control and Water Conservation District shall be consulted regarding grading plans for construction and operation

of the proposed projects. The County will review and approved final grading (and drainage) plans prior to start of construction. Storm water improvement sections of the plans shall be designed to maintain a discharge of storm water runoff consistent with the characteristics of storm water runoff presently discharged from project areas including the Alberhill Substation site. Measures included in the plans shall minimize adverse effects on existing or planned storm water drainage systems. Ground surface improvements installed at the site pursuant to the plans shall be designed to minimize discharge of materials that would contribute to a violation of water quality standards or waste discharge requirements. The final grading design shall include features that would minimize erosion and siltation both onsite and offsite. In addition, the final grading (and drainage) design shall be based on the results of the geotechnical study and soil evaluation for the substation site (Project Commitment F).

- **Project Commitment F: Geotechnical Study, Soil Testing, and Seismic Design Standards.** Prior to the start of construction, the applicant shall conduct geotechnical and hydrologic studies and field investigations of the Alberhill Substation site, 500-kV transmission line routes, all 115-kV subtransmission line routes, and all telecommunications line routes. The studies shall include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils, soil resistivity, and slope stability (landslide susceptibility). The studies shall include soil boring and laboratory testing to determine the engineering properties of soils, would characterize soils and underlying bedrock units, characterize groundwater conditions, and evaluate faulting and seismicity risk. Soil samples shall be collected and analyzed for common contaminants and the presence of hazardous materials. If chemicals are detected in the soil samples at concentrations above action levels, the applicant shall avoid the contaminated soil or work with the property owner to remove the contaminated soil. The results of this study shall be applied to final engineering designs for the projects. The information collected shall be used to determine final tubular steel pole foundation designs. In addition, the applicant shall design Alberhill Substation consistent with the Institute of Electrical and Electronic Engineers 693 Standard, *Recommended Practices for Seismic Design of Substations*.

4.6.5.2 Impacts Analysis (Alberhill Project)

Impact GE-1 (ASP): Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving 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); strong seismic ground shaking; seismic-related ground failure including liquefaction; or landslides.
LESS THAN SIGNIFICANT WITH MITIGATION

Refer to Impact GE-3 (ASP) for discussion of liquefaction and landslides.

The proposed Alberhill Substation, 500-kV transmission lines, and 115-kV transmission lines would be constructed within a Seismic Hazard Zone as specified by the California Seismic Hazards Mapping Act. The Elsinore Fault system is located approximately 1.5 miles southwest of the proposed Alberhill Substation site and 500-kV transmission lines routes. A Glen Ivy North fault section of the Elsinore Fault system crosses beneath 115-kV Segments ASP4 and ASP5, but the section is not within an established Alquist-Priolo Earthquake Fault Zone (Figure 4.6-1). The Elsinore Fault system is capable of generating earthquakes with maximum magnitudes in the range of 6.8 to 7.0 and a recurrence interval of approximately 250 years between major events. Smaller events are likely to occur more frequently. The proposed Alberhill Project area is likely to experience moderate to intense ground shaking generated by the Elsinore Fault system or other active faults in the region (Table 4.6-3).

Construction

Although there is a risk of an earthquake occurring in the area, the chance of an earthquake occurring during the 28-month construction period is low. However, such an event would expose construction workers on site to seismic hazards. This impact would be potentially significant. MM GE-1 would ensure that, prior to the start of construction, construction personnel receive training about seismic risks and the applicant's safety guidelines in the event of an earthquake and that workers follow the guidelines during construction. Impacts would be less than significant with implementation of MM GE-1.

Operation and Maintenance

Strong ground shaking is likely to occur in the proposed project area, and fault rupture and seismic-related ground failure could occur during the operational lifetime of the proposed Alberhill Project. Strong seismic shaking could cause damage to certain project components. Fault rupture is most likely to occur on known fault traces. A Glen Ivy North fault section of the Elsinore Fault system crosses beneath 115-kV Segments ASP4 and ASP5, and fault rupture may occur in this area. Underground and aboveground components of the telecommunications system and transmission system would be subject to ground shaking. Ground shaking could cause poles to topple over and underground conduit to crack and could also affect structures at the substation. This would potentially cause harm to people and damage to property. This impact would be significant. Project Commitment F requires the applicant to design the proposed Alberhill Substation consistent with the Institute of Electrical and Electronic Engineers 693 Standard, Recommended Practices for Seismic Design of Substations and consistent with California Building Code standards for the area. Impacts at the proposed Alberhill Substation would be less than significant. Project Commitment F would require the applicant to complete a geotechnical study and incorporate recommendations from the study into final engineering designs. Impacts would be less than significant.

Mitigation Measure

MM GE-1: Seismic Safety Training.

Impact GE-2 (ASP): Result in substantial soil erosion or the loss of topsoil.
LESS THAN SIGNIFICANT WITH MITIGATION

Soils at the proposed Alberhill Substation site (including the Import Soil Source Area) and along the 500-kV transmission lines and 115-kV subtransmission line routes lack substantial organic material, are located within a dry climate, and are prone to erosion (Tables 4.6-2 through 4.6-4). Moderate to high levels of erosion have occurred and are expected to continue in sloped areas (15 to 50 percent slope) with sandy and rocky loam soils along greater than 90 percent of the 500-kV transmission line routes and severe erosion may occur along the proposed and existing access roads to the proposed 500-kV towers (NRCS 2003, 2008). The potential for erosion is expected to be low along paved areas of the proposed 115-kV subtransmission line routes but moderate to severe within undeveloped, sloped areas with sandy, rocky loam, and cobbly clay soils (e.g., sections of 115-kV Segments ASP2, ASP3, and ASP5). Substantial erosion would not occur in staging areas, which are flat areas that would not be graded and would be covered with gravel or crushed rock.

Construction

During construction, erosion would occur from soil disturbance during grading and excavation associated with 500-kV transmission line, subtransmission line, and fiber optic line construction. Soil disturbance would be distributed along the entire alignment, such that the amount of erosion or loss of topsoil at any one location along the transmission line or subtransmission line would be minor. As a whole, however, construction of the transmission line and subtransmission line could result in substantial soil erosion. The potential for erosion along the 500-kV transmission line would be greater under the Conventional Method than under the Helicopter Construction option, as the latter would involve less ground disturbance. This impact would be potentially significant, however, under both options due to the extent of ground disturbance. The applicant would implement Project Commitment D, which would require restoration of temporarily disturbed areas and would prevent erosion after construction. Project Commitment E would require preparation of a grading plan that would in part aim to reduce erosion. Project Commitment D would not address impacts during construction, and Project Commitment E would address erosion only from grading activities. Impacts would remain significant. MM BR-15 would require implementation of certain erosion BMPs during construction as part of the SWPPP developed for the proposed project. Impacts from construction of the 500-kV transmission line, 115-kV subtransmission line, and fiber optic line would be less than significant after implementation of MM BR-15.

Construction of the Alberhill Substation would involve soil-disturbing activities at the proposed substation site, such as vegetation clearing, excavation, grading, and other earth-moving activities. Soils at the site are prone to moderate to high erosion and have 4 to 12 percent slopes. The soil would be improved at the site by obtaining soil from the Import Soil Source Area (Import Soil Option 1) or by obtaining soil from a nearby quarry (Import Soil Option 2).

If Import Soil Option 2 is selected for construction of the proposed Alberhill Substation, soil would be trucked in from a nearby active quarry, such as Corona Rock and Asphalt (also known as Vulcan Materials Company–Western Division or Corona Quarry). Impacts would be limited to impacts from substation construction. The soil would be graded and compacted to create an even slope that varies between 1 and 2 percent and slopes downward from east to west parallel with Temescal Canyon Road and perpendicular to Love Lane. Impacts from these activities would be significant due to destabilization of the soils during construction. As previously described, the applicant would implement Project Commitments D and E. Project Commitment D would not address impacts during construction, and Project Commitment E would address erosion only from grading activities. However, impacts would remain significant. To address these remaining impacts, MM BR-15 would require implementation of certain erosion BMPs during construction as part of the SWPPP developed for the proposed project. Impacts from substation construction under Import Soil Option 2 would be less than significant after implementation of MM BR-15.

Construction that utilizes Import Soil Option 1 would have the same impacts as Import Soil Option 2 but would also have erosion impacts related to excavation of the Import Soil Source Area on the Alberhill Substation Site. If Import Soil Option 1 is selected for construction of the proposed Alberhill Substation, a 5.2-acre area located adjacent to the northeast side of the proposed substation site would be excavated and up to 80,000 cubic yards of soil removed for use as fill within the footprint of the proposed substation. The soils within the larger, central part of 5.2-acre Import Soil Source Area are prone to moderate erosion, and slopes are less than 10 percent. The soils extending from the central part of the Import Soil Source Area, however, are prone to high to severe erosion, and slopes exceed 15 percent. Preliminary engineering designs indicate that natural slopes along the outer parts of the Import Soil Source Area would be substantially increased after excavation. Hence, erosion levels in proximity to the

Import Soil Source Area are anticipated to substantially increase if Import Soil Option 1 is selected for construction of the proposed Alberhill substation. This would be a significant impact. The applicant would implement Project Commitments A, D, and E, as previously described. If Import Soil Option 1 were implemented, these Project Commitments would also cover activities at the Import Soil Source Area. Project Commitments A and D would not address impacts during construction, and Project E would address erosion only from grading activities. Impacts would remain significant. MM BR-15 would require implementation of certain erosion BMPs during construction as part of the SWPPP developed for the proposed project. Impacts would be less than significant after implementation of MM BR-15.

Operation and Maintenance

No additional ground disturbance would occur during operation of the proposed project. There would be no impact related to soil erosion or loss of topsoil.

Mitigation Measure

MM BR-15: Stormwater Pollution Prevention Plan (SWPPP) Best Management Practices (BMPs).

Impact GE-3 (ASP): 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 offsite landslide, lateral spreading, subsidence, liquefaction or collapse.
LESS THAN SIGNIFICANT

The proposed Alberhill Substation site is a relatively flat area with slopes less than 5 percent in most areas and less than 12 percent in all areas (Table 4.6-2). The proposed substation site has low to locally moderate landslide susceptibility. The steep hills to the northeast through which the proposed 500-kV transmission lines and proposed access roads would traverse have a moderate potential for landslide, with a high potential in some areas. Low to moderate landslide susceptibility is expected along 115-kV Segments ASP2, ASP3, and ASP5 depending on the steepness of slopes. For the remaining 115-kV subtransmission line segments, landslide susceptibility would be low (CGS 2011; County of Riverside 2003; USGS 2015a, 2003).

Liquefaction susceptibility ranges from low to moderate at the proposed Alberhill Substation site, the lower sections of the proposed 500-kV transmission line routes, and along the proposed 115-kV subtransmission line routes. Liquefaction is not expected along the upper sections of the 500-kV transmission lines. Sections of 115-kV Segments ASP2 and ASP5 and the entirety of 115-kV Segment ASP3 would be constructed within or adjacent to areas with very high susceptibility to liquefaction (Figure 4.6-2). Lateral spreading may occur in sloped areas prone to liquefaction or subsidence.

The potential for subsidence at the proposed substation site or along the proposed 500-kV transmission line routes is low (County of Riverside 2003; NRCS 2008). Within the greater Lake Elsinore area, no clear evidence of subsidence has been identified, although continued groundwater deficits, which have been recorded annually in the South Coast Hydrologic Region (Section 4.9, "Hydrology and Water Quality"), could lead to subsidence (City of Lake Elsinore 2006). The Riverside County General Plan identifies much of the 115-kV subtransmission line route along the south side of I-15 though the City of Lake Elsinore and into the City of Wildomar as being susceptible to subsidence, but no documented areas of subsidence have been identified (County of Riverside 2003, 2008b).

The proposed Alberhill Substation site and sections of 115-kV Segments ASP1, ASP1.5, ASP2, ASP3, ASP4, ASP5, and ASP8 would be constructed on recent alluvial deposits (Tables 4.6-1) that may collapse when hydrated. In addition, the proposed substation site, lower sections of the proposed 500-kV transmission line routes, and sections of the proposed 115-kV subtransmission line segments would be located at the base of mountainous areas or hills where collapsible soils may be present.

The proposed project would be located in areas with potential for landslides, liquefaction, and soil collapse. Subsidence may also occur, but the potential is low. The various forms of soil instability could lead to damage to project components such as poles, conduit, and the proposed substation equipment. This may also lead to harm to people nearby should, for example, a pole topple or a slope become destabilized during construction activities. This would be a significant impact. Project Commitment F would require the applicant to conduct a geotechnical study of the proposed Alberhill Substation site (including the Import Soil Source Area if Import Soil Option 1 is selected), 500-kV transmission line routes, and 115-kV subtransmission line routes. The study would include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils, soil resistivity, and slope stability. The results of the geotechnical study would be applied to final engineering designs for the proposed Alberhill Project. In addition, Project Commitment F requires the applicant to design the proposed Alberhill Substation consistent with the Institute of Electrical and Electronic Engineers 693 Standard, Recommended Practices for Seismic Design of Substations. Impacts would be less than significant.

Impact GE-4 (ASP): Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.
LESS THAN SIGNIFICANT

The shrink-swell potential at the proposed Alberhill Substation site and along the proposed 500-kV transmission line routes is low (Table 4.6-2). The shrink-swell potential along the proposed Alberhill Project 115-kV segments is generally low except for areas with higher clay concentrations along sections of 115-kV Segment ASP2 and 115-kV Segment ASP8 (Table 4.6-2). Expansive soils (e.g., those with high-plasticity clay content) can cause structural failure of foundations such as those associated with the proposed subtransmission line structures and with the substation. This would be a significant impact.

The presence of expansive soils at the proposed Alberhill Substation site or along the 500-kV transmission line or 115-kV subtransmission line routes would be identified during the geotechnical study conducted prior to construction of the proposed Alberhill Project (Project Commitment F). If identified, the geotechnical report would offer site-specific design and construction recommendations to minimize effects due to the presence of expansive soils. The results of the study would be applied to final engineering design of the proposed Alberhill Project. Impacts would be less than significant.

Impact GE-5 (ASP): Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.
LESS THAN SIGNIFICANT

The proposed Alberhill Substation site is not served by a public sewer system. A stand-alone, prefabricated, permanent restroom would be installed within the proposed Alberhill Substation perimeter near the control building. The restroom would discharge to an onsite septic system.

The soils present at the proposed Alberhill Substation site are sandy and should accommodate septic system installation (Table 4.6-2). There is a possibility that the soils may be inadequate to support a septic system, which would be a potentially significant impact. The applicant would conduct a geotechnical investigation according to Project Commitment F, which would include a soils investigation. If, during the site-specific geotechnical investigation, some soils are found to be inadequate for supporting a septic system, the information obtained would be used to design a septic system that would be appropriate for site conditions pursuant to County permit requirements. Impacts would be less than significant.

Impact GE-6 (ASP): 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.
LESS THAN SIGNIFICANT

The proposed project area includes areas with economically viable deposits of clay, sand, gravel, and stone products. Most of the proposed project area and western Riverside County are classified MRZ-3 (undetermined mineral resource significance), but areas along the I-15 corridor north of Lake Elsinore are classified MRZ-2 (areas where there are, or there is a significant likelihood of, significant mineral deposits). Sections of 115-kV Segment ASP2 would traverse areas classified as MRZ-2.

Although 115-kV Segment ASP2 would traverse land classified MRZ-2, ground-disturbing activities would only occur where four 115-kV structures would be replaced adjacent to the proposed Alberhill Substation site. Along 115-kV Segment ASP2, a second 115-kV subtransmission line would be installed on the proposed Valley–Ivyglen 115-kV structures (115-kV Segments VIG4 and VIG5). Therefore, impacts would be less than significant under this criterion.

Impact GE-7 (ASP): 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.
LESS THAN SIGNIFICANT

The Riverside County General Plan and City of Lake Elsinore General Plan discuss mineral resources in terms of the areas classified by the State of California using the MRZ classification system. Impacts to areas designated MRZ-2 are discussed under Impact GE-6 (ASP) and would be less than significant.

4.6.6 References

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