BEFORE THE PUBLIC UTILITIES COMMISSION OF THE

STATE OF CALIFORNIA

In the Matter of the Application of SOUTHERN CALIFORNIA EDISON COMPANY (U 338-E) for a Certificate of Public Convenience and Necessity for the West of Devers Upgrade Project and for an Interim Decision Approving the Proposed Transaction between Southern California Edison and Morongo Transmission LLC	))))))))	A.13-10-XXX

PROPONENT'S ENVIRONMENTAL ASSESSMENT (PEA)
IN THE WEST OF DEVERS UPGRADE PROJECT

VOLUME 3 OF 7

This PEA is being filed separately from the Application and is being submitted as an Archival DVD and CD-ROM

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4.6 Geology and Soils

This section describes the geology and soils in the area of the Proposed Project. The potential impacts of the Proposed Project and the Alternative Project are also discussed. This section contains a description of existing conditions and the potential geology and soils impacts associated with construction and operation of the Proposed Project and the Alternative Project. For the purposes of this section, the Project Study Area is defined as the locations where work described in Chapter 3.0, Project Description, would be performed. An additional Project Study Area buffer is not included because geology and soil resources deposits are generally site-specific.

4.6.1 Environmental Setting

The Project Study Area includes the cities of Banning, Beaumont, Calimesa, Colton, Grand Terrace, Loma Linda, Palm Springs, Rancho Cucamonga, Redlands, San Bernardino, and Yucaipa, and unincorporated areas of Riverside and San Bernardino counties. The Proposed Project component in the City of Rancho Cucamonga is limited to improvements within the Mechanical-Electrical Equipment Room (MEER) at Etiwanda Substation. The extent of this work within an existing facility would not have the potential to impact geology and soils in the City of Rancho Cucamonga; therefore, the City of Rancho Cucamonga is not included for further discussion.

This section describes the topography of the Project Study Area, the regional and local geologic setting, the soils in the Project Study Area, the seismic sources in the vicinity of the Proposed Project, and the geologic hazards in the Project Study Area. The discussion of the geologic hazards includes the potential for surface fault rupture, seismic ground shaking, liquefaction, seismic slope instability, landslides, soil erosion, subsidence, settlement, collapsible soils, expansive soils, and corrosive soils. Information was obtained from review of readily available geologic maps, fault maps, seismic data, geologic hazards maps, published geotechnical literature, and aerial photographs. Additionally, geotechnical site reconnaissance by a representative from Ninyo & Moore was conducted on March 26 and March 29, 2012, to observe and document the existing surface conditions along accessible portions of the WOD corridor.

4.6.1.1 Topography

The Project Study Area transects the western end of the Coachella Valley, the Whitewater River canyon, steep foothills of the San Bernardino Mountains, the San Gorgonio Pass between the San Bernardino and the San Jacinto Mountains, hilly terrain of the San Timoteo Badlands, the southern flanks of San Timoteo Canyon, and the southern part of the San Bernardino Valley. The topography for the Project Study Area is as follows:

Segment 1. Segment 1 of the Proposed Project extends north into the San Bernardino Valley from the San Bernardino Junction located in the San Timoteo Badlands. Elevations along this segment range from approximately 1,800 feet above mean sea level (amsl) in the steep hilly terrain to 1,100 feet amsl in the gently sloping valley.

Segment 2. From San Bernardino Junction to Vista Substation, Segment 2 of the Proposed Project extends westward across the north end of the San Timoteo Badlands and narrow Reche Canyon through areas of moderate to steep terrain at elevations ranging from approximately 1,000 to 1,800 feet amsl. Vista Substation is situated on an elevated terrace above the Santa Ana River on the west side of Interstate 215 at an elevation of approximately 1,000 feet amsl.

Segment 3. From San Bernardino Junction to El Casco Substation, Segment 3 of the Proposed Project extends eastward through the hilly San Timoteo Badlands on the south flank of San Timoteo Canyon, and crosses hilly areas and narrow valleys comprising gentle to steep terrain where elevations range from approximately 1,800 to 2,400 feet amsl.

Segment 4. El Casco Substation at the west end of Segment 4 is located in an area of relatively moderate terrain at an elevation of approximately 2,200 feet amsl. Between El Casco Substation and the City of Beaumont, the Proposed Project traverses the north flank of San Timoteo Canyon where existing access roads and tower sites are located on moderate to steep hilly terrain and elevations range from approximately 2,100 to 2,600 feet amsl. In the City of Beaumont and the Cherry Valley area, the Proposed Project extends across gentle to moderate topographic terrain where elevations range from approximately 2,700 to 2,400 feet amsl. Further east, the Proposed Project crosses over the Banning Bench, an elevated topographic mesa, where existing access roads and tower sites are located on gentle to steep gradients with elevations ranging from approximately 2,600 to 3,000 feet amsl.

Segment 5. Segment 5 extends across gentle to moderate topographic gradients in the San Gorgonio Pass north of the City of Banning and the unincorporated community of Cabazon, where elevations gradually descend (west to east) from approximately 2,600 to 1,400 feet amsl.

Segment 6. Segment 6 traverses the foothills of the San Bernardino Mountains where existing access roads and tower sites are located on steep terrain and elevations range from approximately 1,500 to 2,000 feet amsl. The Proposed Project extends across the steep-flanked canyon of the Whitewater River where existing structures are sited on each side of the canyon and the conductors span the canyon. Devers Substation and the eastern end of the Proposed Project are situated in the western end of the Coachella Valley. This area east of the Whitewater River is generally comprised of relatively gentle to moderate topographic gradients for existing access roads and tower sites. Elevations in this part of the Project Study Area range from approximately 1,100 to 1,600 feet amsl. Devers Substation is situated at an elevation of approximately 1,100 feet amsl.

4.6.1.2 Regional Geologic Setting

The Project Study Area is situated within three of California's geomorphic regions, or "provinces." These provinces are generally bounded by large-scale tectonic-structural features such as faults and mountain ranges and are characterized by the morphology of the landforms and the type and age of the geologic materials. The Proposed Project crosses the Colorado Desert,Transverse Ranges, and Peninsular Ranges Geomorphic Provinces (Norris and Webb 1990).

The western portion of the Proposed Project west of Beaumont, including the San Timoteo Badlands and San Bernardino Valley areas, is situated within the Peninsular Ranges Geomorphic Province. The central portion of the Proposed Project within the San Gorgonio Pass and extending west roughly to the Beaumont area is located along the border between the Transverse Ranges and Peninsular Ranges Provinces. This border is formed by the San Andreas Fault system, which extends from the western edge of the Coachella Valley near Devers Substation through the San Gorgonio Pass along the San Gorgonio Pass Fault Zone. The steep foothills of the San Bernardino Mountains in the pass north of the Proposed Project are part of the Transverse Ranges Province.

Devers Substation and the eastern end of the Proposed Project in the Coachella Valley are within the northwestern corner of the Colorado Desert Geomorphic Province. The Colorado Desert Geomorphic Province is considered the low desert area of Southern California and is characterized by a large structural trough area comprising the Coachella Valley, Salton Sea, and Imperial Valley, and includes mountain ranges and hills of moderate relief.

The Transverse Ranges Province is characterized by east-west trending mountain ranges, including the San Gabriel and San Bernardino Mountains, and east-west trending fault systems, including the Sierra Madre, Cucamonga and North Frontal Fault Zone. The Peninsular Ranges Province is located in the southwest part of the State and is characterized by northwest-trending mountain ranges, including the San Jacinto Mountains south of the Proposed Project and San Timoteo Badlands, and by northwest-trending fault systems, including the San Jacinto Fault Zone. The Proposed Project crosses the San Jacinto Fault Zone in the San Timoteo Badlands near the west end of the Proposed Project in the City of Loma Linda.

4.6.1.3 Local Geologic Setting

The geologic units within the Proposed Project are comprised primarily of young Holocene epoch deposits (last 11,000 years), older Pleistocene epoch sediments (11,000 to 2.6 million years old), and older Pliocene epoch formations (2.6 to 5.3 million years old). Some older Mesozoic era (65 to 245 million years old) granitic rocks are present in the City of Grand Terrace at the west end of the Proposed Project. Fill soils from farming, grading, previous transmission line development, or other human-made activities also are present in parts of the Project Study Area.

The younger Holocene sediments consist of stream, floodplain, and alluvial fan deposits, and are generally present in low-lying valley and canyon bottoms within the Project Study Area. These areas generally include the area around Devers Substation; the Whitewater River channel; stream drainages in the San Gorgonio Pass and in the cities of Beaumont and Banning; stream drainage areas in the San Timoteo Badlands and San Timoteo Canyon; and the San Bernardino Valley area. These younger Holocene sediments are typically composed of unconsolidated, poorly sorted alluvial clay, silt, sand, and gravel deposits.

Pleistocene sediments in the Project Study Area comprise older alluvial valley and fan deposits of gravel and sand and are primarily mapped in the San Gorgonio Pass valley area between the City of Beaumont and the community of Cherry Valley, and in the City of Grand Terrace. Older Pleistocene alluvial sediments are typically moderately to well consolidated and occasionally cemented. Pleistocene alluvial fanglomerate sediments are present in the steep terrain of the San Bernardino Mountains foothills in the San Gorgonio Pass and are comprised of weakly indurated, crudely bedded, unsorted boulders, cobbles, and pebble detritus.

A Pliocene-Pleistocene formation (the San Timoteo Beds) is mapped under a large part of the Proposed Project and extends from the Banning Bench westward through the San Timoteo Badlands and San Timoteo Canyon to the Loma Linda area near the west end of the Proposed Project . The San Timoteo Beds occur in moderate to steep terrain and consist of weakly indurated sandstone, conglomerate, and interbedded silty claystone.

The older, Mesozoic-era granitic rocks within the Project Study Area are mapped in a few outcrops in the City of Grand Terrace and underlying Vista Substation and are comprised of quartz monzonite, granodiorite, quartz diorite, and tonalite. The granitic rocks in this area are covered by Pleistocene alluvial deposits.

4.6.1.4 Soils

Soils are present at the ground surface along the majority of the Project Study Area except in locations where rock formations are exposed. Generally, deeper soils are anticipated in valleys and other low-lying areas, and shallow soils in mountainous areas. The soil types consist of variable materials from gravel and sand to silt and clay and are generally reflective of the geomorphic terrain, underlying geologic materials, extent of weathering, degree of slope, and the degree of human modification. The Proposed Project traverses varied terrain and land areas that include undeveloped desert and mountain areas, agricultural land, developed rural properties, and developed urban areas consisting of industrial, commercial, and residential uses. In order to inventory the soils underlying the Proposed Project, web soil survey data in Soil Survey Geographic (SSURGO) database format from the Natural Resources Conservation Service (NRCS) were evaluated. An inventory of the individual soil types, including a general description of the soil, the soil erodibility potential, wind erodibility group and index, shrink-swell (expansion) potential, and corrosion potential for both concrete and steel is presented on Table 4.6-1, United States Department of Agriculture (USDA) Soil Units.

Table 4.6-1: USDA Soil Units

Soil Association and ID	Project Segment	Description	Soil Erodibility Potential[1]	Wind Erodibility Group/ Index[2]	Expansion Potential[3]	Concrete Corrosion Potential[4]	Steel Corrosion Potential[4]
Hanford HbA	Segment 1 San Bernardino Substation	Sandy loam, 0 to 2% slopes	Slight	3/86	L	L	M

Table 4.6-1: USDA Soil Units

Soil Association and ID	Project Segment	Description	Soil Erodibility Potential[1]	Wind Erodibility Group/ Index[2]	Expansion Potential[3]	Concrete Corrosion Potential[4]	Steel Corrosion Potential[4]
San Emigdio SbC	Segment 1	Gravelly sandy loam, 2 to 9% slopes	Slight	5/56	L	L	H
Hanford HaD	Segment 1	Coarse sandy loam, 9 to 15% slopes	Slight	3/86	L	L	M
San Emigdio ScA	Segment 1, 2	Fine sandy loam, 0 to 2% slopes	Slight	3/86	L	L	H
San Emigdio ScC	Segment 1, 2, 3	Fine sandy loam, 2 to 9% slopes	Slight	3/86	L	L	H
Hanford HaC	Segment 1, 2, 3 Vista Substation	Coarse sandy loam, 2 to 9% slopes	Slight	3/86	L	L	M
Saugus ShF	Segment 1, 2, 3 San Bernardino Junction Vista Substation	Sandy loam, 30 to 50% slopes	Severe	3/86	L	L	L
Ramona RmE2	Segment 1, 3	Sandy loam, 15 to 30% slopes, eroded	Moderate	3/86	M	M	M
Tujunga TuB	Segment 2	Loamy sand, 0 to 5% slopes	Slight	2/134	L	L	M
San Timoteo SgF2	Segment 2	Loam, 30 to 50% slopes, eroded	Severe	5/56	L	L	H
Monserate MoC	Segment 2 Vista Substation	Sandy loam, 2 to 9% slopes	Slight	3/86	M	L	M
San Emigdio SaD	Segment 2	Sandy loam, 9 to 15% slopes	Slight	3/86	L	L	H
Vista Vr	Segment 2	Rock outcrop complex	Severe	3/86	L	M	M
Greenfield GtC	Segment 2, 3	Sandy loam, 2 to 9% slopes	Slight	3/86	L	L	M

Table 4.6-1: USDA Soil Units

Soil Association and ID	Project Segment	Description	Soil Erodibility Potential[1]	Wind Erodibility Group/ Index[2]	Expansion Potential[3]	Concrete Corrosion Potential[4]	Steel Corrosion Potential[4]
Tujunga TvC	Segment 2, 3, 4	Gravelly loamy sand, 0 to 9% slopes	Slight	3/86	L	L	M
Metz MgC	Segment 3	Coarse sandy loam, 2 to 9% slopes	Slight	3/86	L	L	H
Ramona RmC	Segment 3	Sandy loam, 2 to 9% slopes	Slight	3/86	M	L	M
Metz MID	Segment 3	Gravelly sandy loam, 2 to 15% slopes	Slight	4/86	L	L	L
Metz MeD	Segment 3	Loamy sand, channeled, 0 to 15% slopes	Slight	2/134	L	L	L
San Timoteo SmF2	Segment 3	Loam, 25 to 50% slopes, eroded	Severe	4L/86	L	L	L
San Emigdio SeD2	Segment 3	Fine sandy loam, 8 to 15% slopes, eroded	Slight	3/86	L	L	L
San Emigdio SeC2	Segment 3	Fine sandy loam, 2 to 8% slopes, eroded	Slight	3/86	L	L	L
Ramona RfC2	Segment 3	Very fine sandy loam, moderately deep, 0 to 8% slopes, eroded	Slight	3/86	M	L	M
San Timoteo SmE2	Segment 3	Loam, 8 to 25% slopes, eroded	Moderate	4L/86	L	L	L
Metz MdC	Segment 3	Loamy sand, 2 to 8% slopes	Slight	2/134	L	L	L
San Emigdio SgC	Segment 3	Loam, 2 to 8% slopes	Slight	4L/86	L	L	L

Table 4.6-1: USDA Soil Units

Soil Association and ID	Project Segment	Description	Soil Erodibility Potential[1]	Wind Erodibility Group/ Index[2]	Expansion Potential[3]	Concrete Corrosion Potential[4]	Steel Corrosion Potential[4]
San Emigdio SgD2	Segment 3 El Casco Substation	Loam, 8 to 15% slopes, eroded	Slight	4L/86	L	L	L
Badland BaG	Segment 3 El Casco Substation	No Data	Very Severe	No Data	No Data	No Data	L
Chino Ce	Segment 3, 4 El Casco Substation	Silt loam, drained	Slight	4L/86	M	L	H
Chino Cg	Segment 3, 4	Silt loam, drained, strongly saline-alkali	Slight	4L/86	M	L	H
Greenfield GyE2	Segment 3, 4	Sandy loam, 15 to 25% slopes, eroded	Moderate	3/86	L	L	L
Grangeville GtA	Segment 4	Fine sandy loam, drained, 0 to 2% slopes	Slight	3/86	L	L	H
Ramona RaC2	Segment 4	Sandy loam, 5 to 8% slopes, eroded	Slight	3/86	L	L	M
Ramona RaD2	Segment 4	Sandy loam, 8 to 15% slopes, eroded	Slight	3/86	L	L	M
Ramona RaB3	Segment 4	Sandy loam, 0 to 5% slopes, severely eroded	Slight	3/86	L	L	M
Ramona ReC2	Segment 4	Very fine sandy loam, 0 to 8% slopes, eroded	Slight	3/86	L	L	M
Ramona RaC3	Segment 4	Sandy loam, 5 to 8% slopes, severely eroded	Slight	3/86	L	L	M

Table 4.6-1: USDA Soil Units

Soil Association and ID	Project Segment	Description	Soil Erodibility Potential[1]	Wind Erodibility Group/ Index[2]	Expansion Potential[3]	Concrete Corrosion Potential[4]	Steel Corrosion Potential[4]
Greenfield GyC2	Segment 4	Sandy loam, 2 to 8% slopes, eroded	Slight	3/86	L	L	L
Ramona RaE3	Segment 4	Sandy loam, 15 to 25% slopes, severely eroded	Moderate	3/86	L	L	M
Greenfield GyD2	Segment 4, 5	Sandy loam, 8 to 15% slopes, eroded	Slight	3/86	L	L	L
Gorgonio GmD	Segment 4, 5	Gravelly loamy fine sand, 2 to 15% slopes	Slight	3/86	L	M	L
Hanford HcD2	Segment 4, 5	Coarse sandy loam, 8 to 15% slopes, eroded	Slight	3/86	L	L	L
Ramona RaD3	Segment 4, 5	Sandy loam, 8 to 15% slopes, severely eroded	Slight	3/86	L	L	M
Ramona RaB2	Segment 4, 5, 6	Sandy loam, 2 to 5% slopes, eroded	Slight	3/86	L	L	M
Hanford HdD2	Segment 5	Cobbly coarse sandy loam, 2 to 15% slopes, eroded	Slight	4/86	L	L	L
Rough Broken Land RuF	Segment 5	No Data	Severe	No Data	No Data	No Data	No Data
Hanford HfD	Segment 5	Sandy loam, 2 to 15% slopes	Slight	3/86	L	L	L
Gorgonio GnD	Segment 5	Cobbly loamy fine sand, 2 to 15% slopes	Slight	3/86	L	M	L
Riverwash RsC	Segment 5	No Data	Slight	8/0	No Data	No Data	No Data

Table 4.6-1: USDA Soil Units

Soil Association and ID	Project Segment	Description	Soil Erodibility Potential[1]	Wind Erodibility Group/ Index[2]	Expansion Potential[3]	Concrete Corrosion Potential[4]	Steel Corrosion Potential[4]
Tujunga TwC	Segment 5	Gravelly loamy sand, 0 to 8% slopes	Slight	3/86	L	L	L
Hanford HcC	Segment 5	Coarse sandy loam, 2 to 8% slopes	Slight	3/86	L	L	L
Terrace Escarpments TeG	Segment 5, 6	No Data	Not Rated	No Data	No Data	No Data	No Data
Soboba SsD	Segment 5, 6	Stony loamy sand, 2 to 15% slopes	Slight	3/86	L	L	L
Ramona RdE3	Segment 5, 6	Sandy loam, moderately deep, 15 to 25% slopes, severely eroded	Moderate	3/86	M	L	M
Soboba SrE	Segment 5, 6	Cobbly loamy sand, 2 to 25% slopes	Slight	3/86	L	L	L
Chuckawalla CnE	Segment 6	Cobbly fine sandy loam, 9 to 30% slopes	Moderate	6/48	L	L	H
Tujunga TrC	Segment 6	Gravelly loamy sand, 0 to 9% slopes	Slight	2/134	L	L	H
Dumps GP	Segment 6	Gravel pits and dumps	Not Rated	1/180	L	No Data	No Data
Chuckawalla CnC	Segment 6	Cobbly fine sandy loam, 2 to 9% slopes	Slight	6/48	L	L	H
Carsitas ChC	Segment 6	Cobbly sand, 2 to 9% slopes	Slight	1/220	L	L	H
Myoma MaD	Segment 6	Fine sand, 5 to 15% slopes	Slight	1/250	L	L	H
Badland BA	Segment 6	No Data Available	Not Rated	No Data	No Data	No Data	No Data

Table 4.6-1: USDA Soil Units

Soil Association and ID	Project Segment	Description	Soil Erodibility Potential[1]	Wind Erodibility Group/ Index[2]	Expansion Potential[3]	Concrete Corrosion Potential[4]	Steel Corrosion Potential[4]
Carsitas CdE	Segment 6	Gravelly sand, 9 to 30% slopes	Moderate	1/220	L	L	H
Soboba SoD	Segment 6	Cobbly sand, 2 to 15% slopes	Slight	1/220	L	L	H
Riverwash RA	Segment 6	No Data Available	Not Rated	No Data	L	No Data	No Data
Rock outcrop LR	Segment 6	Lithic Torripsamme nts-Rock outcrop complex	Not Rated	No Data	No Data	No Data	No Data
Myoma MaB	Segment 6	Fine sand, 0 to 5% slopes	Slight	1/250	L	L	H
Carsitas CdC	Segment 6 Devers Substation	Gravelly sand, 0 to 9% slopes	Slight	1/220	L	L	H
Carsitas CkB	Segment 6 Devers Substation	Fine sand, 0 to 5% slopes	Slight	1/250	L	L	H

Data from USDA (2008a, b, and c).
[1] Soil Erodibility Potential based on NRCS hazard of off-road or off-trail erosion data.
[2] Wind Erodibility Group/Index based on NRCS data. Wind erodibility groups include soils of similar properties affecting their susceptibility to wind erosion in cultivated areas. Soils assigned to group 1 are most susceptible, and soils assigned to group 8 are least susceptible. Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion.
[3] Expansion Potential based on NRCS linear extensibility percent data (L=Low, M=Moderate, H=High, VH= very high).
[4] Concrete and Steel Corrosion Potential (L=Low, M=Moderate, H=High).
NRCS = Natural Resources Conservation Service
USDA = United States Department of Agriculture

4.6.1.5 Seismic Sources in the Vicinity of the Project Study Area

The Proposed Project is located in a seismically active area, as is the majority of Southern California. The numerous faults in Southern California include active, potentially active, and inactive faults. As defined by the California Geological Survey (CGS), active faults are faults that have ruptured within Holocene time, or within approximately the last 11,000 years. Potentially active faults are those that show evidence of movement during Quaternary time (approximately the last 1.6 million years), but for which evidence of Holocene movement has not been established. Inactive faults have not moved in the last approximately 1.6 million years.

Principal active faults that cross the Proposed Project are described in the following sections. Figure 4.6-1, Fault Locations, shows the approximate locations of the principal active and potentially active faults in the region and their geographic relationship to the Proposed Project.

Principal Active Faults Crossing the Project Study Area

South Branch San Andreas Fault. The active San Andreas Fault Zone has long been recognized as the dominant seismotectonic feature in California. This right-lateral, strike-slip fault is over 600 miles long and extends northwest through the State from the Salton Sea to north of San Francisco. Two of California's three largest historic earthquakes, the 1906 San Francisco earthquake and the 1857 Fort Tejon earthquake, occurred along the San Andreas Fault. The San Andreas Fault Zone includes the Mojave, San Bernardino, North Branch, South Branch and Coachella segments in the vicinity of the Project Study Area. The active South Branch of the San Andreas Fault Zone forms a complex system of faults, including the San Gorgonio Pass Fault Zone and Banning Fault, which cross the Proposed Project in Segments 4, 5 and 6. The fault is considered capable of producing earthquakes in excess of M_{max} 7.4,[1] and the average frequency of earthquakes along this segment of the San Andreas Fault is approximately 140 years.

San Gorgonio Pass Fault Zone. The active San Gorgonio Pass Fault Zone is a thrust fault system that consists of a series of faults that extend west for a length of approximately 15 miles through the San Gorgonio Pass. The fault zone in the Project Study Area is roughly located between the Twentynine Palms Highway and Whitewater River on the east and extends to the City of Banning on the west. Several active splays of the fault are mapped crossing Segments 5 and 6 of the Proposed Project. The San Gorgonio Pass Fault Zone is part of a complex fault system associated with the Banning Fault and South Branch of the San Andreas Fault. The fault zone is considered capable of generating earthquakes in the range of M_{max} 6.0 to 7.0 and might rupture concurrently during an earthquake with the Banning Fault.

Banning Fault. Based on the referenced geologic maps and fault maps, the Banning Fault does not cross the WOD alignment; however, the Banning Fault consists of a right-lateral strike-slip, oblique right-reverse and thrust fault system that extends with the San Gorgonio Pass Fault Zone for approximately 24 miles through the communities of Whitewater, Cabazon, Banning, and Cherry Valley north of Beaumont. The Banning Fault is considered capable of generating earthquakes in the range of M_{max} 6.0 to 7.2 alone, and could rupture along with the San Andreas Fault Zone, resulting in a M_{max} 7.0 to 8.0 earthquake.

Beaumont Plain Fault Zone. Extending south of the Banning Fault, an active splay of the Beaumont Plain Fault Zone is mapped crossing Segment 4 of the WOD alignment west of the City of Beaumont (Jennings 2010). The Beaumont Plain Fault Zone is a series of northwest-trending en-echelon fault scarps that traverse late Quaternary alluvial

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1 M_{max} refers to maximum earthquake magnitude. Magnitude measures the energy released at the source of the earthquake. An earthquake with a M_{max} of 7.4 would correspond to an intensity level that would cause slight damage in specially designed structures, considerable damage in ordinary substantial buildings with partial collapse, and great damage in poorly built structures (USGS, 2013).

deposits in the vicinity of Beaumont. They have formed by normal dip-slip displacements and probably represent an extensional strain field.

San Jacinto (San Bernardino) Fault Zone. The active San Jacinto Fault Zone is a prominent tectonic feature in Southern California and consists of a series of right-lateral strike-slip fault segments that extend northwest for a length of approximately 130 miles through the communities of Borrego Springs, Anza, Hemet, Loma Linda, and San Bernardino. The Coyote Creek segment of the fault, located at the southeast end of the fault zone, was the source of the 1968 M6.5 Borrego Mountain earthquake. The San Jacinto Fault Zone has a slip rate of approximately 6 millimeters (mm) per year. The San Bernardino segment of the fault near the Proposed Project was the source of the 1923 M6.3 Loma Linda earthquake. The San Bernardino portion of the fault zone is considered capable of generating earthquakes of M_{max} 6.7 The main branch of the San Jacinto Fault Zone crosses Segment 2 of the Proposed Project in the San Timoteo Badlands hills between the communities of Loma Linda and Grand Terrace approximately 1.75 miles west of San Bernardino Junction. Active splays of the fault are mapped subparallel and crossing the Proposed Project for a length of approximately 1 mile near and west of San Bernardino Junction, and for a length of approximately 0.5-mile at a distance of 1 mile east of San Bernardino Junction.

4.6.1.6 Geologic Hazards in the Vicinity of the Project Study Area

Surface Fault Rupture

Surface fault rupture is the offset or rupturing of the ground surface by relative displacement across a fault during an earthquake. Evaluation of the potential hazard of surface fault rupture is based on the concepts of recentness and recurrence of faulting along existing faults. In general, the more recent the faulting, the higher the probability for future faulting. Stated another way, faults of known historic activity during the last 200 years, as a class, have greater probability for future activity than faults classified as Holocene age (last 11,000 years) and a much higher probability of future activity than faults classified as Quaternary age (last 1.6 million years). However, it should be kept in mind that certain faults have recurrent activity measured in tens or hundreds of years, whereas other faults may be inactive for thousands of years before being reactivated. The magnitude, sense, and nature of fault rupture also vary for different faults or even along different strands of the same fault. Even so, future faulting generally is expected to recur along preexisting faults. The development of a new fault or reactivation of a long-inactive fault is relatively uncommon and is not a design consideration in project development.

The probability for surface fault rupture within the Project Study Area would primarily occur along active faults (Holocene-age) designated by the State of California as Earthquake Fault Zones (formerly Alquist-Priolo Special Studies Zones). Four active faults are mapped crossing the Proposed Project , and include the South Branch San Andreas Fault, San Gorgonio Pass Fault Zone, Beaumont Plain Fault Zone, and the San Jacinto Fault Zone.

Three of the active faults that cross the Project Study Area have been designated by the State of California as Earthquake Fault Zones (EFZs) under the Alquist-Priolo Special Studies Zone Act of 1972: (1) the South Branch San Andreas Fault near (and partially underlying) Devers Substation, (2) portions of the San Gorgonio Pass Fault Zone in the communities of Whitewater, Cabazon, and Banning, and (3) the main branch of the San Jacinto Fault Zone in the San Timoteo Badlands between the communities of Loma Linda and Grand Terrace, west of the San Bernardino Junction. Development within EFZs and across the active splay of the Beaumont Plain Fault Zone would involve further evaluation prior to design of the project to address the fault rupture hazards. The location of the boundaries of the EFZ is based on the presence of well-defined, active fault traces. Earthquake Fault Zone boundaries are typically 500 feet or more away from the fault traces and are positioned to accommodate imprecise locations of the faults and the possible existence of other active branches. The approximate location of active faults and EFZs and their geographic relationship to the Proposed Project are shown on Figure 4.6-1, Fault Locations, located at the end of this chapter. Table 4.6-2, Active Faults Crossing the Project Study Area, lists the active faults that cross the Project Study Area , whether the fault is located in an EFZ, and the segment of the Proposed Project in which the fault is located.

Table 4.6-2: Active Faults Crossing the Project Study Area

Active Fault[1]	Earthquake Fault Zone Crossing Project Study Area[2]	Proposed Project Segment Crossed
South Branch San Andreas	Yes	Segment 6
San Gorgonio Pass	Yes	Segment 5 and 6
Beaumont Plain	No	Segment 4
San Jacinto	Yes	Segment 2

[1] Jennings, 2010.
[2] Hart, E.W., and Bryant, W.A., 1997 (formerly Alquist-Priolo Special Studies Zones).

Seismic Ground Shaking

Seismic ground shaking is the response of the ground surface to the passing of earthquake wave fronts radiating from the focus of the earthquake. The period of shaking corresponds with the passage of the seismic wave through the site. Earthquake events from one of the regional active or potentially active faults within or near the Project Study Area could result in strong ground shaking that could affect the Project Study Area. The level of ground shaking at a given location depends on many factors, including the size and type of earthquake, distance from the earthquake, and subsurface geologic conditions. Disregarding local variations in ground conditions, the intensity of shaking at different locations within a given area can generally be expected to decrease with distance away from an earthquake source. The size and type of construction also affects how particular structures perform during ground shaking.

In order to evaluate the level of ground shaking that might be anticipated along the Proposed Project segments due to the extent of the area, probabilistic peak horizontal ground acceleration (PGA) contour data available from the United States Geological Survey (USGS) were reviewed. These available data are for a return interval with a 10 percent probability of exceedance in 50 years. The USGS web-based ground motion calculator was used to estimate the site-specific PGA (adjusted for site class) for the substation and junction locations. In accordance with California Building Code guidelines, these site-specific PGA data are for a return interval having a 2 percent probability of exceedance in 50 years. These data indicate that the Project Study Area is located in an area where PGA ranging from 0.4 g to 0.84 g (40 to 84 percent of the acceleration due to gravity) would be anticipated during an earthquake. Higher ground acceleration levels are attributable to potentially higher levels of earthquake ground shaking. A summary of potential ground shaking levels for the Proposed Project segments is presented in Table 4.6-3, Probabilistic PGA Anticipated along the Proposed Project.

Table 4.6-3: Probabilistic PGA Anticipated along Segments of the Proposed Project

Segment /Location	Probabilistic Peak Horizontal Ground Acceleration (g)[1]
Segment 1	0.6 to 0.8 g
San Bernardino Substation	0.60 g
Segment 2	0.4 to 0.8 g
Vista Substation	0.69 g
San Bernardino Junction	0.76 g
Segment 3	0.4 to 0.8 g
El Casco Substation	0.60g
Segment 4	0.4 to 0.6 g
Segment 5	0.4 to 0.8 g
Segment 6	0.4 to 0.8 g
Devers Substation	0.84 g

[1] Segment data with a 10 percent probability of exceedance in 50 years from the United States Geological Survey (USGS) Seismic Hazard Maps for the United States (USGS, 2008); Substation/Junction data with a 2 percent probability of exceedance in 50 years from USGS Ground Motion Parameter Calculator (USGS, 2013).
g = acceleration due to gravity

PGA = peak horizontal ground acceleration

Liquefaction

Liquefaction is a phenomenon in which soil loses its shear strength for short periods during an earthquake. Ground shaking of sufficient duration can result in the loss of grain-to-grain contact due to a rapid increase in pore water pressure, causing the soil to behave as a fluid for short periods. To be susceptible to liquefaction, a soil is typically cohesionless, with a grain size distribution of a specified range (generally sand and silt), loose to medium dense, below the groundwater table, and subjected to a sufficient magnitude and duration of ground shaking.

The State of California Seismic Hazards Mapping Program produces maps identifying areas of the State susceptible to liquefaction, but has not yet produced maps within the Project Study Area. The counties of Riverside and San Bernardino have evaluated generalized areas of liquefaction susceptibility based on areas where potentially loose alluvial soils and shallow groundwater (generally within 50 feet of the ground surface) exist.

Based on the Safety Element of the County of Riverside 2003 General Plan, the Proposed Project crosses areas in Riverside County mapped as having a low to moderate susceptibility for liquefaction. The Generalized Liquefaction Susceptibility Map from the General Plan indicates that portions of the Proposed Project in the area, roughly from Devers Substation to Cabazon, has deep groundwater with liquefaction-susceptible sediments and has a moderate potential for liquefaction. The General Plan shows that the portion of the Proposed Project in Riverside County west of Cabazon has liquefaction-susceptible sediments with a low to moderate potential for liquefaction; however, no groundwater data is available for this area. The areas in this part of the Proposed Project with a moderate potential for liquefaction generally include the Beaumont, Banning, and San Timoteo Canyon areas; and the areas with a low potential for liquefaction generally include the elevated areas of San Timoteo Canyon and the San Timoteo Badlands. Based on the Geologic Hazard Overlays of the San Bernardino County Land Use Plan (2009), the Proposed Project crosses an area in Reche Canyon and near San Bernardino Substation in Segment 2 that are mapped as having a low susceptibility for liquefaction. The Environmental Impact Report for the El Casco System Project (CPUC 2008) indicates that portions of the El Casco Substation site have a high liquefaction potential due to the presence of shallow groundwater and loose granular soils beneath the site.

Portions of the Proposed Project mapped in areas having a moderate susceptibility for liquefaction generally include valleys and stream/canyon bottoms, typically where liquefaction-prone conditions are present (loose granular soils and shallow groundwater). The potential hazard of liquefaction is not a consideration for portions of the Proposed Project underlain by shallow bedrock, which is typical of the elevated areas in the San Bernardino Mountains foothills, Banning Bench, and San Timoteo Badlands areas. A summary of areas with liquefaction potential based on review of background documents is presented in Table 4.6-4, Liquefaction Potential for the Proposed Project.

Seismic Slope Instability

Seismically-induced slope instability (landslides) typically occurs in areas of steep slopes where underlying earth materials are unstable. Shallow seismically induced landslides typically consist of rockfalls or shallow slumps within weak surficial materials. Deeper seismically induced landslides can consist of rotational or block-type landslides that form deeper within the ground and are generally related to discontinuities in the earth materials that manifest into a sliding surface. Ground shaking due to earthquakes can cause landslides to develop, trigger incipient landslides, or reactivate ancient landslides.

The State of California Seismic Hazards Mapping Program produces maps identifying areas susceptible to earthquake-induced landslides, but has not yet produced maps within the Project Study Area. The CGS EFZs map of the Whitewater quadrangle indicates that areas of steep terrain in the foothills of the San Bernardino Mountains north of the San Gorgonio Pass and west of the Whitewater River (Segment 6) are subject to seismically induced landsliding and ridgetop spreading.

Table 4.6-4: Liquefaction Potential for the Proposed Project

Segment/Location	Description/Information	Liquefaction Potential
Segment 1 (Northern approximately ¼ mile-includes San Bernardino Substation)	Area around San Bernardino Substation at the northern part of Segment 1.	Low[1]
Segment 2 (Reche Canyon Portion)	Reche Canyon (low-lying canyon bottom area).	Low[1]
Segment 3 (Riverside County Portion)	No groundwater data available; liquefaction-susceptible sediments. [2]	Low to Moderate[2]
El Casco Substation	Shallow groundwater and loose granular soils. [3]	High[3]
Segment 4 West of Beaumont	No groundwater data available; liquefaction-susceptible sediments. [2]	Low to Moderate [2]
Segment 4 East of Beaumont	No groundwater data available; liquefaction-susceptible sediments. [2]	Low to Moderate [2]
Segment 5 West of Malki Road	No groundwater data available; liquefaction-susceptible sediments. [2]	Moderate[2]
Segment 5 East of Malki Road	Deep groundwater; liquefaction-susceptible sediments. [2]	Moderate[2]
Segment 6 (Includes Devers Substation)	Deep groundwater; liquefaction-susceptible sediments. [2]	Moderate[2]

[1] San Bernardino County, Land Use Plan, General Plan Geologic Hazard Overlays FH30C and FH31C, March 9, 2010.
[2] County of Riverside, General Plan, Chapter 6: Safety Element, Appendix H: Geotechnical Report, October 9, 2003.
[3] CPUC, Recirculated Final Environmental Impact Report for the El Casco System Project, approved December 18, 2008.

The counties of Riverside and San Bernardino have evaluated areas generally susceptible to earthquake-induced landslides based on slope gradient and underlying material types. Based on the Safety Element of the County of Riverside 2003 General Plan, the Proposed Project crosses areas in Riverside County mapped as having a low to high susceptibility for earthquake-induced landslides. The Earthquake-Induced Slope Stability Map from the General Plan indicates that the elevated portions of the Proposed Project that have a low to moderate susceptibility for seismically induced landslides and rockfalls generally include the San Bernardino Mountains foothills in Segment 6 and hilly area in Segment 3 between Beaumont and El Casco Substation in San Timoteo Canyon. The elevated areas of the Banning Bench and the San Timoteo Badlands are shown to have a moderate to high susceptibility for seismically induced landslides and rockfalls. The Geologic Hazard Overlays of the San Bernardino County Land Use Plan indicate that Segments 1, 2, and 3 of the Proposed Project cross areas in the San Timoteo Badlands portion of San Bernardino County that are mapped as having a moderate to high susceptibility for earthquake-induced landslides.

The portions of the Proposed Project mapped in areas having a moderate to high susceptibility for seismically induced landslides and rockfalls generally include areas with steep slope gradients and less stable formations. The potential for seismically induced landslides and rockfalls is not a consideration for low-lying valley and canyon bottom areas of the Proposed Project with gentle to moderate topographic gradients, in particular much of Segments 4 and 5 of the San Gorgonio Pass, Banning, and Beaumont areas.

A summary of areas susceptible to landslides based on a review of background documents is presented in Table 4.6-5, Earthquake-Induced Landslide Potential for the Proposed Project.

Table 4.6-5: Earthquake-Induced Landslide Potential for the Proposed Project

Segment	Description	Landslide Susceptibility
Segment 1	Steep areas in the San Timoteo Badlands in the south part of Segment 1	Moderate to High[1]
Segment 2	Steep areas in the San Timoteo Badlands	Moderate to High[1]
Segment 3	Steep areas in the San Timoteo Badlands	Moderate to High [1, 2]
Segment 3	Low-lying or gentle terrain areas in the San Timoteo Badlands	Low[2]
Segment 4	Low-lying or gentle terrain areas in Beaumont, Cherry Valley, Banning	Low to Moderate[2]
Segment 4	Steep terrain areas in San Timoteo Canyon and Banning Bench	Moderate to High[2]
Segment 5	Gentle to moderate terrain areas	Low[2]
Segment 6	Gentle terrain areas	Low[2]
Segment 6	Steep terrain areas in San Bernardino Foothills north of the San Gorgonio Pass and west of the Whitewater river gorge.	Moderate to High[2] Subject to seismically induced landsliding and ridgetop spreading[3]

[1] San Bernardino County, Land Use Plan, General Plan Geologic Hazard Overlays FH30C and FH31C, March 9, 2010.
[2] County of Riverside, General Plan, Chapter 6: Safety Element, Appendix H: Geotechnical Report, October 9, 2003.
[3] State of California, Earthquake Fault Zones, Whitewater Quadrangle, 7.5 Minute Series: Scale 1:24,000, dated June 1, 1995.

Landslides

Landslides typically occur in areas of steep slopes where underlying earth materials are unstable and particularly where high rainfall occurs and/or high groundwater levels are present. Landslides can consist of surficial failures that include rockfalls, shallow slumps, and mudflows, or deeper-seated rotational and block failures. Shallow failures are typically caused by high incident rainfall or concentrated surface runoff conditions that weaken surficial materials. Rotational slides and block-type slides form deeper within the ground and are generally related to discontinuities in the rock that manifest into a sliding surface. Rainfall and other water infiltration into the ground can exacerbate and trigger these deeper sliding conditions. Landslides can also be caused by construction activities such as grading that undercuts the toe of a slope or induces loading at the top of a slope.

Geologic maps that are available for quadrangles in the Project Study Area were reviewed for mapped landslides located within the Project Study Area. In addition, the Safety Element of the County of Riverside 2003 General Plan and Geologic Hazard

Overlays of the San Bernardino County Land Use Plan (2009) show existing landslides in the Project Study Area. Based on review of these referenced geologic materials, there are existing landslides mapped within the Project Study Area in the San Timoteo Badlands (Segment 3) and San Bernardino Mountains foothills (Segment 5). The approximate locations of the mapped landslides in Segment 3 are shown on Figure 4.6-2, Mapped Landslides, located at the end of this chapter. The landslides shown in Segment 5 in the Safety Element of the County of Riverside 2003 General Plan are not substantiated by detailed geologic maps of this area by Thomas W. Dibblee and are not, therefore, presented on Figure 4.6-2, Mapped Landslides. Older geologic maps published by the CGS (formerly the California Division of Mines and Geology) also do not substantiate the presence of landslides in Segment 5. The potential for landslides exists where steep slopes and weak rock formations are present, including portions of the Proposed Project located in the San Timoteo Badlands (Segment 3), San Bernardino Mountains foothills (Segments 5 and 6), Banning Bench (Segment 4), and San Timoteo Canyon (Segment 4) areas.

Soil Erosion

Erosion refers to the process by which soil or earth material is loosened or dissolved and removed from its original location. Erosion can occur by varying processes and may occur in the Project Study Area where soil is exposed to wind or moving water (both rainfall and surface runoff). The processes of erosion are generally a function of material type, terrain steepness, rainfall or irrigation levels, surface drainage conditions, and general land uses. Review of geologic maps and soil data indicate that surface soils along the Proposed Project are comprised of variable types of materials. In addition, the Proposed Project follows varied topographic terrain ranging from gentle to steep gradients. In a general sense, steeper slope gradients, such as in areas of the foothills of the San Bernardino Mountains, Banning Bench, and San Timoteo Badlands areas provide a higher erosion potential for similar soil types.

The Proposed Project crosses rivers, creeks, washes, and gullies where perennial and ephemeral water flows occur. Areas within close proximity to these drainage features may be subjected to higher levels of water-related erosion during flow periods. Water-related erosion of surface soils is also exacerbated when saturated by rain or heavy irrigation.

Many surface soils along the Proposed Project are comprised of sandy materials, with variable amounts of gravel, and some fine-grained silt and clay soils. Sandy soils typically have low cohesion and have a relatively higher potential for erosion from surface runoff, particularly when exposed in cut slopes or utilized near the face of fill embankments. These types of sandy soils are present in much of the alluvial areas in the Coachella Valley, fanglomerate deposits in the foothills of the San Bernardino Mountains and San Gorgonio Pass, and in the coarse-grained sections of the San Timoteo Beds in the Banning Bench and San Timoteo Badlands areas. Surface soils with higher amounts of clay, which may be present in low-lying valley and agricultural areas, tend to be less erodible, as the clay acts as a binder to hold the soil particles together. Hard rock formations and granitic rock, such as in the Grand Terrace area, tend to be less erodible.

In order to evaluate the water-related erosion potential of the soils underlying the Proposed Project, data from the NRCS were evaluated. The data pertain to the potential hazard of erosion to "off-road" and "off-trail" areas along the Proposed Project from ground disturbance due to Proposed Project construction. The erosion hazard ratings apply to the potential for sheet or rill erosion in areas where 50 to 75 percent of the areas have been exposed by ground disturbance, such as grading for access roads and tower sites. Potential areas of erosion for the Proposed Project have been categorized as slight, moderate, severe, and very severe. An inventory of the erodibility potential for individual soil types along the Proposed Project is presented in Table 4.6-1, USDA Soil Units.

In order to evaluate the wind-related erosion potential of the soils underlying the Project Study Area, wind erodibility data from the NRCS were evaluated. The data pertain to the wind erodibility index of soils, a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. Based on the index values, soils are assigned to wind erodibility groups that include soils of similar properties affecting their susceptibility to wind erosion in cultivated areas. Soils assigned to Group 1 are most susceptible, and soils assigned to Group 8 are least susceptible. An inventory of the erodibility potential for individual soil types along the Proposed Project is presented on Table 4.6-1, USDA Soil Units. The wind erodibility data indicate that many of the soil types along the Proposed Project have a moderate susceptibility to wind-related erosion and that soils in the Coachella Valley area have a higher susceptibility to wind-related erosion.

Subsidence

Subsidence is characterized as a sinking of the ground surface relative to surrounding areas and can generally occur where deep alluvial soil deposits are present in valley areas such as the Coachella Valley and San Bernardino Valley. Based on review of the County of Riverside 2003 General Plan, areas with documented subsidence or potential subsidence are not present in the Riverside County portion of the Proposed Project.

The San Bernardino County Land Use Plan does not include subsidence maps, and the San Bernardino County 2007 General Plan Program does not include discussion of subsidence.

Settlement and Collapsible Soils

Loose natural soils or undocumented/poorly compacted fill may be present throughout the Project Study Area; however, the exact location of these soils/fills in relation to the Project Study Area is unknown at this time and will not be known until the completion of final engineering. Portions of the Project Study Area are mantled by young alluvial soils, which are generally poorly consolidated, reflecting a history without substantial loading. The older alluvial deposits mapped in the Project Study Area are generally more dense or have some degree of cementation and are typically less compressible than the younger alluvial soils. However, older alluvial deposits may include potentially collapsible layers above the groundwater table. Collapsible soils are distinguished by their potential to undergo a significant decrease in volume upon an increase in moisture content, even without an increase in external loads.

Portions of the Project Study Area contain existing fill soils associated with transmission facilities construction, roadway construction, property and structure development, utilities, and other factors. The exact degree of compaction, material types, and underlying ground conditions of existing fill soils in the Project Study Area is unknown; however, undocumented or poorly compacted fill may be present in these areas. Where areas of undocumented or poorly compacted fill are found in relation to the Proposed Project is unknown at this time and will not be known until the completion of final engineering. The Proposed Project corridor transitions between variable materials ranging from loose soils to hard rock, and the potential for differential ground settlement can exist at these transitions. The potential for soils prone to settlement or collapse would be evaluated on a site-specific basis during the design phase of the Proposed Project.

Expansive Soils

Expansive soils may be present in some of the geologic units that underlie the Proposed Project segments. Expansive soils are characterized by their ability to undergo significant volume change (shrink or swell) due to variations in moisture content. Earth materials susceptible to these volumetric changes include soils and rock formations containing clays. Sandy soils are generally not expansive. Changes in soil moisture content can result from rainfall, irrigation, pipeline leakage, surface drainage conditions, perched groundwater, drought, or other factors. Volumetric change of expansive soil may cause excessive cracking and heaving of structures with shallow foundations, concrete slabs-on-grade, or pavements supported on these materials.

Due to the size of the Project Study Area and lack of site-specific geologic references regarding the presence of expansive soils in that area, USDA soil data from the NRCS was utilized to evaluate the presence of expansive soils. The NRCS data is limited to soils that have been evaluated by the USDA, and expansive soils may be present in other areas of the project not indicated by the NRCS data.

Linear extensibility percent is the method used by the NRCS to evaluate the shrink-swell potential of soils and refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. The volume change is reported as percent change for the whole soil. The shrink-swell (expansion) potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 5.9 percent; high if 6 to 8.9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3 percent, shrinking and swelling can cause damage to buildings, roads, and other structures.

An inventory of the shrink-swell (expansion) potential of individual soil types along the Proposed Project is presented on Table 4.6-1, USDA Soil Units. The data indicate that areas of the Proposed Project with potentially moderately expansive soils are located in portions of Segments 1, 2, 3 and 4.

Corrosive Soils

The Project Study Area is located in a geologic environment that could potentially contain soil conditions that are corrosive to concrete and buried metal structures. Corrosive soil conditions may exacerbate the corrosion hazard to concrete foundations, metal pipes, and other buried concrete or metal improvements that are planned for the Proposed Project.

The NRCS data is available for much of the soil units traversed by the Proposed Project; however, some soil units do not have reported information regarding their corrosive potential. Detailed assessment of the potential for corrosive soils in the Project Study Area would be evaluated on a site-specific basis during the design phase of the Proposed Project.

4.6.2 Regulatory Setting

4.6.2.1 Federal Regulatory Setting

Clean Water Act

See Section 4.9 (Hydrology and Water Quality) for a description of the Clean Water Act (CWA). Erosion potential is discussed in this section and erosion control requirements associated with Storm Water Pollution Prevention Plans (SWPPPs). There are no other applicable Federal regulations.

4.6.2.2 State Regulatory Setting

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code [PRC] § 2621 et seq.) was enacted by the State of California in 1971 to mitigate the hazard of surface faulting to structures planned for human occupancy and to other critical structures. Regulatory zones established by the State (known as EFZs) are used by government agencies during planning and review processes for new construction. The CGS produces maps delineating EFZs for quadrangles located in the Project Study Area, and these maps are incorporated into the evaluation of potential surface fault rupture related to EFZs in the Impact Analysis discussion, below.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (PRC, § 2690 et seq.) was enacted by the State of California in 1990 to protect public safety from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and other hazards caused by earthquakes. Discussion of potential hazards required under this Act is presented in Section 4.6.4, Impact Analysis.

4.6.2.3 Local Regulatory Setting

The California Public Utilities Commission (CPUC) has jurisdiction over the siting and design of the Proposed Project because it authorizes the construction of investor-owned public utility (IOU) facilities. Although such projects are exempt from local land use and zoning regulations and permitting, General Order (GO) No. 131-D Section III.C requires "the utility to communicate with, and obtain the input of, local authorities regarding land-use matters and obtain any nondiscretionary local permits." As part of its environmental review process, SCE considered local and state land use plans and policies, and local land use priorities and concerns. Table 4.6-6, Local Land Use Documents Related to Geology and Soils Applicable to Proposed Project, summarizes key elements of local land use documents that have policies applicable to recreational resources.

Table 4.6-6: Local Land Use Documents Related to Geology and Soils Applicable to Proposed Project

Document	Plans, Policies, Programs
City of Banning General Plan, Geotechnical Element	**Goal:** Increased protection and safety of human life, land, and property from the effects of seismic and geotechnical hazards. **Policy 2:** In accordance with State law, all development proposals within designated Alquist-Priolo Earthquake Fault Zones shall be accompanied by appropriate geotechnical analysis. **Policy 3:** Development in areas identified as being susceptible to slope instability shall be avoided unless adequately engineered to eliminate geotechnical hazards.
City of Beaumont General Plan, Safety Element	**Goal 1:** The City of Beaumont will make every effort to mitigate the seismic hazards that are present within the General Plan's Planning Area **Policy 1:** The City of Beaumont will continue to promote seismic safety through comprehensive land use planning. **Policy 4:** The City of Beaumont will require special soils and structural investigations for all proposed structures of large scale or involving large groups of people.
City of Calimesa General Plan, Land Use Element	**Policy 5.3:** Graded areas shall be revegetated with native plans compatible to the area to prevent erosion.
City of Calimesa General Plan, Resource Management Element	**Goal 2:** Conserve and protect significant landforms and hillside areas. **Policy 2.2:** Require the practice of proper soil management techniques to reduce erosion, sedimentation and other soil-related problems. **Policy 2.4:** Discourage the grading of hillside areas through compliance with the City's Hillside Development Guidelines.
City of Calimesa General Plan, Safety Element	**Goal 1:** Minimize injury and loss of life, property damage, and other impacts caused by seismic shaking, fault rupture, ground failure, and landslides. **Policy 1.2:** Require geological and geotechnical investigations in areas of potential seismic or geologic hazards as part of the environmental and development review process. Require mitigation of seismic or geologic hazards to the satisfaction of the responsible agencies. **Policy 4.6:** Support earthquake strengthening and provisions for alternative or back-up essential services, such as water, sewer, electricity, and natural gas

Table 4.6-6: Local Land Use Documents Related to Geology and Soils Applicable to Proposed Project

Document	Plans, Policies, Programs
	pipelines and connections, especially in areas of high seismic or geologic hazard. **Policy 6.1:** Continue to enforce seismic design provisions for Seismic Zone 4 of the Uniform Building Code and encourage the design of critical facilities with greater margins in safety.
City of Colton General Plan, Safety Element	**Principle 1:** Identify geological conditions that need special management, restrict widespread urban development in areas of geologic hazards and designate land areas determined unfit for structures of human occupancy as open space land. **Standard 2:** Structural design shall be compatible with the local geologic hazard.
City of Grand Terrace General Plan, Public Health and Safety Element	**Goal 5.1:** Minimize the risk to public health and safety, social and economic welfare of the City resulting from geologic and seismic hazards. **Policy 5.1.1** All new development shall comply with current seismic design standards. **Goal 5.2** Protect humans and property from hazards associated with slope instability. **Policy 5.2.2:** All new developments in areas of slope instability shall be required to perform adequate geotechnical analysis and provide an engineered design to assure that slope instability will not impact the development.
City of Loma Linda General Plan, Public Health and Safety Element	**Guiding Policy 10.1.2:** Minimize the risks of property damage and personal injury resulting from seismic and geologic hazards. **Implementing Policies:** … b. Enforce the provisions of the Alquist-Priolo Earthquake Fault Zoning Act. c. Require geologic and soils reports to be prepared for proposed development sites, and incorporate the findings and recommendations of these studies into project development requirements… g. Require that engineered slopes be designed to resist seismically induced failure. h. Require that structures overlying both cut and fill areas within a grading operation be over excavated to mitigate the potential for seismically induced differential settlement... i. Require specialized soils reports in areas suspected of having problems with potential liquefaction and areas depicted as liquefaction zones as shown on Figure 10.1 (Geologic Hazards), bearing strength, expansion, settlement, or subsidence, including implementation of the recommendations of these reports into the project development. j. Work with Southern California Edison, the Southern California Gas Company, pipeline companies, and industrial companies to implement measures to safeguard the public from seismic hazards associated with high voltage transmission lines, caustic and toxic gas and fuel lines, and flammable storage facilities.
City of Palm Springs General Plan, Safety Element	**Goal SA1:** Reduce, to the greatest extent possible, the physical and environmental effects of seismic hazards within the City. **Policy SA1.2** Require geologic and geotechnical investigations in areas of potential seismic hazards such as fault rupture, seismic shaking, liquefaction, and slope failure, as part of the environmental and/or development review process for all structures, and enforce structural setbacks from faults that are identified through those investigations in accordance with the Seismic Hazards Mapping Act. Require subsurface investigations of the Garnet Hill fault if and as that area of northern Palm Springs is developed.
City of Redlands General Plan	**Guiding Policy 8.50a:** Investigate and mitigate geologic and seismic hazards, or locate development away from such hazards, in order to preserve life and protect

Table 4.6-6: Local Land Use Documents Related to Geology and Soils Applicable to Proposed Project

Document	Plans, Policies, Programs
	property. Areas of unmitigable hazards should be preserved as open space.
City of San Bernardino General Plan, Safety Element	**Goal 10.7** Protect life, essential lifelines, and property from damage resulting from seismic activity. ***Policies:*** **10.7.1** Minimize the risk to life and property through the identification of potentially hazardous areas, establishment of proper construction design criteria, and provision of public information. **10.7.2** Require geologic and geotechnical investigations for new development in areas adjacent to known fault locations and approximate fault locations (Figure S-3) as part of the environmental and/or development review process and enforce structural setbacks from faults identified through those investigations. (LU-1) **10.7.3** Enforce the requirements of the California Seismic Hazards Mapping and Alquist-Priolo Earthquake Fault Zoning Acts when siting, evaluating, and constructing new projects within the City. (LU-1) **10.7.4** Determine the liquefaction potential at a site prior to development, and require that specific measures be taken, as necessary, to prevent or reduce damage in an earthquake. **10.7.5** Evaluate and reduce the potential impacts of liquefaction on new and existing lifelines. ***Policies:*** **10.8.1** Enforce the requirements of the California Seismic Hazards Mapping and Alquist-Priolo Earthquake Fault Zoning Acts when siting, evaluating, and constructing new projects within the City. (LU-1) **10.8.2** Require that lifelines crossing a fault be designed to resist the occurrence of fault rupture. **Goal 10.9** Minimize exposure to and risks from geologic activities.
City of Yucaipa General Plan	**Policy H:** Because of the potential for displacement along faults not classified as active, the City shall reserve the right to require site-specific geotechnical analysis and mitigation for development located contiguous to potentially active faults, if deemed necessary by the City Engineer. **Policy J:** Because many structures with important functions and potentially severe consequences of failure do not fall under City control (i.e., … utility installations, …), the City shall implement the following actions. **Action 1:** Continue to work with public utilities, school districts, … and other agencies supplying critical public services to ensure that they have incorporated structural safety and other measures to be adequately protected from seismic hazards for both existing and proposed facilities. **Action 2:** Encourage … and all utilities to review all their facilities within the City to assess potential impacts of seismic hazards; comments based on this review should be forwarded to the City. **Action 3:** Encourage utilities companies to institute orderly programs of installing cut-off devices on utility lines, starting with the lines that appear to

Table 4.6-6: Local Land Use Documents Related to Geology and Soils Applicable to Proposed Project

Document	Plans, Policies, Programs
	be most vulnerable and those which serve the most people…
County of Riverside General Plan, Safety Element	**Policy S 2.1:** Minimize fault rupture hazards through enforcement of Alquist-Priolo Earthquake Fault Zoning Act provisions and the following policies: (AI 80, 91) a. 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. b. 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. c. Require that lifelines be designed to resist, without failure, their crossing of a fault, should fault rupture occur. d. Support efforts by the California Department of Conservation, Division of Mining and Geology to develop geologic and engineering solutions in areas of disseminated ground deformation due to faulting, in those areas where a through-going fault cannot be reliably located… e. Encourage and support efforts by the geologic research community to define better the locations and risks of County faults. Such efforts could include data sharing and database development with regional entities, other local governments, private organizations, utility agencies or companies, and local universities. **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 (Figure S-3). **Policy S 2.5:** Require that engineered slopes be designed to resist seismically induced failure. For lower-risk projects, slope design could be based on pseudo-static stability analyses using soil engineering parameters that are established on a site-specific basis. For higher-risk projects, the stability analyses should factor in the intensity of expected ground shaking, using a Newmark-type deformation analysis. **Policy S 3.1:** Require the following in landslide potential hazard management zones, or when deemed necessary by the California Environmental Quality Act: (AI 104) a. Preliminary geotechnical and geologic investigations. b. Evaluations of site stability, including any possible impact on adjacent properties, before final project design is approved. c. 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.
County of San Bernardino General Plan, Safety Element	**Policy S 6.1:** Require development on hillsides to be sited in such a manner that minimizes the extent of topographic alteration required to minimize erosion, to maintain slope stability, and to reduce the potential for offsite sediment transport. **Goal S 7:** The County will minimize exposure to hazards and structural damage from geologic and seismic conditions.

Morongo Reservation

The Proposed Project will traverse approximately 8 miles of the tribal trust lands of the Morongo Indian Reservation east of Banning, California. Except for approximately two miles of new corridor between Malki Road and the western boundary of the Reservation, the Proposed Project will utilize the transmission corridor that has been used by existing SCE 220 kV transmission lines starting in 1945, and as subsequently expanded. Matters concerning the use of the Reservation's trust lands are subject to approval by the Morongo Band's General Membership, which consists of all enrolled adult voting members. With limited exceptions, the Morongo Band does not release its internal ordinances and other laws to the public.

The Morongo Band's General Membership has voted to approve the Bureau of Indian Affairs' grants to SCE of the rights of way and easements necessary for SCE to continue operating its existing 220 kV facilities on the Morongo Reservation and to replace and upgrade those facilities with the WOD Project. The Morongo Band's approval of these grants of rights of way and easements includes relocating approximately two miles of the corridor west of Malki Road into a new corridor depicted on Figure 2-3, Proposed and Alternative Transmission Line Routes, as either the Proposed Project (Alternative 1) or the Alternative Project (1X). The existing corridor, plus either Alternative 1 or 1X, thus would be consistent with all applicable tribal laws, and are the only corridors approved by the Morongo Band for the continued operation and eventual replacement of SCE's 220 kV facilities on and across the trust lands of the Morongo Indian Reservation.

4.6.3 Significance Criteria

4.6.3.1 CEQA Significance Criteria

The significance criteria for assessing the impacts to geology and soils come from the California Environmental Quality Act (CEQA) Environmental Checklist. According to the CEQA Checklist, a project causes a potentially significant impact if it would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, or 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; and landslides.
- Result in substantial soil erosion or the loss of topsoil.
- 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.
- 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.

- 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.

4.6.3.2 NEPA Analysis

Unlike CEQA, NEPA does not have specific significance criteria. However, NEPA regulations contain guidance regarding significance analysis. Specifically, consideration of “significance” involves an analysis of both context and intensity (Title 40 Code of Federal Regulations 1508.27).

4.6.4 Impact Analysis

4.6.4.1 CEQA Impact Assessment

Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, or 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; and landslides?

<u>Construction Impacts</u>

The following discussion addresses all project components, including substation modifications, 220 kilovolt (kV) transmission lines, 66 kV subtransmission lines, 12 kV distribution lines, telecommunication facilities, and the establishment of staging yards.

The Proposed Project would cross four active faults, including three EFZs, and has the potential to be directly impacted by surface rupture at these crossings. In addition, there is a risk of strong seismic ground shaking due to the Proposed Project’s proximity to active fault zones. As a result, the Proposed Project could experience moderate to high levels of earthquake-induced ground shaking. However, due to the temporary nature of construction activities, the probability of a large earthquake exposing construction personnel to fault rupture and seismic-related hazards during construction of the Proposed Project would be extremely low. Therefore, the impact would be less than significant.

<u>Operation Impacts</u>

Normal operation of the lines would be controlled remotely through SCE control systems, and manually in the field as required. SCE inspects the transmission, subtransmission, telecommunications and distribution overhead facilities in a manner consistent with CPUC GO 165, a minimum of once per year via ground and/or aerial observation. Maintenance would occur as needed and could include activities such as repairing conductors, washing or replacing insulators, repairing or replacing other hardware components, replacing poles and structures, tree trimming, brush and weed control, and access road maintenance. Most regular O&M activities of overhead facilities are performed from existing access roads with no surface disturbance. Repairs to facilities, such as repairing or replacing poles and structures, could occur in undisturbed areas.

Substation Modifications. The probability for surface fault rupture within the Project Study Area occurs primarily along the four active faults crossed by the Proposed Project, particularly along the three active faults designated as EFZs. Devers Substation is located near the AP zone for the South Branch San Andreas Fault, an active EFZ. Work at Devers Substation would include replacement of disconnect switches, circuit breakers, foundations, and reconductoring line positions. No major structural changes are proposed to the existing substation. Therefore, there would be no change to the risk from rupture of a known earthquake fault, and this impact is less than significant.

Ground shaking with Peak Ground Acceleration (PGA) in the range of 0.8 to 0.84 g[2] is anticipated during an earthquake for San Bernardino Substation and Vista Substation, according to Table 4.6-3, Estimated PGA Anticipated Along Segments of the Proposed Project. Ground shaking with PGA in the range of 0.4 to 0.8 g is anticipated for El Casco Substation and Devers Substation. Damages due to ground shaking could include cracks in concrete foundations and walls and other damage to equipment within the substations. Work at El Casco and Devers Substations would include replacement of disconnect switches, circuit breakers, foundations, and reconductoring line positions. No major structural changes are proposed to the existing substations. Therefore, there would be no change to the risk from strong seismic ground shaking and this impact would be less than significant.

Liquefaction could be a potential hazard in parts of the Project Study Area where liquefaction zones are mapped and where liquefaction-prone conditions are present. Review of the Safety Element of the County of Riverside 2003 General Plan and Geologic Hazard Overlays of the San Bernardino County Land Use Plan indicates that both El Casco and Devers substations are in areas mapped as having a low to moderate susceptibility for liquefaction. As described above, no major structural changes are proposed to the existing substations. Therefore, there would be no change to the risk from liquefaction, and this impact would be less than significant.

220 kV Transmission Lines. The probability for surface fault rupture within the Project Study Area occurs primarily along the four active faults crossed by the Proposed Project, particularly along the three active faults designated as EFZs. There would be the potential for siting and operation of the 220 kV transmission lines to cross the traces of the active faults and areas.

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2 g = gravity. PGA is measured as the percentage of the acceleration due to gravity during an earthquake. Higher ground acceleration levels, i.e., PGA = 0.84 g, are attributable to potentially higher levels of earthquake ground shaking.

As described on Figure 4.6-1, Fault Locations, and in Table 4.6-2, Active Faults Crossing the Project Study Area, the San Jacinto Fault crosses Segment 2, the San Gorgonio Pass Fault crosses Segments 5 and 6, and the South Branch San Andreas Fault crosses Segment 6 of the Proposed Project. All three are EFZs. In addition, the Banning Fault crosses Segment 4 of the Proposed Project. The Banning Fault is not an EFZ. The initial impacts related to surface fault rupture are high. Damage could occur to the 220 kV transmission line improvements due to fault rupture if those elements are constructed across the fault rupture surface. Damages may include offset/damage or structural damage to lattice steel towers (LSTs), tubular steel poles (TSPs), wood structures, or roadways at portions of the Proposed Project crossing the fault rupture. The 220 kV transmission lines would be designed and constructed in accordance with the appropriate industry standards, as well as good engineering and construction practices and methods. The Proposed Project components would be designed to minimize the potential for significant risks associated with fault rupture. Where significant risks associated with fault hazards have the potential to exist, appropriate engineering design and common construction practices could include, but are not limited to, 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. Such measures would be incorporated into the Proposed Project final design to minimize the potential for impacts. Furthermore, the Proposed Project would be designed consistent with the CPUC GO 95 – Rules for Overhead Line Construction, in order to withstand wind, temperature, and wire tension loads. Accounting for these factors would result in a design that would be adequate to withstand expected seismic loading. Implementation of GO 95's requirements would minimize the potential for damage as a result of surface fault rupture. The incorporation of engineering design and common construction practices would reduce impacts to less than significant levels.

The seismic hazard likely to impact the operation of the Proposed Project is ground shaking during an earthquake on one of the nearby or distant active faults. Based on the review of seismic data, PGA in the range of 0.4 g to 0.8 g is anticipated to affect the entire Project Study Area. Ground shaking could cause detrimental damage to the 220 kV transmission lines during operation if the appropriate design for the anticipated level of shaking is not considered. Damages due to ground shaking could include misaligned TSPs, LSTs, and other structural elements; cracks in concrete foundations and walls; and damage to access and spur roads. However, as mentioned above, the 220 kV transmission lines would be designed and constructed in accordance with the appropriate engineering design and common construction practices, and this impact would be less than significant.

Liquefaction could be a potential hazard in parts of the Project Study Area where liquefaction zones are mapped and where liquefaction-prone conditions are present. According to Table 4.6-4, Liquefaction Potential for the Proposed Project, the Proposed Project crosses areas mapped as having a low to moderate susceptibility for liquefaction. The final design and construction of all Proposed Project components would incorporate appropriate engineering design and common construction practices to address such hazards, and this impact would be less than significant.

66 kV Subtransmission Lines. As with the 220 kV transmission lines, the 66 kV subtransmission lines would be located in areas with the potential for high levels of ground shaking during earthquakes and a moderate to high earthquake-induced landside potential. As with the 220 kV transmission lines, the final design and construction of all Proposed Project components would incorporate appropriate engineering design and common construction practices to address such hazards; therefore, this impact would be less than significant.

Telecommunications. Telecommunications facilities would be removed and relocated as part of the Proposed Project. Telecommunications equipment and cables would be installed along the same route as the 220 kV transmission lines, as well as other locations outside of the existing WOD corridor, as shown in Figure 3.1-7, Telecommunications Route Description. The telecommunication routes outside of the existing WOD corridor are associated with existing substations and would be constructed primarily in existing public streets. Fiber optic cable would also be installed in a new underground system. The potential for seismic hazard impacts would be similar to that of other project components, and potentially significant. The final design and construction of all Proposed Project components would incorporate appropriate engineering design and common construction practices to address such hazards, and this impact would be less than significant.

Taken together, the project components would have a less than significant impact from the exposure of people or structures to potential substantial adverse effects involving the rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, and landslides.

Would the project result in substantial soil erosion or the loss of topsoil?

The following discussion addresses all project components, including substation modifications, 220 kV transmission lines, 66 kV subtransmission lines, 12 kV distribution lines, telecommunication facilities, and the establishment of staging yards.

<u>Construction Impacts</u>

Substation Modifications. The Proposed Project could potentially impact soil resources during construction if mitigation for erosion is not considered during the design and construction phases. Soils with varying degrees of erosion potential are located at the substation sites and are categorized as having a slight, moderate, severe, and very severe erodibility potential (see Table 4.6-1, USDA Soil Units). In general, a soil with a higher potential for erosion would be a more sensitive resource that could be more impacted by the Proposed Project activities. According to Table 4.6-1, USDA Soil Units, soils in the vicinity of Vista Substation have severe erodibility potential and soils in the vicinity of El Casco Substation have very severe erodibility potential.

New equipment foundations would be required at several existing substation locations. The disturbance of soils during construction would potentially result in erosion impacts. The substation modification activities would be conducted in accordance with the soil erosion/water quality protection measures to be specified in the Project Construction SWPPPs as discussed in Section 4.9, Hydrology and Water Quality. This impact would be less than significant.

220 kV Transmission Lines. The 220 kV transmission lines cross areas of steep terrain and numerous drainages where erosion can be accelerated. According to Table 4.6-1, USDA Soil Units, some soils along Segments 1, 2, 3, and 5 have severe erodibility potential.

In addition to the loss of surface soils as a geologic resource, erosion of soils and earth materials can cause damage to 220 kV transmission line improvements such as tower foundations, access roads, and manufactured slopes. Erosion can potentially result in the loss of support or undermining of these improvements.

Construction activities for the 220 kV transmission lines would result in ground disturbance during excavation, grading, and trenching that would create the potential for erosion to occur. For example, new access roads would be designed to minimize ground disturbance from grading to follow natural ground contours as closely as possible, and would include specific features for road drainage. These features would reduce impacts; however, due to the topography and soil conditions in the Project Study Area, construction-related erosion impacts would be potentially significant. During construction, SWPPP measures would be implemented to control potential erosion of temporarily disturbed areas. Storm Water Pollution and Prevention Plan measures could include water bars, drainage dips, side ditches, slope drains, and velocity reducers. Following the completion of construction, all areas temporarily disturbed by Proposed Project construction activities would be stabilized as specified in Chapter 3.0, Project Description. These measures would address site drainage and soil stabilization in a manner that would limit erosion and reduce impacts to a less than significant level.

Relocation of existing distribution facilities would be required to accommodate relocation of 220 kV transmission infrastructure. Distribution work resulting from the 220 kV transmission line portion of the Proposed Project would include overhead and underground construction. Distribution work resulting from 220 kV transmission line work would be conducted in franchise or newly acquired utility ROW. The Dental 12 kV circuit would be relocated to a new underground system (approximately 1.5 miles). The Intern 12 kV circuit would be relocated into the same new underground system as the Dental 12 kV circuit, and a portion would be underbuilt on an existing 66 kV subtransmission line.

As with the 220 kV transmission lines, disruption during excavation, grading, and trenching would create the potential for erosion to occur. With the implementation of SWPPPs and soil stabilization measures described above, this impact would be reduced to less than significant levels.

66 kV Subtransmission Lines. As with the 220 kV transmission lines, the 66 kV subtransmission lines would be located in areas with the potential for severe levels of soil erosion. As with the 220 kV transmission lines, SWPPPs and soil stabilization measures, this impact would be reduced to less than significant levels.

Telecommunications. Telecommunications facilities would be removed and relocated as part of the Proposed Project. In areas where excavation and trenching would occur, there is the potential for erosion to occur. With the incorporation of SWPPPs and soil stabilization measures, this impact would be reduced to less than significant levels.

Staging Yards. Construction activities taking place on staging yards would result in ground surface disruption that would create the potential for erosion to occur. Worker vehicles and equipment traversing the staging yards have the potential to accelerate erosion at these locations. By incorporating SWPPPs and soil stabilization measures, this impact would be reduced to less than significant levels.

In summary, with implementation of SWPPPs and soil stabilization measures, the Proposed Project would have a less than significant impact with regard to construction impacts.

<u>Operation Impacts</u>

As explained above (Construction Impacts), the Proposed Project includes areas of steep terrain where erosion could be accelerated and according to Table 4.6-1, USDA Soil Units, some soils along Segments 1, 2, 3, and 5 have severe erodibility potential. Section 3.2.3.1, Access and Spur Road of Chapter 3.0, Project Description indicates that for areas of rolling terrain or mountainous terrain the extent of permanent slope stability improvements would be determined as a part of final engineering. Such permanent improvements would minimize the potential for substantial erosion or the loss of topsoil during operations of the Proposed Project. Therefore, impacts would be less than significant.

Normal operation of the lines would be controlled remotely through SCE control systems, and manually in the field as required. SCE inspects the transmission, subtransmission, telecommunications and distribution overhead facilities in a manner consistent with CPUC GO 165, a minimum of once per year via ground and/or aerial observation. Maintenance would occur as needed and could include activities such as repairing conductors, washing or replacing insulators, repairing or replacing other hardware components, replacing poles and structures, tree trimming, brush and weed control, and access road maintenance. Most regular O&M activities of overhead facilities are performed from existing access roads with no surface disturbance. Repairs to facilities, such as repairing or replacing poles and structures, could occur in undisturbed areas.

Based on the activities explained above, the routine inspection and maintenance of the Proposed Project would not result in substantial erosion or loss of topsoil. Therefore, impacts would be less than significant.

Would the project 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?

The following discussion addresses all project components, including substation modifications, 220 kV transmission lines, 66 kV subtransmission lines, 12 kV distribution lines, telecommunication facilities, and the establishment of staging yards.

Construction Impacts

The geologic components for subsidence are present in some parts of the Project Study Area, specifically the valley areas. The Riverside County 2003 General Plan indicates that low-lying portions of the San Gorgonio Pass, Banning, and Beaumont, and some narrow canyon bottoms in the San Timoteo Badlands area are susceptible to subsidence, although subsidence has not been documented in these areas. Compressible natural soils and undocumented fills pose the risk of adverse settlement under static loads imposed by new embankment fills, roadway fills, tower foundations, and associated structures. Differential settlement of soils can cause damage to improvements during construction of the Proposed Project, including concrete structures and foundations, retaining walls, substation improvements, and pavements.

Since the Proposed Project would involve construction of new improvements that would be constructed upon the existing soils, potential settlement and/or collapsible soils would be considered in design and construction of project improvements. Proposed Project components would be designed to minimize the potential for significant risks associated with subsidence. Measures that may be used to minimize impacts could include, but are not limited to, removal of unstable materials, avoidance of highly unstable areas, construction of pile formations, ground improvements of liquefiable zones, installation of flexible bus connections, and incorporation of slack in cables.

The final design and construction of all Proposed Project components would incorporate appropriate engineering design and common construction practices to address such hazards. The incorporation of engineering design and common construction practices would reduce impacts to less than significant levels.

Impacts associated with the risk of landslides, liquefaction, and lateral spreading are considered potentially significant due to the presence of geologic components related to subsidence in some parts of the Project Study Area. The final design and construction of all Proposed Project components would incorporate appropriate engineering design and common construction practices to address such hazards. The incorporation of engineering design and common construction practices would reduce impacts to less than significant levels.

Operation Impacts

Normal operation of the lines would be controlled remotely through SCE control systems, and manually in the field as required. SCE inspects the transmission, subtransmission, telecommunications and distribution overhead facilities in a manner consistent with CPUC GO 165, a minimum of once per year via ground and/or aerial observation. Maintenance would occur as needed and could include activities such as repairing conductors, washing or replacing insulators, repairing or replacing other hardware components, replacing poles and structures, tree trimming, brush and weed control, and access road maintenance. Most regular O&M activities of overhead facilities are performed from existing access roads with no surface disturbance. Repairs to facilities, such as repairing or replacing poles and structures, could occur in undisturbed areas.

The effects of O&M for the Proposed Project would be similar to those described for construction. Therefore, potential O&M impacts would be less than significant.

Would the project 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?

The following discussion addresses all project components, including substation modifications, 220 kV transmission lines, 66 kV subtransmission lines, 12 kV distribution lines, telecommunication facilities, and the establishment of staging yards.

Construction Impacts

Some portions of the Proposed Project are located on soils with moderate to high shrink-swell potential (expansive soils) as identified by NRCS soil surveys (see Table 4.6-1, USDA Soil Units). Where expansive soils have the potential to exist, appropriate engineering design and common construction practices such as the removal of unstable materials, the avoidance of highly unstable areas, the construction of pile formations, ground improvements where expansive soils are discovered, installation of flexible bus connections, and incorporation of slack in cables, would be incorporated into the Proposed Project final design to minimize the potential for impacts. The incorporation of engineering design and common construction practices would reduce impacts to less than significant levels.

Operation Impacts

Normal operation of the lines would be controlled remotely through SCE control systems, and manually in the field as required. SCE inspects the transmission, subtransmission, telecommunications and distribution overhead facilities in a manner consistent with CPUC GO 165, a minimum of once per year via ground and/or aerial observation. Maintenance would occur as needed and could include activities such as repairing conductors, washing or replacing insulators, repairing or replacing other hardware components, replacing poles and structures, tree trimming, brush and weed control, and access road maintenance. Most regular O&M activities of overhead facilities are performed from existing access roads with no surface disturbance. Repairs to facilities, such as repairing or replacing poles and structures, could occur in undisturbed areas.

The effects of O&M for the Proposed Project would be similar to those described for construction and would not result in substantial risk to life or property. Therefore, potential O&M impacts would be less than significant.

Would the project 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?

The following discussion addresses all project components, including substation modifications, 220 kV transmission lines, 66 kV subtransmission lines, 12 kV distribution lines, telecommunication facilities, and the establishment of staging yards.

Construction Impacts

The construction of the Proposed Project would not require the use of septic tanks or alternative waste disposal systems. No impact would result.

Operation Impacts

The operation of the Proposed Project would not require the use of septic tanks or alternative waste disposal systems. No impact would result.

4.6.4.2 NEPA Assessment

Based on the analysis performed, it is anticipated that the Proposed Project would not result in significant effects under NEPA.

4.6.5 Applicant Proposed Measures

The Proposed Project would not result in potentially significant impacts associated with geology and soils. Therefore, no Applicant Proposed Measures are proposed.

4.6.6 Alternative Project

The 220 kV Line Route Alternative 2 (Alternative Project) would include relocation of an approximately 3-mile section of Segment 5 of the existing WOD corridor pursuant to an agreement between SCE and Morongo (see Figure 3.1-3, Transmission Line Route Description). Both the Proposed Project and the Alternative Project include the same common elements outside of Segment 5.

The Alternative Project transects the Reservation in a different location than the Proposed Project. Both the Proposed Project and the Alternative Project involve the removal of existing infrastructure on the Reservation. The length of the Alternative Project is approximately 0.13 mile longer than the Proposed Project, and is located in the same geologic formations and soil conditions. The impacts of the Alternative Project to geology and soils would occur in slightly different areas under similar conditions and at the same level of magnitude as the Proposed Project. Therefore, the impacts discussed above associated with the Proposed Project would be the same for the Alternative Project.

4.6.7 No Project Alternative

Under the No Project Alternative, existing conditions would remain in place. The existing WOD corridor and associated facilities would continue to operate in the existing geology and soils environment. The No Project Alternative would not result in construction or operation of the Proposed Project. No new impacts to geology or soils would result.

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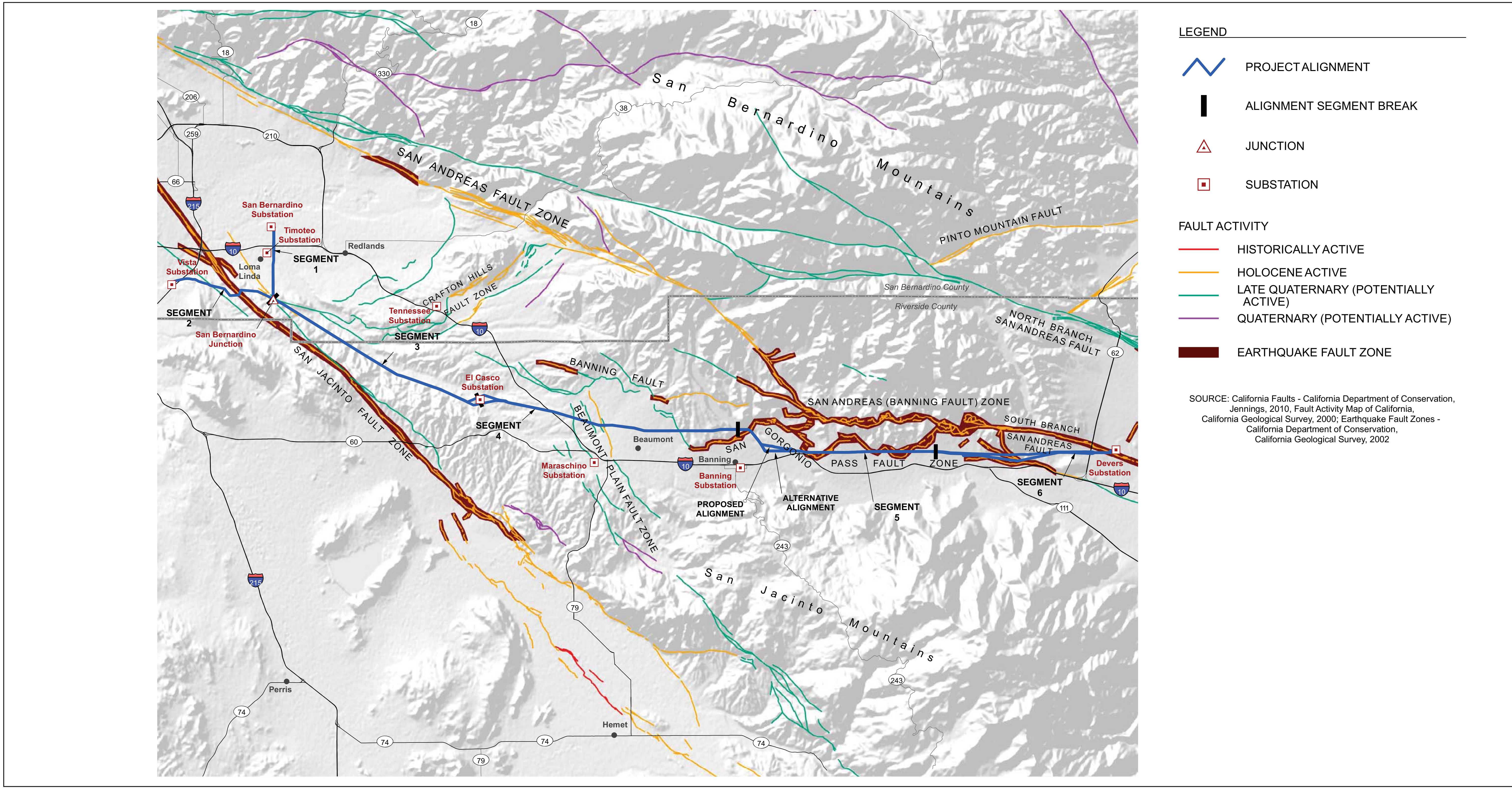

FIGURE 4.6-1

Southern California Edison
An EDISON INTERNATIONAL Company

N

0 2.75 5.5
MILES

SOURCE: Ninyo & Moore

Southern California Edison
West of Devers Upgrade Project

Fault Locations

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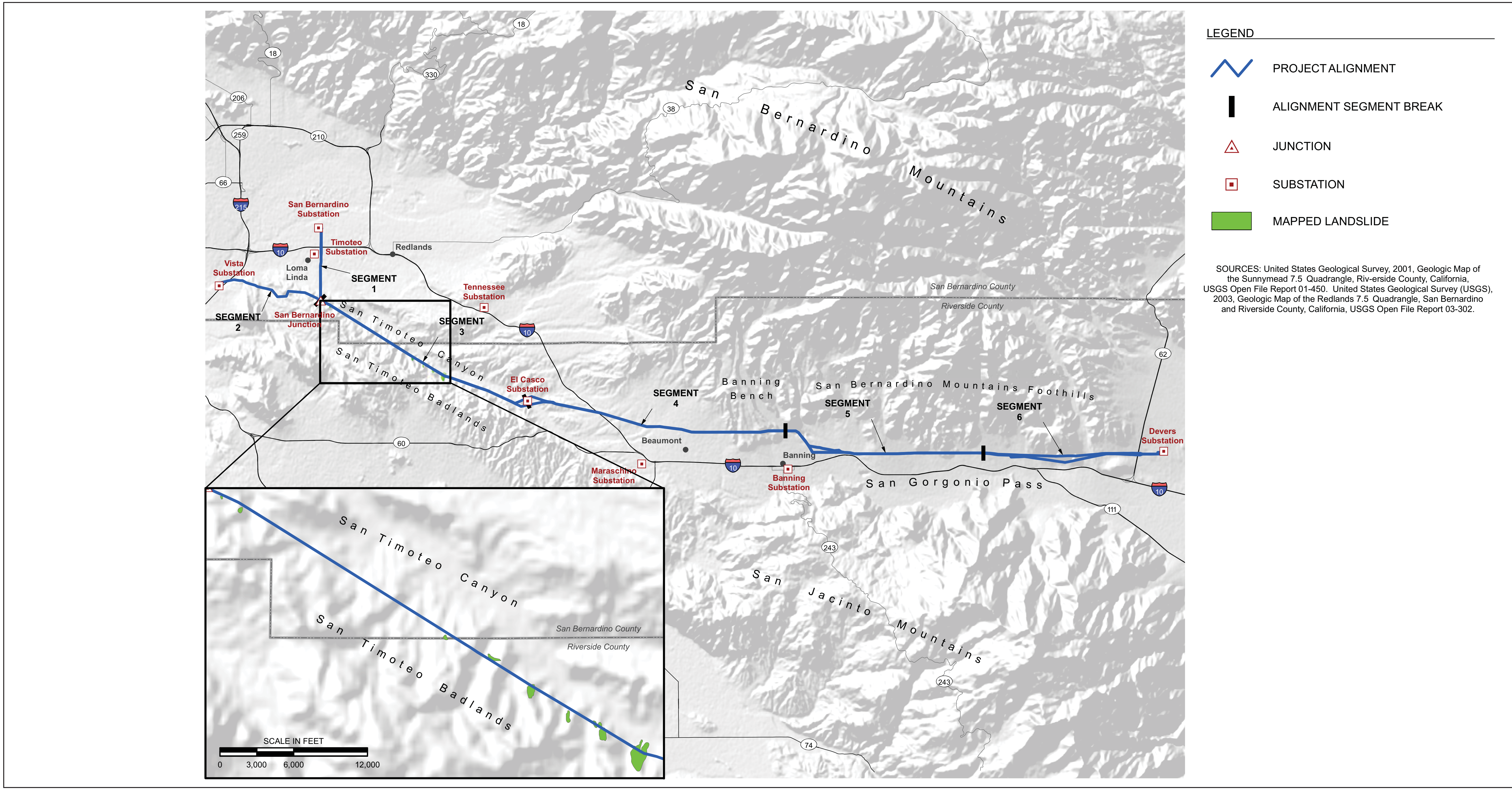

FIGURE 4.6-2

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

N

0 3 6
MILES

SOURCE: Ninyo & Moore

Southern California Edison
West of Devers Upgrade Project

Mapped Landslides

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