D.13 Geology, Mineral Resources, and Soils

This section addresses potential geologic impacts resulting from construction and operation of the Proposed PROJECT. Section D.13.1 provides a description of the environmental setting/affected environment for existing geologic, mineral resources, and soils in the project study area. Applicable geologic, mineral resources, and soils laws and regulations are introduced in Section D.13.2. An analysis of the Proposed PROJECT impacts/environmental effects and discussion of mitigation is provided in Section D.13.3. An analysis of Proposed PROJECT alternatives is provided in Sections D.13.4 through D.13.7. Section D.13.8 provides mitigation monitoring, compliance, and reporting information. Section D.13.9 addresses residual effects of the project and Section D.13.10 lists the references cited in this section.

D.13.1 Environmental Setting/Affected Environment

Methodology and Assumptions

This section presents a discussion of the regional topography, geology, seismicity, soils, and mineral resources within the East County (ECO) Substation, Tule Wind, and Energia Sierra Juarez U.S. Generator-Tie (ESJ Gen-Tie), as well as the Campo, Manzanita, and Jordan wind energy project areas. The Campo, Manzanita, and Jordan wind energy projects are being analyzed at a program level in this EIR/EIS as no site-specific survey data is available. Due to the close proximity of these wind energy projects to the ECO Substation, Tule Wind, and ESJ Gen-Tie projects, a similar geologic, mineral resource, and soil setting is assumed.

The study area addressed in this section includes lands that may be affected (directly and/or indirectly) by construction and operation of the Proposed PROJECT. The study area includes land underlying and adjacent to the proposed ECO Substation, Tule Wind, and ESJ Gen-Tie projects. Baseline geologic information was collected from the U.S. Geological Survey (USGS 2009), the Natural Resources Conservation Service, and the California Geological Survey. The Geologic Hazards Assessment for the Tule Wind Project, San Diego County, California (HDR, Inc. 2010), and the Interim Geologic Investigation, East County Substation, San Diego Gas & Electric Company, Jacumba, California (URS 2008), were reviewed in preparation of this section. Lastly, San Diego Gas & Electric Company's (SDG&E's) Proponent's Environmental Assessment (PEA) for the East County Substation Project (SDG&E 2009), the Applicant's Environmental Document for the Tule Wind Project (Iberdrola 2010a), and Energia Sierra Juarez U.S Transmission, LLC's, Initial Study (ESJ 2010) were also reviewed to assess the existing environmental setting.

D.13.1.1 General Overview

Topography

The Proposed PROJECT area lies within the Peninsular Ranges, in a mountainous region of southeast San Diego County (County). Components of the Proposed PROJECT, including the ECO Substation 500-kilovolt (kV) and 230/138 kV yards, Southwest Powerlink (SWPL) Loop-In, eastern portion of the 138 kV transmission line, and ESJ Gen-Tie Project, are located south of the Jacumba Mountains. The Tule Wind Project would be located primarily within the In-Ko-Pah Mountain range located west of the Jacumba Mountains. Topography of the Proposed PROJECT varies from gently sloping areas in the proposed ECO Substation Project and ESJ Gen-Tie Project areas to moderating sloping areas in the proposed Tule Wind Project area. The Proposed PROJECT would be built within the elevation range of approximately 2,800 to 6,400 feet above mean sea level (amsl), with the lowest point being along the ECO Substation's proposed 138 kV line, and the highest point being in the In-Ko-Pah Mountains of the Tule Wind Project.

Geology

The mountains of the Peninsular Ranges are a group of predominantly north–south trending ranges that stretch 900 miles from Southern California to the southern tip of Mexico's Baja California peninsula. They are part of the North American Coast Ranges that run along the Pacific coast from Alaska to Mexico. Elevations range from about 500 to 11,500 feet amsl. Mountains of the Peninsular Ranges are primarily composed of extensive Mesozoic granitic plutons, overlain and intruded in areas by metasedimentary rocks such as marbles, slates, schist, quartzites, and gneiss (San Diego Natural History Museum 2009). The geology of the project area is depicted in Figure D.13-1, Geological Hazards. Within the Proposed PROJECT area, the Peninsular Mountain Ranges include the In-Ko-Pah and Jacumba Mountain ranges. Geologic units in the project areas are from the Jurassic, Triassic, Cretaceous, Miocene, Pleistocene, and Holocene ages.

Soils

A variety of soil types occur in the Proposed PROJECT area (Figure D.13-2, Soils Overview Map, and Table D.13-1, General Descriptions and Characteristics of the Soils). The soil types associated with granitic rock in the project area are generally susceptible to erosion due to large, loose grains generated by the weathering of crystalline granite, except where extensive clay-bearing soil horizons have developed. Erodible soils generally correspond to those on the hillsides and mountains where granitic bedrock is close to or at the surface (USDA 1973). The majority of the Proposed PROJECT area has sandy soils over granitic rocks.

Elsinore fault zone, Julian section

Elsinore fault zone, Coyote Mountain section

Elsinore fault zone, Coyote Mountain section

San Jacinto fault zone, Superstition Mountain section

San Jacinto fault zone, Superstition Mountain section

Project Study Area

Elsinore fault zone, Coyote Mountain section

San Diego County

Imperial County

Yuha Wells fault

Elsinore fault zone, Laguna Salada section

Elsinore fault zone, Laguna Salada section

Elsinore fault zone, Laguna Salada section

Mexico

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Proposed PROJECT including Campo, Manzanita, and Jordan Wind Energy Projects

Geology (along project buffer)

- Alluvium (mostly Holocene, some Pleistocene) Quaternary nonmarine & marine
- Cretaceous marine undivided
- Granitic and metamorphic rocks, undivided, of pre-Cenozoic age
- Mesozoic granitic rocks
- Schist of various types and ages (metasedimentary or metavolcanic
- Tertiary volcanic flow rocks
- Areas with Slopes > 25%
- Faults

N

0 2.5 5 Miles

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SOURCE: Geology - USGS 2010

FIGURE D.13-1

Geological Hazards

East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects - EIR/EIS

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ECO Substation Project

- Proposed 138 kV Line
- Existing Transmission Line
- Existing Boulevard Substation
- Proposed 138 kV Transmission Line Milepost
- Proposed ECO Substation
- Proposed Boulevard Substation Rebuild

Tule Wind Project Components

- Proposed Wind Turbine
- Proposed Met Tower
- Alternative Met Tower
- Proposed SODAR
- Proposed Tule 138 kV Line Milepost
- Operation and Maintenance Station
- Collector Substation
- Overhead
- Proposed 138 kV Gen-Tie Line

Energia Sierra Juarez Gen-Tie (ESJ) Gen-Tie Project

- ESJ Gen-Tie 500 kV Route
- ESJ Gen-Tie 230 kV Route

Soil Types:

- Acid igneous rock land
- Bancas stony loam, 30 %to 65% slopes
- Bancas stony loam, 30% to 65% slopes, eroded
- Bancas stony loam, 5% to 30% slopes
- Bancas stony loam, 5% to 30% slopes, eroded
- Calpine coarse sandy loam, 2% to 5% slopes
- Calpine coarse sandy loam, 5% to 9% slopes
- Calpine coarse sandy loam, 5% to 9% slopes, eroded
- Calpine coarse sandy loam, 9% to 15% slopes, eroded
- Carrizo very gravelly sand, 0% to 9% slopes
- Grangeville fine sandy loam, 0% to 2% slopes
- Holland fine sandy loam, 5% to 15% slopes
- Holland stony fine sandy loam, 30% to 60% slopes
- Holland stony fine sandy loam, 5% to 30% slopes
- Indio silt loam, 0% to 2% slopes
- Indio silt loam, 2% to 5% slopes
- Indio silt loam, saline, 0% to 2% slopes
- Kitchen Creek loamy coarse sand, 5% to 9% slopes
- Kitchen Creek loamy coarse sand, 9% to 15% slopes, eroded
- La Posta loamy coarse sand, 5% to 30% slopes, eroded
- La Posta loamy coarse sand, 5% to 30% slopes, severely eroded
- La Posta rocky loamy coarse sand, 5% to 30% slopes, eroded
- La Posta-Sheephead complex, 30% to 65% slopes
- La Posta-Sheephead complex, 9% to 30% slopes
- Loamy alluvial land
- Mecca coarse sandy loam, 2% to 5% slopes
- Metamorphic rock land
- Mottsville loamy coarse sand, 0% to 2% slopes
- Mottsville loamy coarse sand, 2% to 9% slopes
- Mottsville loamy coarse sand, 9% to 15% slopes
- Ramona sandy loam, 5% to 9% slopes
- Ramona sandy loam, 9% to 15% slopes, eroded
- Reiff fine sandy loam, 0% to 2% slopes
- Riverwash
- Rositas loamy coarse sand, 0% to 2% slopes
- Rositas loamy coarse sand, 2% to 9% slopes
- Rough broken land
- Sheephead rocky fine sandy loam, 30% to 65% slopes, eroded
- Sheephead rocky fine sandy loam, 9% to 30% slopes, eroded
- Sloping gullied land
- Steep gullied land
- Stony land
- Tollhouse rocky coarse sandy loam, 30% to 65% slopes
- Tollhouse rocky coarse sandy loam, 5% to 30% slopes, eroded
- Water

Manzanita Wind Energy Project

Campo Wind Energy Project

Jordan Wind Energy Project (Padoma)

Project Study Area

Jordan Wind Energy Project (Padoma)

County-Highway-S2

Old Highway-80

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San Diego County

Imperial County

UNITED STATES

MEXICO

0 1.5 3 Miles

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SOURCE: BLM; SanGIS; SANDAG; USFS; Tule Wind Project: HDR Engineering 2010;
ESJ U.S. Project: ENTRIX 2009; ESJ Wind Project: ENTRIX 2010;
ECO Substation Project: SDG&E 2009
Soils: County of San Diego, SSURGO Soils

East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects - EIR/EIS

FIGURE D.13-2

Soils Overview Map

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Table D.13-1
General Descriptions and Characteristics of the Soils

Map Symbol	Soil	Acres on Site	Erodibility	Shrink/Swell
ECO Substation Project				
AcG	Acid igneous rock land	110	Severe	Low
CeC	Carrizo very gravelly sand, 0% to 9% slopes	42	Severe	Low
InB	Indio silt loam, saline 2% to 5% slopes	24	Severe	Low
IoA	Indio silt loam, saline, saline 0% to 2% slopes	32	Severe	Low
LaE2, LaE3	La Posta loamy coarse sand, 5% to 30% slopes, eroded and severely eroded	12	Severe	Low
LcE2	La Posta rocky loamy coarse sand, 5% to 30% slopes, eroded	5	Severe	Low
LdG	La Posta–Sheephead complex, 30% to 65% slopes	2	Severe	Low
LdE	La Posta–Sheephead complex, 9% to 30% slopes	95	Severe	Low
MvC	Mottsville loamy coarse sand, 2% to 9% slopes	121	Severe	Low
RaD2	Ramona sandy loam, 9% to 15% slopes, eroded	3	Severe	Moderate
RsC	Rositas loamy coarse sand, 2% to 9% slopes	43	Severe	Low
RuG	Rough broken land	132	Severe	variable
SrD	Sloping gullied land	71	Severe	High
SvE	Stony land	74	Severe	Low
ToE2	Tollhouse rocky coarse sandy loam, 5% to 30% slopes, eroded	46	Severe	Low
ToG	Tollhouse rocky coarse sandy loam, 30% to 65% slopes	183	Severe	Low
Tule Wind Project				
AcG	Acid igneous rock land	14	Severe	Low
CaB, CaC	Calpine coarse sandy loam, 2% to 5% slopes, 5% to 9% slopes	23	Moderate	Low
GoA	Grangeville fine sandy loam, 0% to 2% slopes	1	Moderate	Low
HmD	Holland fine sandy loam, 5% to 15% slopes	45	Severe	Moderate
HnE, HnG	Holland stony fine sandy loam, 5% to 30% slopes and 30% to 60% slopes	348	Severe	Moderate
KcC	Kitchen Creek loamy coarse sand, 5% to 9% slopes and 9% to 15% slopes, eroded	532	Severe	Low
LaE2, LaE3	La Posta loamy coarse sand, 5% to 30% slopes, eroded and severely eroded	995	Severe	Low
LcE2	La Posta rocky loamy coarse sand, 5% to 30% slopes, eroded	2052	Severe	Low
LdE, LdG	La Posta–Sheephead complex, 9% to 30% slopes and 30% to 65% slopes	642	Severe	Low
Lu	Loamy alluvial land	66	Severe	Low
MvC, MvD	Mottsville loamy coarse sand, 2% to 9% slopes and 9% to 15% slopes	282	Severe	Low
SpE2, SpG2	Sheephead rocky fine sandy loam, 9% to 30% slopes,	827	Severe	Low

Table D.13-1 (Continued)

Map Symbol	Soil	Acres on Site	Erodibility	Shrink/Swell
	eroded, and 30% to 65% slopes, eroded			
ToE2, ToG	Tollhouse rocky coarse sandy loam, 5% to 30% slopes, eroded, and 30% to 65% slopes	831	Severe	Low
ESJ Gen-Tie Project				
RsC	Rositas loamy coarse sand, 2% to 9% slopes	331	Severe	Low

Source: USDA 1973.

Expansive soils undergo volume change (shrink and swell) as a result of variation in soil moisture content. Soil moisture can change due to many factors, including perched groundwater, landscape irrigation, rainfall, and utility leakage. Expansive soils are commonly very fine-grained with high clay content. These soils are present in the Proposed PROJECT area, as indicated in Table D.13-1, and may also be present in imported fill materials.

The soils at the combined project site consist generally of silty sand, and thus are likely to have soil resistivities greater than 10,000 ohm centimeters (Ωcm). Shallow bedrock is also expected to have a resistivity significantly greater than 10,000 Ωcm. The American Petroleum Institute (API) provides guidance for the potential corrosivity of materials based upon resistivity measurements. Table D.13-2, Classification of Resistivity, lists the general classification of resistivity and potential corrosion activity for each range.

Table D.13-2
Classification of Resistivity

Resistivity Range, Ωcm	Resistivity Range, Ωm	Resistivity Range, Ωfeet	Potential Corrosion Activity
<500	<5	<16	Very Corrosive
500–1,000	5–10	16–33	Corrosive
1,000–2,000	10–20	33–66	Moderately Corrosive
2,000–10,000	20–100	66–330	Mildly Corrosive
>10,000	>100	>330	Progressively Less Corrosive

Source: Iberdrola 2010a.

Expected high soil resistivity and thin soil cover conditions may require specific design consideration for the wind turbine ground grid. Based on the expected soil resistivity of >10,000 Ωcm, the soils and bedrock for the project area appear to have a very low corrosivity, although testing is recommended for site-specific soil type and topographic setting. This is somewhat in contrast to the soil descriptions, which indicate most soils near the Proposed PROJECT site are mildly corrosive to steel and concrete (SDG&E 2009; Iberdrola 2010a). More corrosive

conditions might be encountered where there are localized increases in clay content, fracturing, and increased moisture conditions (Iberdrola 2010a).

Regional Faulting and Seismicity

Earthquake activity, also known as seismicity, is common throughout the Southern California region. Southern California is dominated primarily by northwest-trending faults, generally of a right-lateral strike-slip nature, although faults of every type and orientation can be found in the region. The State of California has established Alquist-Priolo Special Studies Zone (A-P Zone) along and parallel to traces of active faults for the purpose of prohibiting the location of structures on the traces of such faults. An active fault, as defined by the California Department of Conservation, California Division of Mines and Geology (DOC 1997), is a fault that has exhibited –surface displacement within Holocene time" (about the last 11,700 years).

Southern California is dominated by a major active tectonic structure delineated as the San Andreas Fault. The San Andreas Fault trends along a roughly northwest–southeast alignment and is located 55 miles northeast of the northern portion of the project area. Other active faults in the project area include the San Jacinto and Elsinore faults that parallel the San Andreas Fault system. The nearest active named fault to the Proposed PROJECT is the Coyote Mountain Segment of the Elsinore Fault, located approximately 7.1 miles northeast of the proposed Tule Wind Project area. Other active named faults in the area include the Laguna Salada Fault, the Borrego Mountain section and the Superstition Hills section of the San Jacinto Fault zone, the Imperial Fault, the Julian Segment of the Elsinore Fault zone, and an unnamed fault of the Brawley seismic zone. Historic data (defined as within the past 200 years), as shown in Table D.13-3, Historic Area Earthquakes, earthquakes of a magnitude of 6.0 or higher in this region occur along the major regional fault zones located approximately 30 to 40 miles from the project site. Earthquakes more than 40 miles from the project site that are not listed in Table D.13-3 may also impact the project, as evidenced by the 7.2-magnitude Easter Earthquake that occurred approximately 45 miles southeast of the project site on April 4, 2010, near Guadalupe Victoria, Baja California, Mexico (USGS 2010). Figure D.13-1 shows and Table D.13-4, Area Active Faults, lists active faults in the study region, as well as fault length, probable maximum earthquake magnitude, and approximate annual fault slip rate per year.

Table D.13-3
Historic Area Earthquakes

Event Date	Earthquake Name or General Location	Fault Involved (if known)	Magnitude	Approximate Closest Distance to Project Sites (miles)
November 24, 1987	Superstition Hills Earthquake	Superstition Hills Fault	6.6	31
November 23, 1987	Elmore Ranch Fault	Elmore Ranch Fault Zone	6.2	27
October 15, 1979	1979 Imperial Valley Earthquake	Imperial, Brawley Fault Zone, Rico Faults	6.4	47
April 8, 1968	Borrego Mountain Earthquake	Coyote Creek segment of the San Jacinto Fault Zone	6.6	39
March 19, 1954	San Jacinto Fault Earthquake	Clark Fault, part of the Anza segment of the San Jacinto Fault Zone	6.4	45
October 21, 1942	Fish Creek Mountains Earthquake	Coyote Creek segment of the San Jacinto Fault Zone	6.6	25
May 18, 1940	1940 Imperial Valley Earthquake	Imperial Fault	6.9	37
March 25, 1937	San Jacinto Fault (Terwilliger Valley) Earthquake	San Jacinto Fault	6.0	54
June 22, 1915	1915 Imperial Valley Earthquake (two strong shocks about 1 hour apart)	Imperial Fault	6.1 and 6.3	38
May 28, 1892	Borrego Mountains, aftershock of the Laguna Salada Earthquake	Coyote Creek, part of the San Jacinto Fault Zone	6.8	39
February 9, 1890	North end of the Borrego Desert	Assumed on the San Jacinto	6.8	54

Table D.13-4
Area Active Faults

Fault Name	Approximate Distance to ECO Substation Project (miles)	Fault Length (miles)	Probable Maximum Earthquake Magnitude	Approximate Slip Rate (millimeters/ year)
San Andreas: Coachella Segment	55	60	7.2	25.0
Brawley Seismic Zone	38	28	6.4	25.0
Brawley Fault Zone	43	9	6.5	20.0
Coronado Bank (offshore)	62	113	7.6	2.0
Earthquake Valley	35	15	7.0	1.0–3.0
Elmore Ranch	32	6	6.5	0.5–1.5
Elsinore	12	112	7.5	4.0
Imperial	38	43	7.0	15.0–20.0

Table D.13-4 (Continued)

Fault Name	Approximate Distance to ECO Substation Project (miles)	Fault Length (miles)	Probable Maximum Earthquake Magnitude	Approximate Slip Rate (millimeters/ year)
Laguna Salada	15	43	7.5	4.0
Newport-Inglewood (offshore)	61	56	7.2	0.8–2.1
Point Loma	—	7.5	—	—
Rose Canyon	60	18	7.2	1.1
San Jacinto	28	50	7.5	2.0–6.0
Sierra Juarez	—	63	—	—
Superstition Hills	31	19	6.8	1.7–5.5
Superstition Mountain	28	17	6.8	5.0–9.0
Wienert	—	6	6.3	1.0–6.0
Yuha Wells	—	9	—	—

Source: Southern California Earthquake Data Center 2009; SDG&E 2009.

Liquefaction

Liquefaction occurs when loose, water-saturated sediments lose strength and fail during strong ground shaking during an earthquake. Liquefaction is defined as the transformation of granular material from a solid state into a liquid or slurry state, which can flow as a consequence of increased pore-water pressure. Structures located in an area of potentially liquefiable soil may experience settling (both total and differential) and loss of foundation support. The factors known to influence liquefaction potential include soil type, grain size, relative density, confining pressure, depth to groundwater, and the intensity and duration of ground shaking. Soils most susceptible to liquefaction are saturated, loose, uniform sandy soils, and some silts at shallow depths. Liquefaction generally occurs in areas of high groundwater (depths of 50 feet or less). The potential for liquefaction for the majority of the Proposed PROJECT site is considered low to nonexistent due to a relatively deep water table and shallow bedrock. However, the potential for liquefaction exists in the Proposed PROJECT area where shallow groundwater may be present in areas of loamy alluvial land or underlain by Quaternary alluvium. Groundwater depths in the project area vary, and may be present at depths of less than 50 feet. For more information on local groundwater resources, refer to Section D.12, Water Resources, of this Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

Landslide

Landslides refer to a wide range of ground movement including rockfalls, rotational slope failure, and debris flow. Although the primary cause of landslides is gravity, other factors, including erosion, saturation of slope, and earthquakes, can also contribute to landslide occurrences. The western 10% of the Tule Wind Project area has steep slopes, with some greater

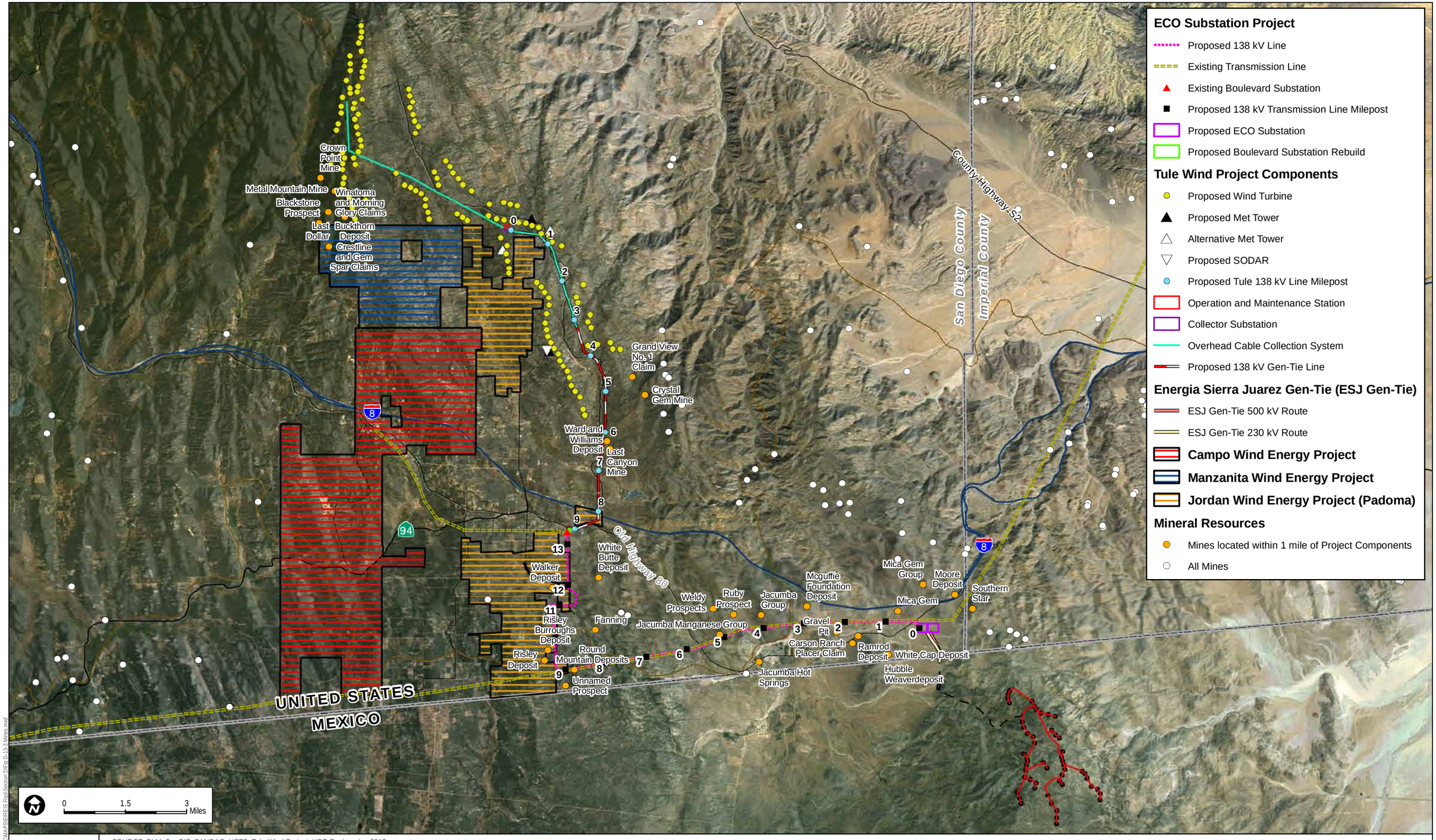
than 25%, and the 138 kV transmission line of the ECO Substation Project would cross areas of steeply sloping terrain that may potentially be prone to landslides and other forms of slope failure. The remaining portions of the ECO Substation site, the remaining 90% of the Tule Wind Project, and the ESJ Gen-Tie Project site are mainly flat, or have gently sloping terrain, and do not include steep slopes or areas prone to landslides.

Subsidence

Subsidence is a lowering of the ground surface. Human activity can initiate ground subsidence, for example when fluids such as groundwater or petroleum are withdrawn from the ground, or when voids are created by subsurface mining. Less common causes of subsidence are regional tectonic forces such as sedimentary basin formation or vertical movements related to earthquakes. The risk factors for groundwater withdrawal induced subsidence—deep, extensive accumulation of soft, unconsolidated alluvial deposits and compressible clay beds—are not present in the project area where groundwater extraction is proposed (ECO Substation and Tule Wind project areas). The underlying rock units are granitic hard rock in these areas, and the alluvial thickness is limited. The granitic rock aquifer is too rigid to subside in response to water-level changes. Therefore, within the majority of the project area, the potential for subsidence is low. However, there are three mine tunnels and one mine shaft adjacent to Turbines N7, N8, P4, and P5 along the southwest boundary of the project area where subsidence could occur.

Mineral Resources

Minerals of economic interest in the project area are generally localized within a series of granitic intrusive (plutonic) rocks ranging in age from Precambrian (600 million years ago) to Cretaceous (65 million years ago), whose lithology varies from granite to gabbro (Iberdrola 2010a). Localized within the plutonic rocks are zones and veins of pegmatite rocks. Plutonic rocks comprise and dominate the Sawtooth Mountains. There are three areas of historic mineral development: the Julian District, the Metal Mountain District (located northwest of McCain Valley), and the Sacatone District (located in the Sacatone Spring/Tule Mountain area southeast of McCain Valley) (Iberdrola 2010a), none of which are located within the Proposed PROJECT site. However, approximately 9 acres of the ECO Substation Project's 138 kV transmission line right-of-way (ROW), 36 acres of the ECO Substation site, and approximately 32 acres of the ESJ Gen-Tie Project site are underlain by Quaternary alluvium. Quaternary alluvium is identified in the County Guidelines for Determining Significance for Mineral Resources as an important mineral resource both mined and used in the County for construction materials (County of San Diego 2008). There are no mines located on the Proposed PROJECT site. Mines located in the project area are shown on Figure D.13-3, Mineral Resources within Project Vicinity. The Proposed PROJECT is in an area that has not been classified for mineral resources by the California Geological Survey and therefore has not been assigned a mineral resource zone (MRZ) classification (Miller, pers. comm. 2010).



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SOURCE: BLM; SanGIS; SANDAG; USFS; Tule Wind Project: HDR Engineering 2010;
ESJ U.S. Project: ENTRIX 2009; ESJ Wind Project: ENTRIX 2010;
ECO Substation Project: SDG&E 2009
Mines; USGS 2010

FIGURE D.13-3

Mineral Resources within Project Vicinity

East County Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Projects - EIR/EIS

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D.13.1.2 ECO Substation Project

The topography of the ECO Substation site slopes gently to the west with elevations ranging from approximately 3,000 to 3,200 feet amsl. Along the ECO Substation Project's proposed 138 kV line route, the topography varies through mountainous terrain of the Jacumba Valley, with elevations ranging from approximately 2,800 to 3,640 feet amsl. The Boulevard Substation rebuild is located just south of Highway 80 in the Town of Boulevard, where elevations range from approximately 3,377 to 3,388 feet amsl.

Geologic units that underlie the ECO Substation and SWPL Loop-In include Holocene alluvium and fanglomerate, older alluvium and fanglomerate, Jacumba Volcanics, Table Mountain Formation, and granitic rocks of the Peninsular Ranges Batholith. Geologic units that underlie the 138 kV transmission line include Holocene alluvium, older alluvium and fanglomerate, Jacumba Volcanics, Table Mountain Formation, granitic rocks of the Peninsular Ranges Batholith, and the Julian Schist. Geologic units that underlie the Boulevard Substation rebuild include Holocene alluvium and Peninsular Ranges Batholith granitic bedrock (SDG&E 2009).

As indicated in Figure D.13-2 (Soils Overview Map) and listed in Table D.13-2, the majority of the ECO Substation Project site is underlain by severely erodible soils, while Table D.13-1 indicates that the majority of the site is underlain by non-expansive soils.

Geologic maps of the ECO Substation Project area do not show any mapped evidence of faulting. Seismic-related activity in the ECO Substation area is primarily related to distant regional fault zones, as discussed previously (SDG&E 2009).

The potential for liquefaction exists in the Proposed PROJECT area where shallow groundwater is present in areas underlain by Quaternary alluvium. The potential for liquefaction at the ECO Substation site is considered minimal due to a relatively deep water table and subsurface materials ranging from well-graded alluvial deposits to shallow bedrock (URS 2008). Liquefaction potential along the majority of the ECO Substation Project 138 kV alignment is considered low because the majority of the ROW traverses shallow or outcropping granitic bedrock. Approximately 0.5 mile of the 138 kV transmission line ROW is underlain by Quaternary alluvium. Groundwater depth in this area is unknown. However, groundwater was encountered at a depth of 50 feet at the nearby ECO Substation site in June 2008 (URS 2008). The Boulevard Substation rebuild site has no liquefaction hazard due to the shallow or outcropping granitic bedrock that is present (URS 2008).

The ECO Substation Project area has very low potential for landslide due to the existing topography and subsurface conditions.

There are two possible mining sites, located in close proximity to the proposed 138 kV transmission line and shown on Figure D.13-3 (Mineral Resources within Project Vicinity): the Jacumba Manganese Group has a prospective manganese claim that is located approximately 550 feet north of the transmission line; and the Round Mountain Deposit, a prospective silica site, is located approximately 150 feet north of the transmission line.

D.13.1.3 Tule Wind Project

The Tule Wind Project would be located in the In-Ko-Pah Mountains and in the McCain Valley areas, which have moderate slopes and elevations ranging between approximately 3,600 and 6,400 feet amsl.

The La Posta tonalite, a granitic unit of early and late Cretaceous age, underlies 90% of the Tule Wind Project areas. The remaining 10% of the Tule Wind Project along the western edge of the project area is underlain by metamorphic rocks from the Triassic and Jurassic ages (Iberdrola 2010a).

As indicated in Figure D.13-2 and listed in Table D.13-2, the majority of the Tule Wind Project site is underlain by severely erodible, non-expansive soils.

One potentially active fault located in the area of the Tule Wind Project is located near Turbines Q1 and Q2 (Iberdrola 2010b). The closest known active fault is the Coyote Mountain section of the Elsinore Fault, located approximately 7.1 miles to the northeast.

The County has identified loamy alluvial land as a hydric soil subject to liquefaction risk (County of San Diego 2007). As indicated in Figure D.13-2 (Soils Overview Map) and listed in Table D.13-2, approximately 66 acres of the Tule Wind Project site near Old Highway 80 is underlain by loamy alluvial land. If these soils were to become saturated, they would have liquefaction potential.

The western 10% of the Tule Wind Project area has steep slopes, with some greater than 25%. Some of the bedrock units in this area also have schists, which have foliations and other planes of weakness that potentially could contribute to instability of steep constructed cut slopes. The remaining 90% of the Tule Wind Project area is underlain by granitic rock (tonalite) and is not considered susceptible to landslides. The 138 kV transmission line would cross terrain ranging from flat to steeply sloping; the steeply sloping terrain may be prone to landslides or slope failure in areas where steep cuts are made.

Development of mineral resources from public lands managed by the Bureau of Land Management (BLM) is regulated under the General Mining Law of 1872, which allows citizens

the right to enter public lands for the purpose of exploration and development of minerals. Deposits of the following minerals have been found in the vicinity of the Tule Wind Project: manganese, gemstones, semiprecious gemstones, beryllium, tungsten, strontium, feldspar, and silica. There are two active tungsten ore mines located along the eastern Tule Wind Project site boundary, near proposed turbine sites N-7, N-8, and P-5 (Iberdrola 2010a). The Metal Mountain Mine is located adjacent to turbines N-7 and N-8, and the Buckthorn Deposit is located southwest of turbine P-5. There is also an active gemstone mine in the regional vicinity, approximately 3.5 miles southeast of the Tule Wind Project site. The project area is identified as having moderate potential for construction materials, nonmetallic/industrial, and locatable (metallic) minerals. There is currently no commercial activity due to poor access and lack of consistent market in the area. Access to the area is limited due to private holdings surrounding the area. There are also at least 48 abandoned or inactive mine openings in the vicinity of the Tule Wind Project, with the majority of these located near Julian and McCain Valley (HDR, Inc. 2010). Abandoned mines pose hazards that include but are not limited to the following: open shafts and adits, open pits and quarries, high and steep walls of pits and trenches, potential for the presence of explosives, the presence of contaminated air or gas in underground workings, and the presence of unstable buildings or structures.

D.13.1.4 ESJ Gen-Tie Project

The ESJ Gen-Tie Project site is within the Jacumba Valley at an elevation of approximately 3,195 to 3,490 feet amsl.

Geologic units that underlie the ESJ Gen-Tie Project site include Cretaceous Plutonic and Quaternary Alluvium rock formations.

As indicated in Figure D.13-2.(Soils Overview Map) and also listed in Table D.13-2, the ESJ Gen-Tie Project site is underlain by Rositas loamy coarse sand, 2% to 9% slopes, which is severely erodible and non-expansive.

Seismic activity in the ESJ Gen-Tie area is primarily related to distant regional fault zones, as discussed previously for the ECO Substation Project.

The potential for liquefaction exists in areas of shallow groundwater that are underlain by Quaternary alluvium. The entire ESJ Gen-Tie Project site is underlain by Quaternary alluvium (refer to Figure D.13-1, Geologic Hazards). Depth to groundwater in the vicinity of the ESJ Gen-Tie Project is 90 feet (AECOM 2009), which indicates that shallow groundwater is unlikely at the project site. However, the ESJ Gen-Tie Project is in an area identified by the San Diego County Department of Public Works, Department of Planning and Land Use, as a potential liquefaction area.

The ESJ Gen-Tie Project area has very low potential for landslide due to the existing gently sloping topography conditions.

There are no mines or known potential mining sites (active, prospective, or unknown status) located on or in close proximity to the ESJ Gen-Tie Project site (USGS 2010b).

D.13.2 Applicable Regulations, Plans, and Standards

This section discusses federal, state, and regional environmental regulations, plans, and standards applicable to the Proposed PROJECT, as well as the Campo, Manzanita, and Jordan wind energy projects. In addition to the federal regulations identified, the Campo and Manzanita wind energy projects may be subject to the Bureau of Indian Affairs' (BIA's) policies and regulations and tribe-specific policies and plans.

D.13.2.1 Federal Regulations

National Environmental Policy Act

The National Environmental Policy Act (NEPA, 42 U.S.C. 4321 et seq.) requires that federal agencies assess the environmental impact of proposed federal projects on geologic hazards. The BLM must comply with the Council on Environmental Quality, Regulations for Implementing NEPA (40 CFR 1500 et seq.), and follow the BLM NEPA Handbook H-1790-1) (BLM 2008).

Federal Land Policy and Management Act of 1976, as amended

The Federal Land Policy and Management Act (FLPMA) establishes goals and policies to be followed by agencies administering public lands, such as BLM. FLPMA specifies policies for conveyance of mineral resources.

D.13.2.2 State Laws and Regulations

Alquist-Priolo Earthquake Fault Zoning Act of 1972

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (California Public Resources Code, Sections 2621–2630, formerly the Special Studies Zoning Act) regulates development and construction of buildings intended for human occupancy to avoid the hazard of surface fault rupture. While this act does not specifically regulate overhead transmission lines, it does help define areas where fault rupture is most likely to occur. This act groups faults into categories of active, potentially active, and inactive. Historic and Holocene-age faults are considered active; Late Quaternary- and Quaternary-age faults are considered potentially active; and pre-Quaternary age faults are considered inactive. These classifications are qualified by the conditions that a fault must be shown to be ~~–~~sufficiently active" and ~~–~~well defined" by

detailed, site-specific geologic explorations in order to determine whether building setbacks should be established.

Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (California Public Resources Code, Sections 2690–2699.6) is designed to protect the public from the effects of strong ground shaking, liquefaction, landslides, other ground failures, or other hazards caused by earthquakes. The act requires site-specific geotechnical investigations to identify the hazard and the formulation of mitigation measures before the permitting of most developments designed for human occupancy. Special Publication 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California (California Geological Survey 1997), constitutes the guidelines for evaluating seismic hazards other than surface fault rupture and for recommending mitigation measures as required by California Public Resources Code, Section 2695(a).

California Building Code and International Building Code

The California Building Code (CBC 2007) is based on the 2006 International Building Code of the International Code Council. The CBC has more extensive structural seismic provisions than the International Building Code. Chapter 16 of the CBC contains definitions of seismic sources and the procedure used to calculate seismic forces on structures.

D.13.2.3 Regional Policies, Plans, and Regulations

San Diego County

The Department of Planning and Land Use maintains and implements the County of San Diego's General Plan and zoning and grading ordinances. Regulations related to grading, excavation, clearing and mining activities within the County are contained within the San Diego County Code of Regulatory Ordinances, Title 8, Division 7 (Excavation and Grading, Clearing and Watercourses, County of San Diego 2000). Where grading activities are proposed, the County's grading ordinance would apply (Title 8, Division 7, Chapter 2, Relating to Grading, Clearing and Watercourses).

Additionally, the County of San Diego Department of Planning and Land use has developed Guidelines for Determining the Significance of Geologic Hazards (County of San Diego 2007). The Guidelines present a range of quantitative, qualitative, and performance levels for particular environmental effects. The Guidelines also includes County Special Study Zones. The County-designated Special Study Zones are areas that have been mapped by the California Division of Mines and Geology as Late Quaternary faults that are similar to Holocene faults but less distinct. Traces of faults within Special Study Zones are treated by the County as active unless a fault investigation can prove otherwise.

General Plan Conservation Element

Chapter 5 of the existing County General Plan Conservation Element discusses the prevalence of mineral resources located within San Diego County and establishes policies intended to protect and conserve the resources remaining in the County (County of San Diego 2001). Chapter 6 of the existing Conservation Element discusses soil and the suitability of soils found within the County to support agricultural production (County of San Diego 1991). In addition, Chapter 6 establishes policies and programs to protect areas within the County that are particularly susceptible to further damage resulting from erosion, sedimentation, and other geologic phenomenon. The relevant policies of the Conservation Element are listed as follows (County of San Diego 1991):

- Chapter 5 (Minerals), Policy 7: The County will, to the extent possible, protect and preserve mineral deposits and historical mining sites available for necessary commercial extraction, and for scientific, education, and recreational uses.
- Chapter 5 (Minerals), Policy 8: The County will, to the extent practical, protect and preserve unique geological features from destruction, damage, or loss.
- Chapter 6 (Soils), Policy 10: The County will regulate major land clearing projects to minimize significant soil erosion, destruction of archaeological historic and scientific resources and endangered species of plants and animals.

General Plan Seismic Safety Element

The Seismic Safety Element of the existing County General Plan provides background information regarding the past occurrences of earthquakes and other geologic phenomenon in San Diego County (County of San Diego 1991). In addition, the element discusses the various fault systems that are located in or traverse the county. Lastly, the seismic safety element establishes policies regarding ground shaking, fault rupture, landslides, liquefaction, tsunamis and seiches, inundation by dam failure, and new development. The relevant policies of the seismic safety element are listed as follows (County of San Diego 1991):

- Ground Shaking, Policy 3: Encourage and support investigation of influence of site conditions on ground shaking.
- Liquefaction, Policy 2: Prohibit new construction of essential, dependent care, and high occupancy facilities in areas subject to liquefaction or settlement unless measures are incorporated into the foundation preparation and structural design which will make the facilities safe.
- New Development, Policy 1: Require all buildings to meet the standards of the Uniform Building Code.

- New Development, Policy 6: Require major utility lines which cross hazardous areas to be built with features that provide for either automatic shut-off or for quick repairs.
- New Development, Policy 7: Require submission of soils and geologic reports prepared by a certified engineering geologist on all projects where geologic hazards are known or suspected to be present.

The County of San Diego's Land Use and Environment Group of the Department of Planning and Land Use, Department of Public Works, published Guidelines for Determining Significance of Geologic Hazards on July 30, 2007. The guidelines review the County's existing geologic conditions and hazards, guidelines for determining significance, and standard mitigation and project design considerations.

D.13.2.4 Other Standards

Institute of Electrical and Electronics Engineers 693 "Recommended Practices for Seismic Design of Substations"

Approved by the American National Standard Institute, the Institute of Electrical and Electronics Engineers (IEEE) 693 standard for "Recommended Practices for Seismic Design of Substations" was developed by the IEEE Power Engineering Society Substations Committee. Included in this document are recommendations regarding seismic design for substations and equipment such as seismic criteria, qualification methods and levels, structural capacities, performance requirements for equipment operation, installation methods, and documentation.

The intent of IEEE 693 is to standardize methods of providing and validating the seismic design tolerance of electrical substation equipment. Included in IEEE 693 are detailed test and analysis methods to perform on each type of major equipment or component found in an electrical substation (IEEE 1984). The test and analysis methods are used to ensure that substation equipment and components will withstand seismic events to predetermined ground acceleration levels and to assist substation designers in selecting the appropriate equipment from various manufacturers, knowing that the seismic withstand rating of substation components and equipment are equivalent among all manufacturers. It establishes standard methods of verifying seismic withstand capability, which gives the substation designer the ability to select equipment from various manufacturers, knowing that the seismic withstand rating of each manufacturer's equipment is an equivalent measure.

D.13.3 Environmental Effects

D.13.3.1 Definition and Use of CEQA Significance Criteria/Indicators under NEPA

The significance of these impacts was determined on the basis of California Environmental Quality Act (CEQA) statutes, guidelines, and appendices, and thresholds of significance developed by local agencies, government codes, and ordinances. Impacts of the project on the geologic environment would be considered significant if project construction or operation would result in any of the following criteria being met (14 CCR 15000 et seq.):

- Project construction would trigger or accelerate erosion or the loss of topsoil
- Project construction would result in the direct or indirect destruction or disturbance of landforms or unique geologic features
- The project would render known mineral and/or energy resources inaccessible.

Geologic impacts created as a result of the Proposed PROJECT are significant if damage to project components from the following scenarios would potentially expose people or structures to substantial adverse effects, including the risk of loss, injury, or death (14 CCR 15000 et seq.):

- Damage to project components due to seismic events (earthquakes), including fault rupture, and seismically induced ground shaking that results in landslides, liquefaction, settlement, lateral spreading, and/or surface cracking
- Project components would 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 landsliding, slope instability, subsidence, or collapse
- Project components could be damaged if located on unsuitable soils, including corrosive, expansive, and compressible soils.

D.13.3.2 Applicant Proposed Measures

ECO Substation Project

SDG&E proposed Applicant Proposed Measure (APM) ECO-GEO-1 to reduce impacts related to geology and mineral resources. APM ECO-GEO-1 would consider the recommendations and findings of the final geotechnical reports in the final design of all project components, as described in Section B.3.4, ECO Substation Project Applicant Proposed Measures, of this EIR/EIS.

Tule Wind Project

Pacific Wind Development proposed APMs TULE-GEO-1 through TULE-GEO-3 to reduce impacts related to geology and mineral resources. These APMs would require additional study to ensure proper foundations for the location of the proposed turbines, identification of soils and groundwater or springs in areas that contain loamy alluvial land and Mottsville soil, and further geologic study to determine correct location and compatible soils for the placement of the operations and maintenance (O&M) septic tank, as described in Section B.4.4, Tule Wind Project Applicant Proposed Measures, of this EIR/EIS.

ESJ Gen-Tie Project

Energia Sierra Juarez U.S. Transmission, LLC, does not propose APMs to reduce potential impacts related to geology and mineral resources.

Campo, Manzanita, and Jordan Wind Energy Projects

At the time this EIR/EIS was prepared, the project proponents for these three wind energy projects have not developed project-specific APMs.

D.13.3.3 Direct and Indirect Effects

Table D.13-5 lists identified impacts and classification of the impacts under CEQA for the Proposed PROJECT. Cumulative effects are analyzed in Section F of this EIR/EIS.

Table D.13-5
Geology and Mineral Resource Impacts

Impact No.	Description	Classification
ECO Substation–Geologic and Mineral Resource Impacts		
ECO-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
ECO-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
ECO-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
ECO-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class III
ECO-GEO-5	Project would impact mineral resources.	Class III
Tule Wind–Geologic and Mineral Resource Impacts		
Tule-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
Tule-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
Tule-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
Tule-GEO-4	Project would expose people or structures to potential substantial adverse effects as a	Class II

Table D.13-5 (Continued)

Impact No.	Description	Classification
	result of landslides, earthflows, rockfall, and/or subsidence.	
Tule-GEO-5	Project would impact mineral resources.	Class III
ESJ Gen-Tie–Geologic and Mineral Resource Impacts		
ESJ-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
ESJ-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
ESJ-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
ESJ-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class III
ESJ-GEO-5	Project would impact mineral resources.	Class III
Proposed PROJECT (COMBINED–including Campo, Manzanita, and Jordan Wind Energy)		
GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class II
GEO-5	Project would impact mineral resources.	Class III

Environmental Impacts/Environmental Effects

Direct and Indirect (*Note: cumulative effects are addressed in Section F of this EIR/EIS*)

Impact GEO-1: Erosion would be triggered or accelerated due to construction activities.

ECO Substation Project

Soils present on the ECO Substation Project site exhibit a severe rating for erosion (Table D.13-1). The fenced area of the ECO Substation would occupy approximately 58 acres, which would be graded during the early phases of construction. Grading would expose soil to erosion by removing the vegetative cover and compromising the soil structure. Rain and wind may potentially further detach soil particles and transport them off site. Construction of the other components of the ECO Substation Project would require grading and could result in loss of topsoil and soil erosion. Grading would be limited to approximately 3.2 acres at the Boulevard Substation rebuild site. Along the 138 kV transmission line, grading would be limited to the amount necessary to safely install the poles to a maximum of 50 feet by 50 feet at each pole site.

Impacts to soils caused by erosion triggered by construction activities would be adverse; therefore, Mitigation Measures HYD-1 and GEO-1 have been provided and would mitigate this

impact. With the implementation of Mitigation Measures HYD-1, which addresses the ECO Substation Project's Stormwater Pollution Prevention Plan (SWPPP), and GEO-1, soil erosion would be minimized, and under CEQA, impacts would be considered less than significant (Class II). For information about Mitigation Measure HYD-1 and more details regarding the SWPPP and Water Quality Construction Best Management Practices (BMP) Manual, please refer to Section D.12, Water Resources.

MM GEO-1 **Erosion Control and Sediment Transport Control Plan:** The Erosion Control and Sediment Transport Control Plan (Plan) would be included with the project grading plans submitted to the County of San Diego for review and comment. The plan would be prepared in accordance with the standards provided in the Manual of Erosion and Sedimentation Control Measures and consistent with practices recommended by the Resource Conservation District of Greater San Diego County. Implementation of the plan would help stabilize soil in graded areas and waterways and reduce erosion and sedimentation. The plan would designate BMPs that would be implemented during construction activities. Erosion control efforts, such as hay bales, water bars, covers, sediment fences, sensitive area access restrictions (e.g., flagging), vehicle mats in wet areas, and retention/settlement ponds, would be installed before extensive soil clearing and grading begins. Appropriate stabilization measures such as mulching or seeding would be used to protect exposed areas during construction activities. Revegetation plans, the design and location of retention ponds, and grading plans would be submitted to the California Department of Fish and Game (CDFG) and U.S. Army Corps of Engineers (ACOE) for review in the event of construction near waterways. In disturbed areas where construction equipment has caused compaction of soils (e.g., staging areas, structure sites, temporary spur roads, etc.), soils would be decompacted as necessary prior to seeding, and reclamation would occur to enhance revegetation and reduce potential for erosion.

Tule Wind Project

Approximately 90% of soils at the Tule Wind Project site exhibit a severe rating for erosion (Table D.13-1). The remaining 10% contains Calpine soil series, which has a moderate potential for erosion. Erosion of the project site would have the potential to decrease the stability of structures on the project site and to decrease the water quality of nearby waterways. Impacts to soils caused by erosion triggered by construction activities would be adverse; therefore, Mitigation Measures HYD-1 and GEO-1 have been provided and would mitigate this impact. Pacific Wind Development will develop a decommissioning plan for the Tule Wind Project prior to the decommissioning of construction activities. The decommissioning plan will be revised prior to the termination of the right-of-way authorization and implemented once project

operations have ceased. The decommissioning plan would describe how the turbine towers and ancillary structures would be removed from the site and the habitat restored when the facility is retired or decommissioned and the project site is returned to preconstruction and operation conditions. Topsoil from all decommissioning activities would be salvaged and reapplied during final reclamation, and all areas of disturbed soil will be reclaimed using weed-free native shrubs, grasses, and forbs. Decommissioning activities are anticipated to have similar types of construction-related activities and would therefore also have adverse impacts on soils. Therefore, Mitigation Measures HYD-1 and GEO-1 would apply to decommissioning activities and mitigate these adverse impacts. The final decommissioning plan will be developed in compliance with the standards and requirements for closing a site at the time decommissioning occurs.

Under CEQA, with implementation of mitigation, impacts to soil erosion or the loss of topsoil as related to construction and decommissioning activities would be less than significant (Class II).

ESJ Gen-Tie Project

The soils on the ESJ Gen-Tie Project site are identified as rough broken land and Rositas loamy coarse sand, a soil that has a severe soil erodibility rating (Table D.13-1). The ESJ Gen-Tie Project is not on existing slopes and would not develop steep slopes. Construction of the ESJ Gen-Tie Project would result in minimal loss of topsoil and soil erosion due to the grading necessary to safely install five poles, with a maximum of 150 feet by 200 feet of grading at each pole site, and an associated project access road. Impacts to soils caused by erosion triggered by construction activities would be adverse; therefore, Mitigation Measures HYD-1 and GEO-1 have been provided and would mitigate this impact. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II).

Proposed PROJECT

As discussed previously, soils present at the Proposed PROJECT site exhibit a severe rating for erosion. Grading during construction including the proposed Campo, Manzanita, and Jordan wind energy project would expose soil to erosion by removing the vegetative cover and compromising the soil structure. Rain and wind may potentially further detach soil particles and transport them off site. . Impacts to soils caused by erosion triggered by construction activities would be adverse; therefore, Mitigation Measures HYD-1 and GEO-1 have been provided and would mitigate this impact. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.

ECO Substation Project

The majority of the soils at the ECO Substation site have a moderate risk of corrosion for steel and concrete. Depending on the degree of corrosivity of the soils, concrete and reinforcing steel in concrete structures and bare-metal structures exposed to these soils could deteriorate, eventually leading to structural failures. Impacts as a result of corrosive soils would be adverse; therefore, Mitigation Measure GEO-2 has been provided that would reduce impacts resulting from corrosive soils by ensuring that the specific soil corrosivity of the project site is identified and that specific measures are taken to counteract any potential corrosivity of the soils on the site, such as the use of corrosive resistant materials and coatings where necessary. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II).

Expansive soils can also cause problems to structures because they can undergo changes in volume as a result in changes in moisture content. Soils that exhibit shrink-swell behavior are clay rich. Two of the natural soil types identified within the ECO Substation Project area have moderate to high shrink-swell potential; one soil type, rough broken land, has a variable shrink-swell potential. The majority of the soils that underlay the ECO Substation Project site have low clay content and low shrink-swell potential. Impacts as a result of expansive soils on the site would be adverse; therefore, Mitigation Measure GEO-2, which supersedes APM ECO-GEO-01 and provides further clarification, would ensure that impacts due to expansive soils would mitigate this impact by ensuring that the shrink-well capacity of the soils on the project site are identified and that specific actions are identified to reduce impacts associated with these soils, such as potentially replacing the soil with engineered soil. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II).

MM GEO-2 Conduct geotechnical studies for soils to assess characteristics and aid in appropriate foundation design: The design-level geotechnical studies to be performed by the applicant shall identify the presence, if any, of potentially detrimental soil chemicals, such as chlorides and sulfates. Appropriate design measures shall be utilized for protection of reinforcement, concrete, and metal-structural components against corrosion, including use of corrosion-resistant materials and coatings, increased thickness of project components exposed to potentially corrosive conditions, and use of passive and/or active cathodic protection systems. The geotechnical studies shall also identify areas with potentially expansive or collapsible soils and include appropriate design features, including excavation of potentially expansive or collapsible soils

during construction and replacement with engineered backfill, ground-treatment processes, and redirection of surface water and drainage away from expansive foundation soils. Studies shall conform to industry standards of care and American Society for Testing and Materials (ASTM) standards for field and laboratory testing. Design shall conform to applicable sections of the County of San Diego grading codes, CBC, and the standard specifications for public works construction.

Tule Wind Project

Corrosive soils, which would have a detrimental effect on concrete and metals, may exist in the Tule Wind Project area. The majority of the soils at the Tule Wind Project site have a moderate risk of corrosion for steel and concrete, which could cause steel and concrete structures to deteriorate and compromise their integrity. Impacts as a result of corrosive soils would be adverse; therefore, Mitigation Measure GEO-2 has been provided that would mitigate this impact for the same reasons as described previously for the ECO Substation Project. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II).

The Tule Wind Project area contains surficial soils of colluvial and alluvial origin, consisting primarily of silty sand and gravel, and does not contain types of clayey soils that have a tendency to absorb water and swell and then shrink as they dry. The soils are primarily composed of granodiorite and maintain the granodiorite as bedrock. The bedrock is fairly stable and thus exhibits a low potential for expansion (Iberdrola 2010a); therefore, impacts resulting from expansive soils would not be adverse. Under CEQA, impacts would be considered less than significant (Class III).

ESJ Gen-Tie Project

The ESJ Gen-Tie Project is underlain by a sandy soil that has a low shrink-swell potential and is considered to have moderate risk of corrosion for steel and concrete. Corrosive soils may cause steel and concrete structures to deteriorate and compromise their integrity. Impacts as a result of corrosive soils would be adverse; therefore, Mitigation Measure GEO-2 has been provided that would mitigate this impact for the same reasons as described for the ECO Substation Project. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II). Since the ESJ Gen-Tie Project is underlain by soils with a low shrink-swell potential, impacts resulting from expansive soils would not be adverse and, under CEQA, would be considered less than significant (Class III).

Proposed PROJECT

Corrosive and expansive soils exist on the Proposed PROJECT site and have the potential to compromise structures through corrosion and shifts in the underlying soils. Similar to Impact GEO-1, corrosive and expansive soils are localized to the Proposed PROJECT area, including the proposed Campo, Manzanita, and Jordan wind energy project sites. Impacts as a result of corrosive and expansive soils would be adverse; therefore, Mitigation Measure GEO-2 has been provided that would mitigate this impact for the same reasons as described for the ECO Substation Project. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.

ECO Substation Project

The proposed ECO Substation Project site does not cross any mapped Alquist-Priolo Earthquake Hazard Zones, County-level fault special study zones, or any mapped faults of Quaternary age that are active or potentially active. The closest active fault to the ECO Substation Project is the Coyote Mountain section of the Elsinore Fault, located approximately 12 miles to the northeast. Therefore, identified impacts associated with fault ruptures would not be adverse. Under CEQA, impacts associated with fault ruptures would be considered less than significant (Class III).

Strong earthquake-induced ground shaking can result in damage to aboveground structures. Due to the distance from active faults that would be a source of seismic shaking (refer to Table D.3-4, Area Active Faults), moderate to high levels of ground shaking are predicted for the project site. While seismically induced liquefaction is possible along an approximately 0.5-mile segment of the 138 kV transmission line that is underlain by Quaternary alluvium, it is unlikely due to low groundwater depths in the area (groundwater was encountered at a depth of 50 feet at the nearby ECO Substation site in June 2008 (URS 2008)). Additionally, where water features intersect with this segment of the 138 kV transmission line the Project would avoid such features. Transmission lines and substations are designed to withstand strong ground shaking and moderate ground-deformation impacts associated with strong seismic shaking. However, because moderate to high levels of ground shaking are anticipated and liquefaction is possible impacts would be adverse. Therefore, Mitigation Measures GEO-3 and GEO-4 would be required and would mitigate for these impacts. Implementation of Mitigation Measures GEO-3 and GEO-4 would reduce impacts associated with ground shaking and liquefaction because they would ensure that the project adhere to all applicable engineering design and construction codes that would reduce adverse effects resulting from fault rupture both during construction and

operational phase. Under CEQA, with Implementation of Mitigation Measures GEO-3 and GEO-4, impacts would be considered less than significant (Class II).

MM GEO-3 **Conduct geotechnical investigations:** The applicant shall perform design-level geotechnical investigations to evaluate the potential for liquefaction, lateral spreading, seismic slope instability, and ground-cracking hazards to affect the approved project and all associated facilities. Where these hazards are found to exist, appropriate engineering design and construction measures that meet CBC and IEEE design parameters shall be incorporated into the project designs. Appropriate measures for project facilities could include construction of pile foundations, ground improvement of liquefiable zones, installation of flexible bus connections, and incorporation of slack in underground cables to allow ground deformations without damage to structures.

MM GEO-4 **Facilities inspections conducted following major seismic event:** If large levels of ground shaking are experienced or a major earthquake occurs along the Elsinore Fault, a professional licensed geologist, geotechnical engineer, and structural engineer hired by the project applicant shall perform facilities inspections as quickly as possible. Careful examination shall be conducted of all project facilities. Any required repair or needed improvements shall be implemented as soon as feasible to ensure that the integrity of project facilities has not been compromised.

Tule Wind Project

The proposed Tule Wind Project site does not cross any mapped Alquist-Priolo Earthquake Hazard Zones. The closest active fault to the Tule Wind Project is the Coyote Mountain section of the Elsinore Fault, located approximately 7.1 miles to the northeast. One potentially active fault transects the project area near turbines Q1 and Q2 (Iberdrola 2010b). Impacts would be adverse in this area; therefore, Mitigation Measures GEO-3 and GEO-4 have been provided that would reduce impacts associated with potential fault rupture because they would ensure that the project adhere to all applicable engineering design and construction codes that would reduce adverse effects resulting from fault rupture both during construction and operational phase. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II). Based on available data reviewed at the time this document was prepared, none of the other facilities appear to be located within 50 feet of a trace of a known potentially active fault or County-level fault special study zone; therefore, fault rupture does not appear to be a significant risk for the remaining facilities.

Strong earthquake-induced ground shaking can result in damage to aboveground structures. Due to the distance from active faults that would be a source of seismic shaking, moderate to high levels of ground shaking are predicted for the project site. Earthquake-generated ground failure, including liquefaction, lateral spreading, and differential settlement, could impact the Tule Wind Project where project facilities are located adjacent to unconsolidated, sandy soil near springs. The County has identified loamy alluvial land as a hydric soil subject to liquefaction risk in areas of shallow groundwater (County of San Diego 2007). The turbines, collector lines, and O&M/substation facilities would not be located in areas of this soil type. However, the proposed 138 kV transmission line adjacent to Old Highway 80 is located on approximately 66 acres of loamy alluvial land. Within this area, groundwater may occur in shallow alluvium at depth within fractures in the area's crystalline bedrock (Geo-Logic Associates 2010). Wind turbines, transmission lines, and support structures can withstand strong ground shaking and moderate ground deformations associated with strong seismic shaking. However, because moderate to high levels of ground shaking are anticipated, along with the potential for liquefaction, impacts would be adverse. Therefore, Mitigation Measures GEO-2, GEO-3, and GEO-4 are provided to reduce this impact to less than significant (Class II). Implementation of Mitigation Measures GEO-2, GEO-3, and GEO-4 would reduce impacts associated with ground shaking and liquefaction. These measures would ensure that site-specific conditions, which contribute to risk of impacts from ground shaking and liquefaction are identified and that the project would adhere to all applicable engineering design and construction codes that would reduce adverse effects resulting from ground shaking and liquefaction during construction and operational phases. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant.

ESJ Gen-Tie Project

The proposed ESJ Gen-Tie Project site does not cross any mapped Alquist-Priolo Earthquake Hazard Zones or County-level fault special study zones. Therefore, impacts resulting from fault rupture would not be adverse. Under CEQA, impacts resulting from fault rupture would be considered less than significant (Class III).

Strong earthquake-induced ground shaking can result in damage to aboveground structures. Due to the distance from active faults that would be a source of seismic shaking (refer to Table D.13-4, Active Area Faults), moderate to high levels of ground shaking are predicted for the project site. Given that transmission lines are designed to withstand strong ground shaking and moderate ground deformations, impacts associated with strong seismic shaking are not anticipated to be significant. The ESJ Gen-Tie Project site is located within a "Potential Liquefaction Area" as identified in the County Guidelines for Determining Significance for Geologic Hazards. Additionally, the entire ESJ Gen-Tie Project site is underlain by Quaternary alluvium, which is prone to liquefaction in areas of shallow groundwater. Depth to groundwater in the project

vicinity is 90 feet (AECOM 2009). Therefore, earthquake-generated ground failure due to liquefaction is unlikely but remains possible and would be adverse. Therefore, implementation of Mitigation Measures GEO-2, GEO-3, and GEO-4 would mitigate impacts associated with ground shaking and liquefaction because they would ensure that site-specific conditions, which would contribute to risk of impacts from ground shaking and liquefaction are identified and that the project would adhere to all applicable engineering design and construction codes that would reduce adverse effects resulting from ground shaking and liquefaction during construction and operational phases. Under CEQA, with mitigation, impacts resulting from ground shaking and liquefaction at the ESJ Gen-Tie Project site would be considered less than significant (Class II).

Proposed PROJECT

The Proposed PROJECT site, including the Campo, Manzanita, and Jordan wind energy projects, do not cross any mapped Alquist-Priolo Earthquake Hazard Zones or County-level fault special study zones. The closest active fault to the Proposed PROJECT area is the Coyote Mountain section of the Elsinore Fault, located approximately 7.1 miles to the northeast of the Tule Wind Project. One potentially active fault transects the project area near Tule Wind Project turbines Q1 and Q2 (Iberdrola 2010b) and is near the northern areas of the Campo, Manzanita, and Jordan wind energy projects; therefore, impacts would be adverse. Implementation of Mitigation Measure GEO-3 would mitigate impacts associated with potential fault rupture because it would ensure that the project would adhere to all applicable engineering design and construction codes that would reduce adverse effects resulting from fault rupture. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II). Based on available data reviewed at the time this document was prepared, none of the other facilities for the Proposed PROJECT appear to be located within 50 feet of a trace of a known, potentially active fault or County-level fault special-studies zone; therefore, fault rupture does not appear to be a significant risk for the remaining facilities.

Strong earthquake-induced ground shaking can result in damage to aboveground structures. Due to the distance from active faults that would be a source of seismic shaking (refer to Table D.13-4, Active Area Faults), moderate to high levels of ground shaking are predicted at the Proposed PROJECT site. Earthquake-generated ground failure, including liquefaction, lateral spreading, and differential settlement, could impact the project where project facilities are located in areas susceptible to liquefaction, such as areas having loamy alluvial land or Quaternary alluvium. Therefore, impacts would be adverse. However, implementation of Mitigation Measures GEO-2, GEO-3, and GEO-4 would reduce impacts associated with ground shaking and liquefaction because they would ensure that site-specific conditions that would contribute to risk of impacts from ground shaking and liquefaction are identified and that the project would adhere to all applicable engineering design and construction codes that would reduce adverse effects resulting from ground shaking and liquefaction during construction and

operational phases. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II).

Impact GEO-4: Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.

ECO Substation Project

The majority of the ECO Substation Project components would be located on relatively flat to gently sloping terrain; therefore, little potential exists for slope failure. The 138 kV transmission line would cross areas of more steeply sloping terrain (areas designated as having slopes of less than 25% by the County Guidelines for Determining Significance for Geologic Hazards (County of San Diego 2007)); however, areas impacted by the construction of the 138 kV transmission line would typically be 50 feet by 50 feet in size, and if applicable, the foundation design of the transmission structures would be developed following the CBC and County ordinances to minimize risks associated with slope failure or instability. Therefore, the ECO Substation Project impacts with regard to landslides, earthflows, rockfall, and/or subsidence would not be adverse. Under CEQA, impacts would be considered less than significant (Class III).

Tule Wind Project

The western 10% of the Tule Wind Project area has steep slopes with some greater than 25%. Some of the bedrock units in this area also have schists, which have foliations and other planes of weakness that may contribute to instability of constructed cut slopes. The remaining 90% of the Tule Wind Project area is underlain by tonalite and is considered to be generally free of the potential for landslides. The Tule Wind Project 138 kV transmission line would cross flat to steeply sloping terrain that also may be prone to landslides or slope failure. The risk of landslides or rock slope failures is therefore adverse. Three mine tunnels and one mine shaft have been identified adjacent to turbines N7, N8, P4, and P5 along the southwest boundary of the project area. The mines may impact foundations and pose a risk of adverse impacts due to mine-related subsidence. These impacts can be avoided by not placing towers in the immediate vicinity of underground mines or shafts, and such mitigation efforts would be implemented through Mitigation Measure GEO-5.

The project proposes to utilize approximately 17 million gallons of water during construction that may come from water wells in the project area (refer to Section D.12, Water Resources, of this EIR/EIS). Risk of subsidence in the area due to groundwater withdrawal is considered extremely low due to the granitic bedrock and low groundwater table in the Tule Wind Project area. However, the risk of subsidence due to mines and proposed groundwater extraction remains. Impacts associated with landslides, earthflows, rockfall, and/or subsidence as a result of

the proposed Tule Wind Project would be adverse. Therefore, implementation of Mitigation Measures GEO-5 and HYD-3 would mitigate these impacts because they would ensure that potential risks are fully identified and appropriate and specific design measures are implemented to reduce their impacts. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II).

MM GEO-5 Conduct geotechnical surveys for landslides and mines. The applicant shall perform design-level geotechnical surveys to evaluate the potential for unstable slopes, landslides, earthflows, debris flows, and mine tunnels/shafts in the vicinity of project facilities and shall address the surveys in final design of project facilities. Based on these surveys, approved project facility design shall incorporate appropriate measures, such as locating facilities away from very steep hillsides, debris flow source areas, the mouths of steep hillside drainages, and mine tunnels and shafts. Appropriate design and construction considerations shall be followed for the slope areas within the project area, including BMPs for surface drainage and reducing slope inclinations where grading operations are conducted to minimize potential slope instabilities. Possible mitigation measures to reduce rockfall, rock slope failure, and landslide hazards include mechanical removal of large boulders from slope faces; stabilization of boulders with anchors, rock bolting, gunite, or cable nets; or construction of intercepting slope ditches or berms.

ESJ Gen-Tie Project

The ESJ Gen-Tie Project site is not within a "Landslide Susceptibility Area," as identified in the County Guidelines for Determining Significance for Geologic Hazards (County of San Diego 2007), and is in a gently sloping area. The project is not located within an identified Landslide Susceptibility Area, the geologic environment has a low probability to become unstable, and the project is not proposing to extract significant amounts of groundwater from the project site. Therefore, impacts due to landslides, earthflows, rockfall, and/or subsidence would not be adverse. Under CEQA, the project would have a less-than-significant impact from the exposure of people or structures to potential adverse effects from landslides, earthflows, rockfall, and/or subsidence (Class III).

Proposed PROJECT

Portions of the Proposed PROJECT area, including the Campo, Manzanita, and Jordan wind energy projects have steep slopes with some greater than 25%. Some of the bedrock units in this area also have schists, which have foliations and other planes of weakness that may contribute to instability of constructed cut slopes. The risk of landslides and/or rock slope failure is therefore

potentially significant. Additionally, three mine tunnels and one mine shaft have been identified adjacent to turbines N7, N8, P4, and P5 along the southwest boundary of the project area. These may impact foundations and would therefore represent a significant hazard. . Implementation of Mitigation Measure GEO-5 would mitigate impacts from landslides, earthflows and rockfall by ensuring that potential risks are fully identified and appropriate and specific design measures are implemented to reduce their impacts. Under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II).

Impact GEO-5: Project would impact mineral resources.

ECO Substation Project

As stated previously, the Proposed PROJECT is in an area that has not been classified for mineral resources by the California Geological Survey and therefore has not been assigned an MRZ classification (Miller, pers. comm. 2010). There are two prospective mining sites located in close proximity to the proposed 138 kV transmission line: the Jacumba Manganese Group has a prospective manganese claim located approximately 550 feet north of the transmission line; and the Round Mountain Deposit, a prospective silica site, is located approximately 150 feet north of the transmission line. Neither of these prospective mining claims is located within the proposed ECO Substation Project 138 kV transmission line 100-foot-wide ROW. Approximately 9 acres of the ECO Substation Project's 138 kV transmission line ROW and approximately 36 acres of the ECO Substation Site and associated access roads are underlain by Quaternary alluvium, which is identified in the County Guidelines for Determining Significance for Mineral Resources as a potentially important mineral resource both mined and used in the County for construction materials (County of San Diego 2008). Development of the project would render mineral resources within the transmission line alignment right-of-way and under the Substation inaccessible to mining and recovery because these facilities would need to be protected from possible damage during mining excavation activities. Approximately 45 acres of Quaternary alluvium beneath project components would therefore not be available for mining once the project is built. This represents 0.009% of the total mapped Quaternary alluvium in San Diego County. Access to the Quaternary alluvium beneath the 138 kV transmission line is currently limited by the existing transmission line along the ROW. There are no mine sites or claims on or within close proximity to the ECO Substation site. Therefore, impacts to recovering known mineral resources as a result of the ECO Substation Project would not be adverse, and under CEQA, impacts would be considered less than significant (Class III).

Tule Wind Project

As stated previously, the Proposed PROJECT is in an area that has not been classified for mineral resources by the California Geological Survey and therefore has not been assigned an

MRZ classification (Miller, pers. comm. 2010). Mineral deposits have been found in the vicinity of the Tule Wind Project, and two active tungsten ore mines are located near proposed turbines N-7, N-8, and P-5 (Iberdrola 2010a). The project would not interfere with the active mines or cause a loss of mineral resources. Therefore, impacts to mineral resources would not be adverse, and under CEQA, impacts would be considered less than significant (Class III).

ESJ Gen-Tie Project

As stated previously, the Proposed PROJECT is in an area that has not been classified for mineral resources by the California Geological Survey and therefore has not been assigned an MRZ classification (Miller, pers. comm. 2010). The Proposed PROJECT site is underlain by Quaternary alluvium, which is identified in the County Guidelines for Determining Significance for Mineral Resources as a potentially important mineral resource that is both mined and used in the County for construction materials (County of San Diego 2008). Once built, the Proposed PROJECT would limit access to approximately 29 acres of mapped Quaternary alluvium, which represents 0.006% of the total mapped Quaternary alluvium in San Diego County. There are no mining sites or claims (active, prospective, or unknown status), located on or in close proximity to the ESJ Gen-Tie Project site (USGS 2010b). Therefore, impacts to mineral resources as a result of the proposed ESJ Gen-Tie Project would not be adverse, and under CEQA, impacts would be considered less than significant (Class III).

Proposed PROJECT

As stated previously, the Proposed PROJECT is in an area that has not been classified for mineral resources by the California Geological Survey and therefore has not been assigned an MRZ classification (Miller, pers. comm. 2010). The Campo Kumeyaay Nation operates the Campo Materials facility in the southern area of its property boundary, which is an existing sand mining and cement operation that produces ready mixed concrete, washed concrete sand, and plaster sand. Besides the Campo Materials facility, no active mining operations are within the Proposed PROJECT site. Approximately 74 acres of the Proposed PROJECT is underlain by Quaternary alluvium, which represents 0.015% of the total mapped Quaternary alluvium in San Diego County. While mineral resources and active mining claims are within the Proposed PROJECT area, the project would not interfere with the active mines. Given the proximity of the proposed Campo, Manzanita, and Jordan wind energy projects, similar soils and mineral deposits are anticipated as found on the Proposed PROJECT site. However, the potential for mineral deposits are spread throughout the entire study area and, given the intensive use of the land that comes with mining operations, only select and unique properties are found to be suitable for such an undertaking. Therefore, impacts to mineral resources as a result of the Proposed PROJECT would not be adverse, and under CEQA, impacts would be considered less than significant (Class III).

D.13.4 ECO Substation Project Alternatives

Table D.13-6summarizes identified impacts and classification of impacts under CEQA for the ECO Substation Project alternatives.

Table D.13-6
Geology, Mineral Resources, and Soils Impacts Identified for ECO Substation Project Alternatives

Impact No.	Description	Classification
ECO Substation Alternative Site		
ECO-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
ECO-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
ECO-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
ECO-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class III
ECO-GEO-5	Project would impact mineral resources.	Class III
ECO Partial Underground 138 kV Transmission Route Alternative		
ECO-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
ECO-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
ECO-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
ECO-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class III
ECO-GEO-5	Project would impact mineral resources.	Class III
ECO Highway 80 138 kV Transmission Route Alternative		
ECO-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
ECO-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
ECO-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
ECO-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class III
ECO-GEO-5	Project would impact mineral resources.	Class III
ECO Highway 80 Underground 138 kV Transmission Route Alternative		
ECO-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
ECO-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
ECO-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
ECO-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class III
ECO-GEO-5	Project would impact mineral resources.	Class III

D.13.4.1 ECO Substation Alternative Site

This alternative would not affect the impact conclusions resulting from implementation of the proposed Tule Wind and ESJ Gen-Tie projects, as discussed in Section D.13.3.3

Environmental Setting/Affected Environment

Because this alternative would only shift the proposed ECO Substation site 700 feet to the east, the geologic, mineral resources, and soils setting would be the same as described in Section D.13.1.1.

Environmental Impacts/Environmental Effects

Direct and Indirect (*Note: cumulative effects are addressed in Section F of this EIR/EIS*)

Impact GEO-1: Impacts associated with this alternative are expected to be the same as described in Section D.13.3.3 for the proposed ECO Substation Project and would be adverse but mitigated with implementation of Mitigation Measures HYD-1 and GEO-1. For this alternative, under CEQA, impacts would be significant but can be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: Because this alternative would only shift the proposed ECO Substation site 700 feet to the east, the soils on the project site are the same as described in Section D.13.1.1, and specifically, the soils for the ECO Substation's alternative location 700 feet to the east are the same as the Proposed PROJECT. As described in Section D.13.3.3, corrosive and expansive soils may exist on the site that may compromise structural integrity, and therefore, impacts would be adverse. Implementation of Mitigation Measure GEO-1 would mitigate GEO-2 impacts resulting from the ECO Substation Project. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: Adverse effects for this alternative as a result of seismically induced ground shaking and/or ground failure would be as described in Section D.13.3.3 and would be mitigated with implementation of Mitigation Measures GEO-3 and GEO-4. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-4: Impacts associated with landslides, earthflow, rockfall, and/or subsidence would not change under this alternative and would not be adverse. Under CEQA, for this alternative, the ECO Substation Project would result in a less-than-significant impact with regard to landslides, earthflow, rockfall, and/or subsidence (Class III).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, impacts would be considered less than significant (Class III).

D.13.4.2 ECO Partial Underground 138 kV Transmission Route Alternative

This alternative would not affect the impact conclusions resulting from implementation of the proposed Tule Wind and ESJ Gen-Tie projects, as discussed in Section D.13.3.3

Environmental Setting/Affected Environment

Because this alternative would only underground the proposed 138 kV transmission line between milepost 9 and the rebuilt Boulevard Substation, the existing setting would be the same as described in Section D.13.1.

Environmental Impacts/Environmental Effects

Direct and Indirect (*Note: cumulative effects are addressed in Section F of this EIR/EIS*)

Impact GEO-1: During installation of the underground portion of this alternative, trenching, in addition to grading, would expose soils and remove vegetative cover that would compromise soil structure; therefore, impacts associated with this alternative would be adverse and greater than those described for the proposed ECO Substation Project. However, implementation of Mitigation Measures HYD-1 and GEO-1 would still apply and would mitigate adverse impacts. Although under this alternative ground disturbance would be greater, Mitigation Measures HYD-1 and GEO-1 would require the preparation and implementation of an SWPPP and an Erosion Control and Sediment Transport Control Plan. These plans would ensure that proper measures would be taken wherever soils were disturbed during construction to reduce erosion and sedimentation. Such measures would be site specific and may include stabilization efforts, such as use of sediment fences, hay bales, mulching, seeding, or revegetation. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: As described in Section D.13.3.3, corrosive and expansive soils may exist on the site that may compromise structural integrity. Under this alternative, a portion of the proposed 138 kV transmission line would be installed underground rather than overhead on transmission line poles. Where the transmission line is installed underground, the soils would be in contact with the underground conduit, which is nonmetallic, not subject to corrosion, and designed to be in contact with soil. Movement of expansive soils could cause minor deflections of the conduit that would not compromise structural integrity. Therefore, under this alternative, where the transmission line is undergrounded impacts due to problematic soils would be reduced. However, where the transmission line would be installed aboveground impacts under this

alternative would be similar to those described for the proposed project, and would be adverse. Implementation of Mitigation Measure GEO-2 would mitigate adverse impacts along the aboveground route. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: Since, under this alternative, a portion of the proposed 138 kV transmission line would be installed underground rather than overhead on transmission line poles, impacts associated with seismically induced ground shaking or ground failure are reduced because underground facilities are confined to overlying soils. While impacts would be reduced, impacts to the underground portion of the transmission line are still possible due to ground failure and ground shaking and may include a break in or exposure of the transmission line. Impacts associated with the remaining portions of the ECO Substation Project remain as described in Section D.13.3.3. Therefore, under this alternative, impacts associated with ground shaking and ground failure would be adverse. However, these impacts would be mitigated with implementation of Mitigation Measures GEO-3 and GEO-4 because these measures would ensure that site-specific hazards are identified, that project designs are tailored to address such hazards, and that after each major seismic event the facility is fully inspected and any necessary repairs are made to ensure facility integrity. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

As described in Section D.13.3.3, the site does not include any known earthquake hazard zones or mapped faults; therefore, impacts due to fault rupture would not be adverse and, under CEQA, are expected to be less than significant (Class III).

Impact GEO-4: Impacts associated with landslides, earthflow, rockfall and/or subsidence would remain as described in Section D.13.3.3 for the proposed ECO Substation Project and therefore would not be adverse. Under CEQA, impacts would be considered less than significant (Class III).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, impacts would be considered less than significant (Class III).

D.13.4.3 ECO Highway 80 138 kV Transmission Route Alternative

This alternative would not affect the impact conclusions resulting from implementation of the proposed Tule Wind and ESJ Gen-Tie projects, as discussed in Section D.13.3.3.

Environmental Setting/Affected Environment

Under this alternative, a portion of the proposed 138 kV transmission line would be installed aboveground along Old Highway 80 expanding and using an existing utility ROW. All other portions of the proposed ECO Substation Project would remain as described in Section B, Project Description. The portion of Old Highway 80 where the proposed 138 kV transmission line would be installed is located in the same regional geologic setting as the proposed ECO Substation Project and as described in Sections D.13.1.1 and D.13.1.2. No active faults exist along the Old Highway 80 route. The site does not include any known earthquake hazard zones or mapped faults. However, the route is subject to ground shaking due to regional fault activity. Soils under the proposed Old Highway 80 route are similar to those for the proposed project. Soils along Old Highway 80 include Acid igneous rock land; Calpine coarse sandy loam, 5% to 9% slopes; La Posta–Sheephead complex, 30% to 65% slopes; La Posta–Sheephead complex, 9% to 30% slopes; Loamy alluvial land; Mottsville loamy coarse sand, 2% to 9% slopes; Mottsville loamy coarse sand, 9% to 15% slopes; and Tollhouse rocky coarse sandy loam, 5% to 30% slopes, eroded. The County has identified loamy alluvial land and Mottsville loamy coarse sand (MxA) 0% to 2% slopes as hydric soils subject to liquefaction risk (County of San Diego 2007). Soils along the alternative Old Highway 80 route are also severely erodible and have low expansive potential and low corrosivity. Portions of the Old Highway 80 route are located in areas designated as having >25% slopes by the County in terms of landslide susceptibility (County of San Diego 2007). Due to the area's geologic conditions, risk of subsidence is considered low.

Environmental Impacts/Environmental Effects

Direct and Indirect (*Note: cumulative effects are addressed in Section F of this EIR/EIS*)

Impact GEO-1: Impacts associated with this alternative are expected to be the same as described in Section D.13.3.3 for the proposed ECO Substation Project, with the exception of impacts associated with installation of an approximately 13-mile section of the 138 kV transmission line between the SWPL ROW and the Boulevard Substation. However, installation of the 138 kV transmission line along Old Highway 80 would reduce the length of the transmission line by 2.7 miles. Installation of the 138 kV transmission line along Old Highway 80 would generally be alongside an existing transmission line route and would therefore require a reduced amount of grading and ground disturbance. However, grading would still be necessary and would expose soils and remove vegetative cover that would compromise soil structure; therefore, impacts would remain adverse. Implementation of Mitigation Measures HYD-1 and GEO-1 would mitigate soil erosion impacts. Under CEQA, impacts would remain significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: As stated previously, soils along this alternative Highway 80 route are similar to the proposed project's soils and are considered severely erodible and have low expansive potential and low corrosivity. As described in Section D.13.3.3, corrosive and expansive soils may compromise structural integrity by breaking down steel or concrete, or by exerting pressure on the soil through expansion. Therefore, impacts would be adverse. Implementation of Mitigation Measure GEO-2 would mitigate impacts resulting from problematic soils at the ECO Substation Project site. Under CEQA, impacts would remain significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: The ECO Substation Project site and the alternative Old Highway 80 route are not located in the immediate vicinity of an active fault. Compared to the proposed ECO Substation Project, this alternative would also be subject to relatively strong seismic shaking due to earthquakes. Portions of the project that would follow the Old Highway 80 Route would be located in a County-designated liquefaction zone (due to loamy alluvial land on site) and have slopes of >25% for landslide susceptibility. Therefore, impacts associated with seismically induced ground shaking or ground failure for this alternative would be adverse and greater than those described in Section D.13.3.3. However, these impacts would be mitigated with implementation of Mitigation Measures GEO-3 and GEO-4 because these measures would ensure that site-specific hazards are identified, that project designs are tailored to address such hazards, and that after each major seismic event the facility is fully inspected and any necessary repairs are made to ensure facility integrity. Under CEQA, impacts would remain significant but would be mitigated to a level that is considered less than significant (Class II).

As described in Section D.13.3.3, the site does not include any known earthquake hazard zones or mapped faults; therefore, impacts due to fault rupture would not be adverse. Under CEQA, impacts relating to known earthquake hazard zones or mapped faults are considered to be less than significant (Class III).

Impact GEO-4: Impacts associated with landslides, earthflow, rockfall, and/or subsidence would not change under this alternative and would not be adverse. Under this alternative, the 138 kV transmission line would also cross areas of more steeply sloping terrain (areas designated as having slopes of less than 25% by the County Guidelines for Determining Significance for Geologic Hazards (County of San Diego 2007)); however, areas impacted by the construction of the 138 kV transmission line along Old Highway 80 would typically only be 50 feet by 50 feet in size and, if applicable, the foundation design of the transmission structures would be developed to minimize risks associated with slope failure or instability. Therefore, under CEQA for this alternative, the ECO Substation Project impacts with regard to landslides, earthflow rockfall, and/or subsidence would be considered less than significant (Class III).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, impacts would be considered less than significant (Class III).

D.13.4.4 ECO Highway 80 Underground 138 kV Transmission Route Alternative

This alternative would not affect the impact conclusions resulting from implementation of the proposed Tule Wind and ESJ Gen-Tie projects, as discussed in Section D.13.3.3

Environmental Setting/Affected Environment

Section D.13.4.3 describes the existing setting associated with the Old Highway 80 138 kV Transmission Route Alternative. Because this alternative would only underground the alternate 138 kV transmission line, the existing setting would be the same as described in Section D.13.4.3. However, it should be noted that based on existing topography and a preliminary slope analysis of the route, Alternative ECO Highway 80 contains grades that exceed the maximum allowable slope (12%) for undergrounding transmission lines. At these locations (three short segments of the alignment), additional ROW, horizontal directional drilling, and other construction considerations could be implemented to avoid slope issues.

Environmental Impacts/Environmental Effects

Direct and Indirect (*Note: cumulative effects are addressed in Section F of this EIR/EIS*)

Impact GEO-1: Impacts associated with this alternative are expected to be the same as described in Section D.13.3.3 for the proposed ECO Substation Project, with the exception of impacts associated with installation of an approximately 13-mile section of the 138 kV transmission line between the SWPL ROW and the Boulevard Substation. Under this alternative, installation of the 138 kV transmission line underground along Old Highway 80 would reduce the length of the transmission line by 2.7 miles. Installation of the 138 kV transmission line along Old Highway 80 would generally be alongside an existing transmission line route. During installation of the underground portion of this alternative, trenching, in addition to grading, would expose soils and remove vegetative cover that would compromise soil structure. Therefore, impacts associated with this alternative would be adverse and would be greater than those described for the proposed ECO Substation Project. As described for the ECO Substation Project in Section D.13.3.3, implementation of Mitigation Measures HYD-1 and GEO-1 would apply and would mitigate impacts. Although under this alternative ground disturbance would be greater, Mitigation Measures HYD-1 and GEO-1 would require through the preparation and implementation of an SWPPP and an Erosion Control and Sediment Transport Control Plan that measures will be taken wherever soils would be disturbed during construction to reduce erosion and sedimentation. Such measures would be site specific and may include stabilization efforts,

such as use of sediment fences, hay bales, mulching, seeding, or revegetation. Where greater than 12% slopes exist along the proposed underground transmission line (three short segments), additional ROW, horizontal directional drilling, and other construction considerations would be implemented to avoid slope issues. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: As described in Section D.13.4.3, corrosive and expansive soils exist on the site that may compromise structural integrity. Under this alternative, a portion of the proposed 138 kV transmission line would be installed underground rather than overhead on transmission line poles. Where the transmission line is installed underground, the soils would be in contact with the underground conduit, which is nonmetallic, not subject to corrosion, and designed to be in contact with soil. Movement of expansive soils could cause minor deflections of the conduit that would not compromise structural integrity. Therefore, under this alternative, where the transmission line is undergrounded impacts due to problematic soils would be reduced. However, where the transmission line would be installed aboveground impacts under this alternative would be similar to those described for the proposed project, and would be adverse. Implementation of Mitigation Measure GEO-2 would mitigate adverse impacts along the aboveground route. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: Compared to the proposed ECO Substation Project, this alternative would also be subject to relatively strong seismic shaking due to earthquakes. Portions of the project that would follow the Old Highway 80 Route would be located in a County-designated liquefaction zone (due to loamy alluvial land on site). Since, under this alternative, a portion of the proposed 138 kV transmission line would be installed underground rather than overhead, seismically induced ground shaking or ground failure impacts would be reduced but would remain adverse. Impacts associated with seismically induced ground shaking or ground failure are reduced because underground facilities are confined to overlying soils. While impacts would be reduced, impacts to the underground portion of the transmission line are still possible due to ground failure and ground shaking and may include a break in, or exposure of, the transmission line. These impacts would be mitigated with implementation of Mitigation Measures GEO-3 and GEO-4 because these measures would ensure that site-specific hazards are identified, that project designs are tailored to address such hazards, and that after each major seismic event the facility is fully inspected and any necessary repairs are made to ensure facility integrity. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

As described in Section D.13.4.3, the site does not include any known earthquake hazard zones or mapped faults; therefore, impacts due to fault rupture would not be adverse and, under CEQA, are expected to be less than significant (Class III).

Impact GEO-4: Under this alternative, risks to transmission lines or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence remain adverse but are reduced by placing a portion of the proposed transmission line underground. Impacts associated with landslides, earthflow, rockfall, and/or subsidence would remain as described for the remaining portions of the proposed ECO Substation Project. Under CEQA, for this alternative, the ECO Substation Project impacts would be considered less than significant with regard to landslides, earthflow, and/or rockfall (Class III).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, for this alternative, impacts would be considered less than significant (Class III).

D.13.5 Tule Wind Project Alternatives

Table D.13-7 summarizes the impacts and classifications of impacts under CEQA that have been identified for the Tule Wind Project alternatives.

Table D.13-7
Geology, Mineral Resources, and Soils Impacts Identified for Tule Wind Project Alternatives

Impact No.	Description	Classification
Tule Wind Alternative 1, Gen-Tie Route 2 with Collector Substation/O&M Facility on Rough Acres Ranch		
Tule-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
Tule-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
Tule-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
Tule-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class II
Tule-GEO-5	Project would impact mineral resources.	Class III
Tule Wind Alternative 2, Gen-Tie Route 2 Underground with Collector Substation/O&M Facility on Rough Acres Ranch		
Tule-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
Tule-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
Tule-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
Tule-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class II

Table D.13-7 (Continued)

Impact No.	Description	Classification
Tule-GEO-5	Project would impact mineral resources.	Class III
Tule Wind Alternative 3, Gen-Tie Route 3 with Collector Substation/O&M Facility on Rough Acres Ranch		
Tule-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
Tule-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
Tule-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
Tule-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class II
Tule-GEO-5	Project would impact mineral resources.	Class III
Tule Wind Alternative 4, Gen-Tie Route 3 Underground with Collector Substation/O&M Facility on Rough Acres Ranch		
Tule-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
Tule-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
Tule-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
Tule-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class II
Tule-GEO-5	Project would impact mineral resources.	Class III
Tule Wind Alternative 5, Reduction in Turbines		
Tule-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
Tule-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
Tule-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
Tule-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class II
Tule-GEO-5	Project would impact mineral resources.	Class III

D.13.5.1 Tule Wind Alternative 1, Gen-Tie Route 2 with Collector Substation/O&M Facility on Rough Acres Ranch

Implementation of this alternative would not affect the impact conclusions identified in Section D.13.3.3 for the proposed ECO Substation and ESJ Gen-Tie projects.

Environmental Setting/Affected Environment

Under this alternative, the Tule Wind Project's collector substation and O&M facility would be relocated from BLM-administered land in the McCain National Cooperative Land and Wildlife Management Area to County of San Diego jurisdictional land on Rough Acres Ranch. Proposed turbines would be located in the same location as identified in the proposed Tule Wind Project. The relocation of the collector substation and O&M facility to Rough Acres Ranch,

approximately 5 miles south of the originally proposed site, would result in a shorter proposed 138 kV transmission line route and a longer overhead cable collector system, as described in Section C.4.2.1, Tule Alternative Gen-Tie Route 2 with Collector Substation/O&M Facility on Rough Acres Ranch.

The relocated collector substation and O&M facility would be located in the same geologic setting as the proposed Tule Wind Project (see Sections D.13.1.1 and D.13.1.3). No active faults exist in the immediate area of this alternative project site. Soils beneath the alternative Rough Acres Ranch facility are La Posta rocky, loamy coarse sand; 5% to 30% slopes; eroded and severely erodible; and have low expansive potential and low corrosivity.

Environmental Impacts/Environmental Effects

Direct and Indirect *(Note: cumulative effects are addressed in Section F of this EIR/EIS)*

Impact GEO-1: Impacts associated with this alternative are expected to be similar to but slightly greater than those described for the proposed Tule Wind Project in Section D.13.3.3. This alternative would result in an increase in the length of the 34.5 kV overhead collector lines to connect the wind turbines to the substation, from 9.4 miles (proposed) to 17 miles, and would increase the amount of collector line poles from 250 to 452 poles. However, as a result of this alternative, the underground collector lines would decrease in distance from 29.3 miles (proposed) to 28.9 miles, the 138 kV transmission line would decrease in distance from 9.7 miles (proposed) to 3.8 miles, and the amount of transmission line poles would decrease from 116 poles (proposed) to 44 poles. Under this alternative, the 138 kV transmission line would run from the alternate collector substation approximately 1 mile east, south along McCain Valley Road, and then west along Old Highway 80, until connecting to the proposed Boulevard Substation rebuild component of the ECO Substation Project. Impacts under this alternative would therefore be similar to and slightly greater than those for the proposed project and would be mitigated with implementation of Mitigation Measures HYD-1 and GEO-1. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: As described in Section D.13.3.3, corrosive and expansive soils may exist on the site and may compromise the integrity of steel and concrete structures. Moving the collector substation, O&M facility, and related transmission lines to the alternative sites would not reduce the risk associated with problematic soils. Therefore, impacts would remain adverse under this alternative, and implementation of Mitigation Measure GEO-2 would mitigate GEO-2 impacts resulting from the Tule Wind Project. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: As described previously, the relocated collector substation and O&M facility would be located in the same geologic setting as the proposed Tule Wind Project and would therefore be subject to relatively strong seismic shaking due to earthquakes, fault rupture, liquefaction, and subsidence. Adverse effects for this alternative would be as described for the proposed Tule Wind Project in Section D.13.3.3 and would be mitigated with implementation of Mitigation Measures GEO-3 and GEO-4. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-4: Under this alternative, the Tule Wind Project would be located in an area with similar topography, and the risk of landslide and subsidence due to mines would remain adverse as described in Section D.13.3.3 for the proposed Tule Wind project. Implementation of Mitigation Measures GEO-5 and HYD-3 would mitigate impacts associated with the risk of landslides and subsidence due to mines and local groundwater use during construction. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, impacts would be considered less than significant (Class III).

D.13.5.2 Tule Wind Alternative 2, Gen-Tie Route 2 Underground with Collector Substation/O&M Facility on Rough Acres Ranch

Implementation of this alternative would not affect the impact conclusions identified in Section D.13.3.3 for the proposed ECO Substation and ESJ Gen-Tie projects.

Environmental Setting/Affected Environment

Section D.13.5.1 describes the existing setting associated with the relocation of the collector substation and O&M facility to Rough Acres Ranch and the subsequent shortened 138 kV transmission line route and extended collector cable system. However, it should be noted that based on existing topography and a preliminary slope analysis of the route, Alternative Gen-Tie Route 2 contains grades that exceed the maximum allowable slope (12%) for undergrounding transmission lines. At these locations (two short segments of the alignment), additional ROW, horizontal directional drilling, and other construction considerations could be implemented to avoid slope issues.

Environmental Impacts/Environmental Effects

Direct and Indirect *(Note: cumulative effects are addressed in Section F of this EIR/EIS)*

Impact GEO-1: Impacts associated with this alternative are expected to be similar to but greater than those described for the proposed Tule Wind Project in Section D.13.3.3. Grading during construction would expose soil to erosion by removing the vegetative cover and compromising the soil structure. Installation of the 138 kV transmission line underground as described under this alternative would increase the potential for soil erosion due to the additional trenching required. Under this alternative, ground disturbance would be adverse and greater than the proposed Tule Wind Project. Implementation of Mitigation Measures HYD-1 and GEO-1 would mitigate for these impacts by requiring the preparation and implementation of an SWPPP and an Erosion Control and Sediment Transport Control Plan. These plans would ensure that proper measures would be taken wherever soils were disturbed during construction to reduce erosion and sedimentation. Such measures would be site specific and may include stabilization efforts, such as use of sediment fences, hay bales, mulching, seeding, or revegetation. Where greater than 12% slopes exist along the proposed underground transmission line (two short segments), additional ROW, horizontal directional drilling, and other construction considerations would be implemented to avoid slope issues. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: Under this alternative, the location of the collector substation, O&M facility, and related aboveground and belowground transmission lines would be located in alternative locations, but in similar geologic conditions. Under this alternative, the proposed 138 kV transmission line would be installed underground rather than overhead on transmission line poles. Where the transmission line is installed underground, the soils would be in contact with the underground conduit, which is nonmetallic, not subject to corrosion, and designed to be in contact with soil. Movement of expansive soils could cause minor deflections of the conduit that would not compromise structural integrity. Therefore, under this alternative, where the transmission line is undergrounded impacts due to problematic soils would be reduced. However, where other project facilities would be installed aboveground impacts under this alternative would be similar to those described for the proposed project, and would be adverse. Implementation of Mitigation Measure GEO-2 would mitigate adverse impacts along the aboveground route. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.

The relocated collector substation and O&M facility would be located in the same geologic setting as the proposed Tule Wind Project and would therefore be subject to relatively strong seismic shaking due to earthquakes, fault rupture, and liquefaction. Ground shaking and/or ground failure impacts to the 138 kV transmission line would be reduced because underground facilities are confined to overlying soils. While impacts would be reduced, impacts to the underground portion of the transmission line are still possible due to ground failure and ground shaking and may include a break in or exposure of the transmission line. Impacts associated with the remaining portions of the Tule Wind Project remain as described in Section D.13.3.3. Therefore, under this alternative, impacts associated with ground shaking and ground failure would be adverse and would be mitigated with implementation of Mitigation Measures GEO-3 and GEO-4. Under CEQA, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

As described previously in Section D.13.3.3, the site does not include any known earthquake hazard zones or mapped faults, and therefore, impacts due to fault rupture would not be adverse. Under CEQA, impacts relating to fault rupture would be considered less than significant.

Impact GEO-4: Under this alternative, the Tule Wind Project's collector substation/O&M facility and transmission lines would also be located in areas of flat to steeply sloping terrain that may be prone to landslides or slope failure. While the risk to the 138 kV transmission line would be reduced by placing the line underground, potential impacts are considered adverse. Implementation of Mitigation Measure GEO-5 would mitigate this impact. Impacts associated with the remaining portions of the Tule Wind Project remain as described in Section D.13.3.3 and would also be adverse but would be mitigated with implementation of Mitigation Measure GEO-5 (Class II). Under CEQA, for this alternative, impacts would remain significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, impacts would be considered less than significant (Class III).

D.13.5.3 Tule Wind Alternative 3, Gen-Tie Route 3 with Collector Substation/O&M Facility on Rough Acres Ranch

Implementation of this alternative would not affect the impact conclusions identified in Section D.13.3.3 for the proposed ECO Substation and ESJ Gen-Tie projects.

Environmental Setting/Affected Environment

Under this alternative, the Tule Wind Project's collector substation and O&M facility would be relocated from BLM-administered land in the McCain National Cooperative Land and Wildlife

Management Area to County jurisdictional land on Rough Acres Ranch. Proposed turbines would be located in the same location as identified in the proposed Tule Wind Project. The relocation of the collector substation and O&M facility to Rough Acres Ranch would result in a shorter proposed 138 kV transmission line route (approximately 5.4 miles vs. the proposed 9.7 miles) and a longer overhead cable collector system as described in Section C.4.2.4, Tule Alternative Gen-Tie Route 3 Underground with Collector Substation/O&M Facility on Rough Acres Ranch.

The alternative gen-tie route 3 and alternative collector substation and O&M facility site would be located in the same geologic setting as the proposed Tule Wind Project (see Sections D.13.1.1 and D.13.1.3). Soils beneath the alternative gen-tie route 3 are La Posta loamy coarse sand, 5 to 30 percent slopes, eroded; La Posta rocky loamy coarse sand, 5 to 30 percent slopes, eroded; Loamy alluvial land; Mottsville loamy coarse sand, 2 to 9 percent slopes; and Tollhouse rocky coarse sandy loam, 5 to 30 percent slopes, eroded. Soils beneath the alternative Rough Acres Ranch facility are La Posta rocky loamy coarse sand, 5% to 30% slopes, eroded. All of these soils are also beneath the Proposed Tule Wind Project site, and are severely erodible, and have low expansive potential and low corrosivity.

Environmental Impacts/Environmental Effects

Direct and Indirect *(Note: cumulative effects are addressed in Section F of this EIR/EIS)*

Impact GEO-1: Impacts associated with this alternative are expected to be similar to those described in Section D.13.5.1 for the Alternative Gen-Tie Route 2 with Collector Substation/O&M Facility on Rough Acres Ranch, with the exception that the proposed 138 kV transmission line would, as shown in Figure C-2, run from the alternate collector substation approximately 3 miles west to Ribbonwood Road, continue south along Ribbonwood Road, and then east along Old Highway 80, until connecting to the proposed Boulevard Substation rebuild component of the ECO Substation Project. As a result of this alternative, the 138 kV transmission line would decrease in distance from 9.7 miles (proposed) to 5.4 miles. Additionally, under this alternative, transmission line poles would decrease from 116 poles (proposed) to 60 poles. However, moving the O&M and collector substation facilities to this alternative location would result in an increase in the length of the 34.5 kV overhead collector lines that connect the wind turbines to the substation, from 9.4 miles (proposed) to 17 miles, and would increase the amount of collector line poles from 250 to 452 poles. In summary, this alternative would increase the potential for erosion due to construction related activities and result in adverse impacts. These impacts would be mitigated with implementation of Mitigation Measures HYD-1 and GEO-1. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: As described in Section D.13.3.3, corrosive and expansive soils may exist on the site and may compromise structural integrity of steel and cement components. Moving the collector substation, O&M facility, and related transmission lines to the alternative sites would not reduce the risk associated with problematic soils, and therefore, impacts would remain adverse. Implementation of Mitigation Measure GEO-2 would mitigate GEO-2 impacts resulting from the Tule Wind Project. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: As described previously, the relocated collector substation and O&M facility would be located in the same geologic setting as the proposed Tule Wind Project and would therefore be subject to relatively strong seismic shaking due to earthquakes, fault rupture, liquefaction, and subsidence. Effects for this alternative would be as described for the proposed Tule Wind Project in Section D.13.3.3, and they would be adverse but mitigated with implementation of Mitigation Measures GEO-3 and GEO-4. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-4: Under this alternative, the Tule Wind Project would be located in an area with similar topography, and the risk of landslide and subsidence due to steep slopes, mines, and groundwater withdrawal would be adverse, as described in Section D.13.3.3 for the proposed Tule Wind Project. Implementation of Mitigation Measures GEO-5 and HYD-3 would mitigate the risk from landslides and subsidence. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, for this alternative, impacts would be considered less than significant (Class III).

D.13.5.4 Tule Wind Alternative 4, Gen-Tie Route 3 Underground with Collector Substation/O&M Facility on Rough Acres Ranch

Implementation of this alternative would not affect the impact conclusions identified in Section D.13.3.3 for the proposed ECO Substation and ESJ Gen-Tie projects.

Environmental Setting/Affected Environment

Because this alternative would underground the 138 kV transmission line along the alternative approximately 5.4 mile route, the existing setting would be the same as described in Section D.13.5.3. However, it should be noted that based on existing topography and a preliminary slope analysis of the route, Alternative Gen-Tie Route 3 contains grades that exceed the maximum allowable slope (12%) for undergrounding transmission lines. At these locations (three short

segments of the alignment), additional ROW, horizontal directional drilling, and other construction considerations could be implemented to avoid slope issues.

Environmental Impacts/Environmental Effects

Direct and Indirect (*Note: cumulative effects are addressed in Section F of this EIR/EIS*)

Impact GEO-1: Impacts associated with this alternative are expected to be similar to but greater than those described in Section D.13.3.3 for the proposed Tule Wind Project and would therefore be adverse. Grading during construction would expose soil to erosion by removing the vegetative cover and compromising the soil structure. Installation of the 138 kV transmission line underground along a 5.4 mile segment as described under this alternative would increase the potential for soil erosion due to the additional trenching required. While under this alternative ground disturbance would be greater than under the proposed Tule Wind Project, Mitigation Measures HYD-1 and GEO-1 would mitigate for these impacts by requiring the preparation and implementation of an SWPPP and an Erosion Control and Sediment Transport Control Plan. These plans would ensure that proper measures would be taken wherever soils were disturbed during construction to reduce erosion and sedimentation. Such measures would be site specific and may include stabilization efforts, such as use of sediment fences, hay bales, mulching, seeding, or revegetation. Where greater than 12% slopes exist along the proposed underground transmission line (three short segments), additional ROW, horizontal directional drilling, and other construction considerations would be implemented to avoid slope issues. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: Under this alternative, the location of the collector substation, O&M facility, and related aboveground and belowground transmission lines would be located in alternative locations but in similar geologic conditions. Where the transmission line is installed underground, the soils would be in contact with the underground conduit, which is nonmetallic, not subject to corrosion, and designed to be in contact with soil. Movement of expansive soils could cause minor deflections of the conduit that would not compromise structural integrity. Therefore, under this alternative, where the transmission line is undergrounded impacts due to problematic soils would be reduced. However, impacts associated with other project facilities under this alternative would be similar to those described for the proposed project, and would be adverse.

Therefore, impacts under this alternative would be as described in Section D.13.3.3 for the proposed Tule Wind Project and would remain adverse. Implementation of Mitigation Measure GEO-2 would mitigate for impacts relating to problematic soils. Under CEQA, for this

alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: As with the proposed Tule Wind Project described previously in Section D.13.3.3, under this alternative one potentially active fault transects the project area near turbines Q1 and Q2 (Iberdrola 2010b). Impacts relating to fault rupture in this area would be adverse; therefore, Mitigation Measures GEO-3 and GEO-4 have been provided that would mitigate for impacts associated with potential fault rupture because they would ensure that the project adhere to all applicable engineering design and construction codes that would reduce adverse effects resulting from fault rupture both during construction and operational phase. Under CEQA, impacts relating to fault rupture on the site would be significant but can be mitigated to a level that is considered less than significant (Class II).

The relocated collector substation and O&M facility would be located in the same geologic setting as the proposed Tule Wind Project and would therefore be subject to strong seismic shaking due to earthquakes, fault rupture, and liquefaction. Ground shaking and/or ground failure impacts to the 138 kV transmission line would be reduced because underground facilities are confined to overlying soils. While impacts would be reduced, impacts to the underground portion of the transmission line are still possible due to ground failure and ground shaking and may include a break in or exposure of the transmission line. Impacts associated with the remaining portions of the Tule Wind Project remain as described in Section D.13.3.3. Therefore, under this alternative, impacts associated with ground shaking and ground failure would be adverse and would be mitigated with implementation of Mitigation Measures GEO-3 and GEO-4. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-4: Under this alternative, the Tule Wind Project's collector substation/O&M facility and transmission lines would also be located in areas of flat to steeply sloping terrain that may be prone to landslides or slope failure. While the risk to the 138 kV transmission line would be reduced by placing the line underground, potential impacts would remain adverse. Implementation of Mitigation Measure GEO-5 would mitigate these impacts. Impacts associated with the remaining portions of the Tule Wind Project remain as described in Section D.13.3.3 and would be mitigated with implementation of Mitigation Measures GEO-5 and HYD-3. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, for this alternative, impacts would be considered less than significant (Class III).

D.13.5.5 Tule Wind Alternative 5, Reduction in Turbines

This alternative would not affect the impact conclusions resulting from the implementation of the proposed ECO Substation and ESJ Gen-Tie projects, as discussed in Section D.13.3.3.

Environmental Setting/Affected Environment

Under this alternative, 62 of the proposed 134 turbines associated with the Tule Wind Project would be removed. Eleven of the turbines would be removed from private land along the eastern project boundary, adjacent to the BLM Area of Critical Environmental Concern (ACEC); and 51 turbines would be removed adjacent to wilderness areas on the western side of the project. The 51 turbine locations proposed for removal in the western project area are generally located in an area with steeper slopes than the other remaining turbine locations, and are in an area of past mining operations. Turbine locations Q1 and Q2, which would be eliminated under this alternative, are near a potentially active fault line. No other turbine locations are near potentially active or active fault lines. The other turbine locations that would be eliminated under this alternative along the eastern project boundary have geologic features that are similar to the remaining turbine locations under this alternative. Therefore, the environmental setting for this alternative would be similar to that identified for the proposed Tule Wind Project in Section D.13.1, with the exception of removed turbines and certain geologic hazards associated with the eliminated turbines (steep slopes, past mining operations, and a potentially active fault line).

Environmental Impacts/Environmental Effects

Direct and Indirect (*Note: cumulative effects are addressed in Section F of this EIR/EIS*)

Impact GEO-1: Under this alternative, ground-disturbing impacts associated with the Tule Wind Project would be less than those described in Section D.13.3.3 due to a reduction in the concrete pads that would otherwise be excavated and built and the access roads and collector transmission lines to these turbines, and avoidance of areas with steeper slopes along the proposed project's western boundary. However, impacts associated with the remaining project components would remain adverse and would be mitigated with implementation of Mitigation Measures HYD-1 and GEO-1. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: Under this alternative, impacts associated with the Tule Wind Project would be reduced at the locations where the turbines and associated collector lines would not be built, but impacts would remain as described in Section D.13.3.3 for the remaining project components. They would be adverse and would be mitigated with implementation of Mitigation Measure GEO-2. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: Under this alternative, impacts associated with the Tule Wind Project would be reduced at the locations where the turbines and associated access roads and collector lines would not be built, including turbine locations Q1 and Q2 near a potentially active fault. Impacts related to seismic events would be less than those discussed for the proposed project. However, impacts to the remaining project components under this alternative would be as described in Section D.13.3.3. Impacts would be adverse and would be mitigated with implementation of Mitigation Measures GEO-2, GEO-3 and GEO-4. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-4: Under this alternative, impacts associated with the Tule Wind Project would be reduced at the locations where the turbines and associated access roads and collector lines would not be built. Under this alternative, risks of landslides, earthflows, and rockfall are reduced due to the elimination of turbine locations within steeper slope areas, and risks of subsidence are reduced due to the elimination of turbine locations in an area of past mining operations. Under this alternative impacts as described in Section D.13.3.3 would be reduced. However, for the remaining project, impacts would be adverse, and would be mitigated with implementation of Mitigation Measure GEO-5. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. The proposed Tule Wind Project is in an area that has not been classified for mineral resources by the California Geological Survey and therefore has not been assigned an MRZ classification (Miller, pers. comm. 2010). Mineral deposits have been found in the vicinity of the Tule Wind Project. Two active tungsten ore mines are located near proposed turbines N7, N8, and P5 (Iberdrola 2010a). The project would not interfere with the active mines or cause a loss of mineral resources. Therefore, impacts to mineral resources would not be adverse. Under CEQA, impacts would be considered less than significant (Class III).

D.13.6 ESJ Gen-Tie Project Alternatives

Table D.13-8 summarizes impacts and classifications of the impacts under CEQA identified for the ESJ Gen-Tie Project alternatives.

Table D.13-8
Geology, Mineral Resources, and Soils Impacts
Identified for ESJ Gen-Tie Project Alternatives

Impact No.	Description	Classification
ESJ 230 kV Gen-Tie Underground Alternative		
ESJ-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
ESJ-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class III
ESJ-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
ESJ-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class III
ESJ-GEO-5	Project would impact mineral resources.	Class III
ESJ Gen-Tie Overhead Alternative Alignment		
ESJ-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
ESJ-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class II
ESJ-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
ESJ-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class III
ESJ-GEO-5	Project would impact mineral resources.	Class III
ESJ Gen-Tie Underground Alternative Alignment		
ESJ-GEO-1	Erosion would be triggered or accelerated due to construction activities.	Class II
ESJ-GEO-2	Project would expose people or structures to potential substantial adverse effects as a result of problematic soils.	Class III
ESJ-GEO-3	Project would expose people or structures to potential substantial adverse effects as a result of seismically induced ground shaking, ground failure, or fault rupture.	Class II
ESJ-GEO-4	Project would expose people or structures to potential substantial adverse effects as a result of landslides, earthflows, rockfall, and/or subsidence.	Class III
ESJ-GEO-5	Project would impact mineral resources.	Class III

D.13.6.1 ESJ 230 kV Gen-Tie Underground Alternative

This alternative would not affect the impact conclusions resulting from implementation of the proposed ECO Substation and Tule Wind projects, as discussed in Section D.13.3.3.

Environmental Setting/Affected Environment

Section D.13.1.4 describes the existing setting associated with the ESJ Gen-Tie Project, which considers both a 500 kV gen-tie and a 230 kV gen-tie option. Because this alternative would select and construct the 230 kV gen-tie underground, the existing setting would be the same as described in Section D.13.1.

Environmental Impacts/Environmental Effects

Direct and Indirect (*Note: cumulative effects are addressed in Section F of this EIR/EIS*)

Impact GEO-1: During installation of the underground portion of this alternative, trenching, in addition to grading, would expose soils and remove vegetative cover that would compromise soil structure; therefore, impacts associated with this alternative would be adverse and greater than those described for the proposed ESJ Gen-Tie Project. Although under this alternative ground disturbance would be greater, Mitigation Measures HYD-1 and GEO-1 would mitigate for erosion impacts by requiring the preparation and implementation of an SWPPP and an Erosion Control and Sediment Transport Control Plan. These plans would ensure that proper measures would be taken wherever soils were disturbed during construction to reduce erosion and sedimentation. Such measures would be site specific and may include stabilization efforts, such as use of sediment fences, hay bales, mulching, seeding, or revegetation. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: With the transmission line installed underground, the soils would be in contact with the underground conduit, which is nonmetallic, not subject to corrosion, and designed to be in contact with soil. Movement of expansive soils could cause minor deflections of the conduit that would not compromise structural integrity. Therefore, under this alternative, impacts from problematic soils would not be adverse and under CEQA, impacts would be considered less than significant (Class III).

Impact GEO-3: Since, under this alternative, the proposed 230 kV transmission line would be installed underground rather than overhead on transmission line poles, impacts associated with seismically induced ground shaking or ground failure are reduced because underground facilities are confined to overlying soils. While impacts would be reduced, impacts to the underground portion of the transmission line are still possible due to ground failure and ground shaking and may include a break in or exposure of the transmission line. Therefore, under this alternative, impacts associated with ground shaking and ground failure would be adverse and would be mitigated with implementation of Mitigation Measures GEO-3 and GEO-4. Under CEQA, for this alternative, impacts relating to ground shaking or ground failure would be significant but would be mitigated to a level that is considered less than significant (Class II).

As described in Section D.13.3.3, the site does not include any known earthquake hazard zones or mapped faults, and therefore, impacts due to fault rupture would not be adverse. Under CEQA, for this alternative, impacts relating to fault rupture would be considered less than significant (Class III).

Impact GEO-4: As described in Section D.13.3.3, the ESJ Gen-Tie Project site is not within a ~~"~~Landslide Susceptibility Area," as identified in the County Guidelines for Determining Significance for Geologic Hazards (County of San Diego 2007), and is in a gently sloping area. Since the project is not located within an identified Landslide Susceptibility Area, the geologic environment has a low probability to become unstable, and the project is not proposing to extract significant amounts of groundwater from the project site. Under this project alternative, the project would not cause an adverse impact from the exposure of people or structures to potential landslides, earthflows, rockfall, and/or subsidence. Under CEQA, for this alternative, impacts would be considered less than significant (Class III).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, for this alternative, impacts would be considered less than significant (Class III).

D.13.6.2 ESJ Gen-Tie Overhead Alternative Alignment

This alternative would not affect the impact conclusions resulting from implementation of the proposed Tule Wind Project as discussed in Section D.13.3.3. This alternative assumes the implementation of the ECO Substation Alternative Site and that the geology, mineral resource, and soil impacts identified in Section D.13.4.1 (ECO Substation Alternative Site) would occur.

Environmental Setting/Affected Environment

Section D.13.1.2 describes the existing setting associated with the ESJ Gen-Tie Project, which considers both a 500 kV gen-tie and a 230 kV gen-tie option. This alternative would shift the project approximately 700 feet to the east, where the existing geologic setting would be the same as described in Section D.13.1.

Environmental Impacts/Environmental Effects

Direct and Indirect (*Note: cumulative effects are addressed in Section F of this EIR/EIS*)

Impact GEO-1: Impacts associated with this alternative would be the same as those described for the proposed ESJ Gen-Tie Project and would be adverse. Therefore, as described for the ESJ Gen-Tie Project in Section D.13.3.3, implementation of Mitigation Measures HYD-1 and GEO-1 would mitigate impacts related to erosion from construction activities. Under CEQA, for this alternative, impacts relating to erosion due to construction activities would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: As described in Section D.13.3.3, corrosive and expansive soils may exist on the site that may compromise structural integrity and therefore cause adverse impacts. Implementation of Mitigation Measure GEO-2 would mitigate GEO-2 impacts resulting from the

ESJ Gen-Tie Project. Under CEQA, for this alternative, impacts resulting from problematic soils would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-3: Under this alternative, impacts associated with the ESJ Gen-Tie Project would be as described in Section D.13.3.3; they would be adverse and would be mitigated with implementation of Mitigation Measures GEO-3 and GEO-4. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-4: As described in Section D.13.3.3, the ESJ Gen-Tie Project site is not within a "Landslide Susceptibility Area," as identified in the County Guidelines for Determining Significance for Geologic Hazards (County of San Diego 2007), and is in a gently sloping area. Since the project is not located within an identified Landslide Susceptibility Area, the geologic environment has a low probability to become unstable, and the project is not proposing to extract significant amounts of groundwater from the project site. Under this alternative, the project would not cause an adverse impact from the exposure of people or structures to potential adverse effects from landslides, earthflows, rockfall, and/or subsidence. Under CEQA, for this alternative, impacts would be considered less than significant (Class III).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, for this alternative, impacts would be considered less than significant (Class III).

D.13.6.3 ESJ Gen-Tie Underground Alternative Alignment

This alternative would not affect the impact conclusions resulting from implementation of the proposed ECO Substation and Tule Wind projects, as discussed in Section D.13.3.3. This alternative assumes the implementation of the ECO Substation Alternative Site and that the geology, mineral resource, and soil impacts identified in Section D.13.4.1 (ECO Substation Alternative Site) would occur.

Environmental Setting/Affected Environment

Section D.13.1.2 describes the existing setting associated with the ESJ Gen-Tie. This alternative would shift the proposed 230 kV gen-tie alignment approximately 700 feet to the east, where the existing setting would be the same as described in Section D.13.1.

Environmental Impacts/Environmental Effects

Direct and Indirect (*Note: cumulative effects are addressed in Section F of this EIR/EIS*)

Impact GEO-1: During installation of the underground portion of this alternative, trenching, in addition to grading, would expose soils and remove vegetative cover that would compromise soil structure; therefore, impacts associated with this alternative would be greater than those described for the proposed ESJ Gen-Tie Project. Although under this alternative ground disturbance would be greater, Mitigation Measures HYD-1 and GEO-1 would require the preparation and implementation of an SWPPP and an Erosion Control and Sediment Transport Control Plan. These plans would ensure that proper measures would be taken wherever soils were disturbed during construction to reduce erosion and sedimentation. Such measures would be site specific and may include stabilization efforts, such as use of sediment fences, hay bales, mulching, seeding, or revegetation. Under CEQA, for this alternative, impacts would be significant but would be mitigated to a level that is considered less than significant (Class II).

Impact GEO-2: With the transmission line is installed underground, the soils would be in contact with the underground conduit, which is nonmetallic, not subject to corrosion, and designed to be in contact with soil. Movement of expansive soils could cause minor deflections of the conduit that would not compromise structural integrity. Therefore, under this alternative, impacts from problematic soils would not be adverse and under CEQA, impacts would be considered less than significant (Class III).

Impact GEO-3: Since, under this alternative, the proposed 230 kV transmission line would be installed underground rather than overhead on transmission line poles, impacts associated with seismically induced ground shaking or ground failure are reduced because underground facilities are confined to overlying soils. While impacts would be reduced, impacts to the underground portion of the transmission line are still possible due to ground failure and ground shaking and may include a break in or exposure of the transmission line. Therefore, under this alternative, impacts associated with ground shaking and ground failure would be adverse and would be mitigated with implementation of Mitigation Measures GEO-3 and GEO-4. Under CEQA, for this alternative, impacts relating to ground shaking or ground failure would be significant but would be mitigated to a level that is considered less than significant (Class II).

As described in Section D.13.3.3, the site does not include any known earthquake hazard zones or mapped faults, and therefore, impacts due to fault rupture would not be adverse. Under CEQA, for this alternative, impacts relating to fault rupture would be considered less than significant (Class III).

Impact GEO-4: As described in Section D.13.3.3, the ESJ Gen-Tie Project site is not within a ―Landslide Susceptibility Area," as identified in the County Guidelines for Determining

Significance for Geologic Hazards (County of San Diego 2007), and is in a gently sloping area. Since the project is not located within an identified Landslide Susceptibility Area, the geologic environment has a low probability to become unstable, and the project is not proposing to extract significant amounts of groundwater from the project site. Under this alternative, the project would not cause an adverse impact from exposure of people or structures to potential adverse effects from landslides, earthflows, rockfall, and/or subsidence. Under CEQA, for this alternative, impacts would be considered less than significant (Class III).

Impact GEO-5: Under this alternative, impacts to mineral resources as a result of the project would not change and would not be adverse. Under CEQA, for this alternative, impacts would be considered less than significant (Class III).

D.13.7 No Project/No Action Alternatives

D.13.7.1 No Project Alternative 1–No ECO Substation, Tule Wind, ESJ Gen-Tie, Campo, Manzanita, or Jordan Wind Energy Projects

Environmental Impacts/Environmental Effects

Impacts GEO-1 through GEO-5: Under the No Project Alternative 1, the ECO Substation, Tule Wind, and ESJ Gen-Tie, as well as the Campo, Manzanita, and Jordon wind energy projects, would not be built, and the existing conditions would remain at these sites.

Geology, mineral resources, and soils impacts resulting from the Proposed PROJECT would not occur.

D.13.7.2 No Project Alternative 2–No ECO Substation Project

Environmental Impacts/Environmental Effects

Impacts GEO-1 through GEO-5: Under No Project Alternative 2, SDG&E would not construct the proposed ECO Substation Project, and the existing energy grid and environmental setting for geology, mineral resources, and soils would not be affected at the ECO Substation site. The Tule Wind and ESJ Gen-Tie projects would still be constructed and would be forced to interconnect with an existing substation or with a new substation. Impacts related to geologic resources, soils, and minerals from expanded substations or a new substation would be unknown, but could be greater due to multiple impact locations and longer gen-tie lines. The location of the ECO Substation Project was selected in part to facilitate the interconnection hub concept; it is located near already planned wind generation projects (CAISO Generation Interconnection Queue) and close to a region with favorable wind potential, as determined by the Department of Energy Wind Program and the National Renewable Energy Laboratory. Impacts associated with the Tule

Wind and ESJ Gen-Tie projects would be expected to be similar to those described in Section D.13.3.3 but could vary depending on the point of interconnection and the resulting gen-tie route and length of the Tule Wind and ESJ Gen-Tie projects.

D.13.7.3 No Project Alternative 3–No Tule Wind Project

Environmental Impacts/Environmental Effects

Impacts GEO-1 through GEO-5: Under No Project Alternative 3, the Tule Wind Project would not be built, and the existing conditions on the project site would remain. Impacts relating to geologic resources, soils, and mineral resources resulting from the Tule Wind Project would not occur. However, the ECO Substation and ESJ Gen-Tie Projects would be constructed, and the impacts identified in Section D.13.3.3 for those projects would occur.

D.13.7.4 No Project Alternative 4–No ESJ Gen-Tie Project

Environmental Impacts/Environmental Effects

Impacts GEO-1 through GEO-5: Under No Project Alternative 4, the ESJ Gen-Tie Project would not be built. If the ESJ Gen-Tie Project were not built, renewable energy generated in Mexico would not be delivered to the proposed ECO Substation and the U.S. market.

Under this alternative, Sempra could be forced to add new gen-tie facilities elsewhere in order to deliver renewable energy to the U.S. market. The ESJ Wind Phase I Project in Mexico would still be built under No Project Alternative 4 conditions, and the impacts associated with an alternative gen-tie would be expected to be similar to those described in Section D.13.3.3 but could vary depending on length of gen-tie line and the location pursued.

D.13.8 Mitigation Monitoring, Compliance, and Reporting

Table D.13.9 presents the mitigation monitoring, compliance, and reporting program for the geology, mineral resources, and soils impacts identified for the ECO Substation, Tule Wind, and ESJ Gen-Tie projects. Section D.13.9 provides residual effects.

The proposed Campo, Manzanita, and Jordan wind energy projects would require preparation of a mitigation monitoring, compliance, and reporting program following project-specific environmental review and evaluation under all applicable environmental regulations once sufficient project-level information has been developed. By including these projects as components of the Proposed PROJECT, it allows the lead agencies to further consider broad policy options and develop mitigation measures that may be required for the project-specific impacts at an early stage in the process for the Campo, Manzanita, and Jordan wind energy projects.

Table D.13-9
Mitigation Monitoring, Compliance, and Reporting–ECO Substation, Tule Wind and ESJ Gen-Tie Projects–Geology, Mineral Resources, and Soils

ECO Substation Project	
Mitigation Measure	**MM GEO-1: Erosion Control and Sediment Transport Control Plan.** The Erosion Control and Sediment Transport Control Plan would be included with the project grading plans submitted to the County for review and comment. The plan would be submitted to CPUC and BLM a minimum of 60 days prior to project design and would be prepared in accordance with the standards provided in the Manual of Erosion and Sedimentation Control Measures and consistent with practices recommended by the Resource Conservation District of Greater San Diego County. Implementation of the plan would help stabilize soil in graded areas and waterways and reduce erosion and sedimentation. The plan would designate BMPs that would be implemented during construction activities. Erosion control efforts, such as hay bales, water bars, covers, sediment fences, sensitive area access restrictions (e.g., flagging), vehicle mats in wet areas, and retention/settlement ponds, would be installed before extensive soil clearing and grading begins. Appropriate stabilization measures, such as mulching or seeding, would be used to protect exposed areas during construction activities. Revegetation plans, the design and location of retention ponds, and grading plans would be submitted to the CDFG and ACOE for review in the event of construction near waterways. In disturbed areas where construction equipment has caused compaction of soils (e.g., staging areas, structure sites, temporary spur roads, etc.), soils would be decompacted as necessary prior to seeding, and reclamation would occur to enhance revegetation and reduce potential for erosion.
Location	Along entire proposed project site
Monitoring/Reporting Action	CPUC and BLM
Effectiveness Criteria	Implementation of the Erosion Control and Sediment Transport Control Plan
Responsible Agency	CPUC/BLM
Timing	Compliance to be ensured during construction
Mitigation Measure	**MM GEO-2: Conduct geotechnical studies for soils to assess characteristics and aid in appropriate foundation design.** The design-level geotechnical studies to be performed by SDG&E shall identify the presence, if any, of potentially detrimental soil chemicals, such as chlorides and sulfates. Appropriate design measures shall be utilized for protection of reinforcement, concrete, and metal-structural components against corrosion, including use of corrosion-resistant materials and coatings, increased thickness of project components exposed to potentially corrosive conditions, and use of passive and/or active cathodic protection systems. The geotechnical studies shall also identify areas with potentially expansive or collapsible soils and include appropriate design features, including excavation of potentially expansive or collapsible soils during construction and replacement with engineered backfill, ground-treatment processes, and redirection of surface water and drainage away from expansive foundation soils. Studies shall conform to industry standards of care and ASTM standards for field and laboratory testing. Design shall conform to applicable sections of the County of San Diego grading codes, CBC, and the standard specifications for public works construction. The geotechnical studies prepared by a certified geologist shall be submitted to CPUC and BLM 60 days prior to construction of proposed structures.
Location	All project components where structures are proposed.
Monitoring/Reporting Action	Results of geotechnical studies are reviewed to ensure that recommendations are implemented during construction.
Effectiveness Criteria	Assurance that proposed structures are not damaged by geologic conditions.

Table D.13-9 (Continued)

Responsible Agency	CPUC/BLM
Timing	Prior to and during construction.
Mitigation Measure	**MM GEO-3: Conduct geotechnical investigations.** The applicant shall perform design-level geotechnical investigations to evaluate the potential for liquefaction, lateral spreading, seismic slope instability, and ground-cracking hazards to affect the approved project and all associated facilities. Where these hazards are found to exist, appropriate engineering design and construction measures that meet CBC and IEEE design parameters shall be incorporated into the project designs. Appropriate measures for project facilities could include construction of pile foundations, ground improvement of liquefiable zones, installation of flexible bus connections, and incorporation of slack in underground cables to allow ground deformations without damage to structures. The geotechnical investigations prepared by a certified geologist shall be submitted to CPUC and BLM 60 days prior to construction of proposed structures.
Location	All project components where structures are proposed
Monitoring/Reporting Action	Results of geotechnical investigations are reviewed to ensure that recommendations are implemented during construction
Effectiveness Criteria	Assurance that proposed structures are not damaged by geologic conditions.
Responsible Agency	CPUC/BLM
Timing	Prior to and during construction.
Mitigation Measure	**MM GEO-4: Facilities inspections conducted following major seismic event.** If large levels of ground shaking are experienced or a major earthquake occurs along the Elsinore Fault, a professional licensed geologist, geotechnical engineer, and structural engineer hired by SDG&E shall perform facilities inspections as quickly as possible. Careful examination shall be conducted of all project facilities. Any required repair or needed improvements shall be implemented as soon as feasible to ensure that the integrity of project facilities has not been compromised.
Location	All project components where structures are proposed.
Monitoring/Reporting Action	Results of facilities inspections are reviewed to ensure that recommendations are implemented following a seismic event.
Effectiveness Criteria	Assurance that proposed structures are not damaged by a seismic event and that repairs are completed as soon as feasible.
Responsible Agency	CPUC/BLM
Timing	Completion of inspections as quickly as possible following a seismic event.
Tule Wind Project	
Mitigation Measure	**MM GEO-1: Erosion Control and Sediment Transport Control Plan.** The Erosion Control and Sediment Transport Control Plan would be included with the project grading plans submitted to the County for review and comment. The plan would be submitted to BLM, San Diego County, CSLC, BIA, and/ or the Ewiiaapaayp Band of Kumeyaay Indians, depending on the jurisdiction where the construction activities are being completed, a minimum of 60 days prior to project design and would be prepared in accordance with the standards provided in the Manual of Erosion and Sedimentation Control Measures and consistent with practices recommended by the Resource Conservation District of Greater San Diego County. Implementation of the plan would help stabilize soil in graded areas and waterways and reduce erosion and sedimentation. The plan would designate BMPs that would be implemented during construction activities. Erosion control efforts, such as hay bales, water bars, covers, sediment fences, sensitive area access restrictions (e.g., flagging), vehicle mats in wet areas, and retention/settlement ponds, would be installed before extensive soil

Table D.13-9 (Continued)

	clearing and grading begins. Appropriate stabilization measures, such as mulching or seeding, would be used to protect exposed areas during construction activities. Revegetation plans, the design and location of retention ponds, and grading plans would be submitted to the CDFG and ACOE for review in the event of construction near waterways. In disturbed areas where construction equipment has caused compaction of soils (e.g., staging areas, structure sites, temporary spur roads, etc.), soils would be decompacted as necessary prior to seeding, and reclamation would occur to enhance revegetation and reduce potential for erosion.
Location	Along entire proposed project site a
Monitoring/Reporting Action	BLM, San Diego County, CSLC, BIA, and/or the Ewiiaapaayp Band of Kumeyaay Indians, depending on the jurisdiction where the construction activities are being completed,
Effectiveness Criteria	Implementation of the Erosion Control and Sediment Transport Control Plan
Responsible Agency	BLM/San Diego County/CSLC/BIA/Ewiiaapaayp Band of Kumeyaay Indians
Timing	Prior to and during construction.
Mitigation Measure	**MM GEO-2: Conduct geotechnical studies for soils to assess characteristics and aid in appropriate foundation design.** The design-level geotechnical studies to be performed by Pacific Wind Development shall identify the presence, if any, of potentially detrimental soil chemicals, such as chlorides and sulfates. Appropriate design measures shall be utilized for protection of reinforcement, concrete, and metal-structural components against corrosion, including use of corrosion-resistant materials and coatings, increased thickness of project components exposed to potentially corrosive conditions, and use of passive and/or active cathodic protection systems. The geotechnical studies shall also identify areas with potentially expansive or collapsible soils and include appropriate design features, including excavation of potentially expansive or collapsible soils during construction and replacement with engineered backfill, ground-treatment processes, and redirection of surface water and drainage away from expansive foundation soils. Studies shall conform to industry standards of care and ASTM standards for field and laboratory testing. Design shall conform to applicable sections of the County of San Diego grading codes, CBC, and the standard specifications for public works construction. The geotechnical studies prepared by a certified geologist shall be submitted to BLM, San Diego County, CSLC, BIA, and/or the Ewiiaapaayp Band of Kumeyaay Indians, depending on the jurisdiction where the construction activities are being completed, 60 days prior to construction of proposed structures.
Location	All project components where structures are proposed.
Monitoring/Reporting Action	Results of geotechnical studies are reviewed to ensure that recommendations are implemented during construction.
Effectiveness Criteria	Assurance that proposed structures are not damaged by geologic conditions.
Responsible Agency	BLM/San Diego County/CSLC/BIA/Ewiiaapaayp Band of Kumeyaay Indians
Timing	Prior to and during construction.
Mitigation Measure	**MM GEO-3: Conduct geotechnical investigations.** The applicant shall perform design-level geotechnical investigations to evaluate the potential for liquefaction, lateral spreading, seismic slope instability, and ground-cracking hazards to affect the approved project and all associated facilities. Where these hazards are found to exist, appropriate engineering design and construction measures that meet CBC and IEEE design parameters shall be incorporated into the project designs. Appropriate measures for project facilities could include construction of pile foundations, ground improvement of liquefiable zones, installation of flexible bus connections, and incorporation of slack in underground cables to allow ground deformations without damage to structures. The geotechnical investigations prepared by a certified geologist shall be submitted to BLM,

Table D.13-9 (Continued)

	San Diego County, CSLC, BIA, and/or the Ewiiaapaayp Band of Kumeyaay Indians depending on the jurisdiction where the construction activities are being completed, 60 days prior to construction of proposed structures.
Location	All project components where structures are proposed
Monitoring/Reporting Action	Results of geotechnical investigations are reviewed to ensure that recommendations are implemented during construction
Effectiveness Criteria	Assurance that proposed structures are not damaged by geologic conditions
Responsible Agency	BLM/San Diego County/CSLC/BIA/Ewiiaapaayp Band of Kumeyaay Indians
Timing	Prior to and during construction
Mitigation Measure	**MM GEO-4: Facilities inspections conducted following major seismic event.** If large levels of ground shaking are experienced or a major earthquake occurs along the Elsinore Fault, a professional licensed geologist, geotechnical engineer, and structural engineer hired by Pacific Wind Development shall perform facilities inspections as quickly as possible. Careful examination shall be conducted of all project facilities. Any required repair or needed improvements shall be implemented as soon as feasible to ensure that the integrity of project facilities has not been compromised.
Location	All project components where structures are proposed.
Monitoring/Reporting Action	Results of facilities inspections are reviewed to ensure that recommendations are implemented following a seismic event.
Effectiveness Criteria	Assurance that proposed structures are not damaged by a seismic event and that repairs are completed as soon as feasible.
Responsible Agency	BLM/San Diego County/CSLC/BIA/Ewiiaapaayp Band of Kumeyaay Indians
Timing	Completion of inspections as quickly as possible following a seismic event.
Mitigation Measure	**MM GEO-5: Conduct geotechnical surveys for landslides and mines.** Pacific Wind Development shall perform design-level geotechnical surveys to evaluate the potential for unstable slopes, landslides, earthflows, debris flows and mine tunnels/shafts in the vicinity of project facilities and shall address these surveys in final design of project facilities. Based on these surveys, approved project facility design shall incorporate appropriate measures, such as locating facilities away from very steep hillsides, debris flow source areas, the mouths of steep hillside drainages, and mine tunnels and shafts. Appropriate design and construction considerations shall be followed for the slope areas within the project area, including BMPs for surface drainage, reducing slope inclinations where grading operations are conducted to minimize potential slope instabilities. Possible mitigation measures to reduce rockfall, rock slope failure, and landslide hazards include mechanical removal of large boulders from slope faces; stabilization of boulders with anchors, rock bolting, gunite, or cable nets; or construction of intercepting slope ditches or berms. The geotechnical studies prepared by a certified geologist shall be submitted to BLM, San Diego County, CSLC, BIA, and/ or the Ewiiaapaayp Band of Kumeyaay Indians, depending on the jurisdiction where the construction activities are being completed, 60 days prior to construction of proposed structures.
Location	Results of geotechnical investigations are reviewed to ensure that recommendations are implemented during construction
Monitoring/Reporting Action	BLM/ San Diego County/CSLC/BIA/Ewiiaapaayp Band of Kumeyaay Indians
Effectiveness Criteria	Assurance that proposed structures are not damaged by geologic conditions
Responsible Agency	BLM/San Diego County/CSLC/Ewiiaapaayp Band of Kumeyaay Indians
Timing	Prior to and during construction

Table D.13-9 (Continued)

ESJ Gen-Tie Project	
Mitigation Measure	**MM GEO-1: Erosion Control and Sediment Transport Control Plan.** The Erosion Control and Sediment Transport Control Plan would be included with the project grading plans submitted to the County for review and comment. The plan would be submitted to San Diego County a minimum of 60 days prior to project design and would be prepared in accordance with the standards provided in the Manual of Erosion and Sedimentation Control Measures and consistent with practices recommended by the Resource Conservation District of Greater San Diego County. Implementation of the plan would help stabilize soil in graded areas and waterways and reduce erosion and sedimentation. The plan would designate BMPs that would be implemented during construction activities. Erosion control efforts, such as hay bales, water bars, covers, sediment fences, sensitive area access restrictions (e.g., flagging), vehicle mats in wet areas, and retention/settlement ponds, would be installed before extensive soil clearing and grading begins. Appropriate stabilization measures, such as mulching or seeding, would be used to protect exposed areas during construction activities. Revegetation plans, the design and location of retention ponds, and grading plans would be submitted to the CDFG and ACOE for review in the event of construction near waterways. In disturbed areas where construction equipment has caused compaction of soils (e.g., staging areas, structure sites, temporary spur roads, etc.), soils would be decompacted as necessary prior to seeding, and reclamation would occur to enhance revegetation and reduce potential for erosion.
Location	Along entire proposed project site
Monitoring/Reporting Action	County of San Diego
Effectiveness Criteria	Implementation of the Erosion Control and Sediment Transport Control Plan
Responsible Agency	County of San Diego
Timing	Prior to and during construction
Mitigation Measure	**MM GEO-2: Conduct geotechnical studies for soils to assess characteristics and aid in appropriate foundation design.** The design-level geotechnical studies to be performed by the applicant shall identify the presence, if any, of potentially detrimental soil chemicals, such as chlorides and sulfates. Appropriate design measures shall be utilized for protection of reinforcement, concrete, and metal-structural components against corrosion, including use of corrosion-resistant materials and coatings, increased thickness of project components exposed to potentially corrosive conditions, and use of passive and/or active cathodic protection systems. The geotechnical studies shall also identify areas with potentially expansive or collapsible soils and include appropriate design features, including excavation of potentially expansive or collapsible soils during construction and replacement with engineered backfill, ground-treatment processes, and redirection of surface water and drainage away from expansive foundation soils. Studies shall conform to industry standards of care and ASTM standards for field and laboratory testing. Design shall conform to applicable sections of the County grading codes, CBC, and the standard specifications for public works construction. The geotechnical studies prepared by a certified geologist shall be submitted to the County of San Diego 60 days prior to construction of proposed structures.
Location	All project components where structures are proposed.
Monitoring/Reporting Action	Results of geotechnical studies are reviewed to ensure that recommendations are implemented during construction.
Effectiveness Criteria	Assurance that proposed structures are not damaged by geologic conditions.
Responsible Agency	County of San Diego
Timing	Prior to and during construction.

Table D.13-9 (Continued)

Mitigation Measure	**MM GEO-3: Conduct geotechnical investigations.** The applicant shall perform design-level geotechnical investigations to evaluate the potential for liquefaction, lateral spreading, seismic slope instability, and ground-cracking hazards to affect the approved project and all associated facilities. Where these hazards are found to exist, appropriate engineering design and construction measures that meet CBC and IEEE design parameters shall be incorporated into the project designs. Appropriate measures for project facilities could include construction of pile foundations, ground improvement of liquefiable zones, installation of flexible bus connections, and incorporation of slack in underground cables to allow ground deformations without damage to structures. The geotechnical investigations prepared by a certified geologist shall be submitted to the County of San Diego 60 days prior to construction of proposed structures.
Location	All project components where structures are proposed.
Monitoring/Reporting Action	Results of geotechnical investigations are reviewed to ensure that recommendations are implemented during construction
Effectiveness Criteria	Assurance that proposed structures are not damaged by geologic conditions
Responsible Agency	County of San Diego
Timing	Prior to and during construction
Mitigation Measure	**MM GEO-4: Facilities inspections conducted following major seismic event.** If large levels of ground shaking are experienced or a major earthquake occurs along the Elsinore Fault, a professional licensed geologist, geotechnical engineer, and structural engineer hired by the project applicant shall perform facilities inspections as quickly as possible. Careful examination shall be conducted of all project facilities. Any required repair or needed improvements shall be implemented as soon as feasible to ensure that the integrity of project facilities has not been compromised.
Location	All project components where structures are proposed
Monitoring/Reporting Action	Results of facilities inspections are reviewed to ensure that recommendations are implemented following a seismic event
Effectiveness Criteria	Assurance that proposed structures are not damaged by a seismic event and that repairs are completed as soon as feasible.
Responsible Agency	County of San Diego
Timing	Completion of inspections as quickly as possible following a seismic event.

D.13.9 Residual Effects

Implementation of the mitigation measures presented in Section D.13.8 would mitigate all impacts, and under CEQA, all impacts would be mitigated to a level that is considered less than significant; therefore, no residual impacts would occur for the Proposed PROJECT or alternatives.

D.13.10 References

14 CCR 15000–15387 and Appendix A–L. Guidelines for Implementation of the California Environmental Quality Act, as amended.

40 CFR 1500–1518. Protection of Environment; Chapter V: Council on Environmental Quality.

42 U.S.C. 4321–4370f. National Environmental Policy Act of 1969, as amended.

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