5.6 Geology and Soils

5.6.1 Environmental Setting

Geology

Topography along the project alignment ranges from nearly flat to steeply sloping. Elevations along the project alignment range from less than 10 feet to approximately 400 feet above mean sea level (USGS n.d.). The project alignment would be located on slopes that range from nearly flat to more than 25 percent (CSDOES and SDCUDC 2010). The project area is located in the western portion of the geomorphic province of California known as the Peninsular Ranges. The Peninsular Ranges province is bound on the east and north by the Colorado Desert and Transverse Ranges provinces, on the south by Mexico, and on the west by the edge of the continental shelf. The Peninsular Ranges are separated by northwest-trending valleys, subparallel to faults branching from the San Andreas Fault zone.

Geology in the Peninsular Ranges province is similar to that of the Sierra Nevada with granitic rocks intruding older metamorphic rocks (DOC 2002). Surficial geology underlying the various project components consists of either Quaternary alluvium, lake, playa, and terrace deposits that include some non-marine deposits near the coast, or Eocene sedimentary rocks that include shale, sandstone, conglomerate, and minor limestone (Jennings et al. 2010). Geologic units underlying project components C510, C738, TL666D, and TL674A are listed in Table 5.6-1 and displayed on Figure 5.6-1.

Table 5.6-1 Geology in the Project Area

Project Components	Map Symbol (Figure 5.6-1) and Description	Formation Age
TL674A Reconfiguration C738 Conversion	Q – Alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated. Mostly non-marine, but includes marine deposits near the coast.	Pleistocene[(a)] – Holocene[(b)]
TL666D Removal C510	Q – Alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated. Mostly non-marine, but includes marine deposits near the coast.	Pleistocene – Holocene
	E – Shale, sandstone, conglomerate, minor limestone; mostly well consolidated.	Eocene[(b)]

Source: Jennings et. al 2010
Notes:
[(a)] Typically defined as the time period that began about 2,588,000 to 11,700 years ago.
[(b)] Typically defined as the time period from about 11,650 years ago to present period.
[(c)] Typically defined as the time period that began about 56 to 33.9 million years ago.

Soils

The soils in the project area have been mapped by the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS). The NRCS maintains an online database of soil survey data for most U.S. counties through the soil survey geographic database (NRCS 2017). The NRCS soil survey data describe the types of soils that exist in an area, their locations on the landscape, and their suitability for various uses. Soils of a similar type are grouped into soil map units. The major soil map units within the project area are presented in Table 5.6-2. The extent of the soil series underlying project-specific utility lines are shown on Figure 5.6-2.

Table 5.6-2 Soils in the Project Area

Soil Map Unit (Map Symbol)	Description/ Soil Texture	Shrink-Swell Potential[a]	Erosion Hazard[b]	Wind Erodibility Group[c]	Drainage
TL666D Removal					
Carlsbad gravelly loamy sand (CbC)	Gravelly loamy sand on uplands, ridges, swales; hillslopes with 5 to 9 percent slopes.	Low	Moderate	2	Moderately Well
Chino Silt Loam, Saline (CkA)	Silt loam on alluvial fans and alluvial plains with 0 to 2 percent slopes.	Low	Slight	4	Moderately Well
Corallitos loamy sand (CsB)	Loamy sand on narrow valleys and alluvial fans with 0 to 5 percent slopes.	Low	Slight	2	Somewhat Excessive
Corallitos loamy sand (CsC)	Loamy sand on narrow valleys; alluvial fans with 5 to 9 percent slopes.	Low	Moderate	2	Somewhat Excessive
Corallitos loamy sand (CsD)	Loamy sand on narrow valleys; alluvial fans with 9 to 15 percent slopes.	Low	Moderate	2	Somewhat Excessive
Huerhuero Loam (HrC)	Loam on valleys, hummocks, and marine terraces with 2 to 9 percent slopes.	High	Moderate	6	Moderately Well
Huerhuero Loam (HrC2)	Loam on valleys, hummocks, and marine terraces with 9 to 15 percent slopes, eroded.	High	Moderate	6	Moderately Well
Huerhuero Loam (HrD2)	Loam in valleys and on sideslope marine terraces with 9 to 15 percent slopes, eroded.	High	Severe	6	Moderately Well
Huerhuero Loam (HrE2)	Loam in valleys and on sideslope marine terraces with 15 to 30 percent slopes, eroded.	High	Severe	6	Moderately Well
Huerhuero-Urban Land Complex (HuC)	Urban land complex with 2 to 9 percent slopes.	High	Moderate	6	Moderately Well
Lagoon Water (LG-W)	Lagoon Water is considered a miscellaneous area by the NRCS; thus, they provide no unit description for it.	NA	NR	NR	NA
Loamy Alluvial Land-Huerhuero Complex (LvF3)	Loamy Alluvial Land-Huerhuero Complex on coastal plains and ridges with 9 to 50 percent slopes, severely eroded.	High	Severe	6	Moderately Well
Made Land (Md)	Made Land is considered a miscellaneous area by the NRCS; thus, they provide no unit description for it.	NA	NR	NR	NA
Terrace Escarpments (TeF)	Terrace Escarpments are considered miscellaneous areas by the NRCS; thus, they provide no unit description for them.	NA	NR	NR	NA
Tidal Flats (Tf)	Tidal Flats are considered miscellaneous areas by the NRCS; thus, they provide no unit description for them.	NA	NR	8	NA
Tujunga Sand (TuB)	Sand on flood plains and alluvial plains with 0 to 5 percent slopes.	Low	Slight	1	Somewhat Excessive

Table 5.6-2 Soils in the Project Area

Soil Map Unit (Map Symbol)	Description/ Soil Texture	Shrink-Swell Potential[a]	Erosion Hazard[b]	Wind Erodibility Group[c]	Drainage
TL674A Reconfiguration					
Grangeville Fine Sandy Loam (GoA)	Fine sandy loam on alluvial fans and alluvial plains with 0 to 2 percent slopes.	Low	Slight	3	Somewhat Poorly
Corallitos loamy sand (CsC)	Loamy sand on narrow valleys and alluvial fans with 5 to 9 percent slopes.	Low	Moderate	2	Somewhat Excessive
Huerhuero Loam (HrD2)	Loam in valleys and on sideslope marine terraces with 9 to 15 percent slopes, eroded.	High	Severe	6	Moderately Well
Huerhuero Loam (HrE2)	Loam in valleys and on sideslope marine terraces with 15 to 30 percent slopes, eroded.	High	Severe	6	Moderately Well
C510 Conversion					
Corallitos loamy sand (CsD)	Loamy sand on narrow valleys and alluvial fans with 9 to 15 percent slopes.	Low	Moderate	2	Somewhat Excessive
Terrace Escarpments (TeF)	Terrace Escarpments are considered miscellaneous areas by the NRCS; thus, they provide no unit description for them.	NA	NR	NR	NA
Tujunga Sand (TuB)	Sand on flood plains and alluvial plains with 0 to 5 percent slopes.	Low	Slight	1	Somewhat Excessive
C738 Conversion					
Made Land (Md)	Made Land is considered a miscellaneous area by the NRCS; thus, they provide no unit description for it.	NA	NR	NR	NA

Source: NRCS 2017.
Notes:
[a] Linear extensibility of less than 3 percent = low shrink-swell potential; 3 to 6 percent = moderate potential; 6 to 9 percent = high potential; greater than 9 percent = very high potential. The reported values were calculated by the NRCS as shrink-swell potential. Soils with a moderate to high shrink-swell potential can damage buildings, roads, and other structures.
[b] Erosion hazard indicates the susceptibility of a soil to sheet and rill erosion by water and is interpreted by the NRCS for unsurfaced roads and trails.
[c] Soils are assigned to wind erodibility groups based on their susceptibility to wind erosion. Soils assigned to Group 1 are the most susceptible; soils assigned to Group 8 are the least susceptible.
Key:

NA = Not Available
NR = Not Rated
NRCS = U.S. Department of Agriculture Natural Resources Conservation Service

TL674A

Soils underlying the proposed project's approximately 1.1-mile duct bank associated with the TL674A conversion consist of loam, fine sandy loam, and loamy sand on 0 to 30 percent slopes. Soil series underlying the TL674A conversion have low to high shrink-swell potential, pose slight to severe erosion hazard, and are somewhat poorly to somewhat excessively drained. Soil series underlying the TL674A conversion have low to high wind erodibility with wind erodibility group (WEG) rankings that range from 2 to 6. The soil series and map symbols underlying the TL674A conversion with high shrink-swell potential are the Huerhuero loams (HrD2 and HrE2) on 9 to 30 percent slopes. The soil series and map symbols underlying the TL674A conversion with severe erosion hazard rankings are the Huerhuero loams

(HrD2 and HrE2) on 9 to 30 percent slopes. The soil series and map symbols underlying the TL674A conversion with high wind erodibility rankings are the Corallitos loamy sand (CsC) and the Grangeville fine sandy loam (GoA).

TL666D

Soils underlying the proposed project's approximately 6-mile overhead TL666D removal consist of loam, sand, loamy sand, gravelly loamy sand, gravelly sandy loam, silt loam, sandy loam, loamy alluvial land complex, urban land complex, lagoon water, made land, terrace escarpments, and tidal flats on 0 to 50 percent slopes. Soil series underlying the TL666D removal have low to high shrink-swell potential, pose slight to severe erosion hazard, and are somewhat poorly to somewhat excessively drained. Soils series underlying the TL666D removal have low to high wind erodibility with WEG rankings that range from 2 to 8. The soil series and map symbols underlying the TL666D removal with high shrink-swell potential are the Huerhuero Loam (HrC, HrC2, HrD2, and HrE2) on 2 to 30 percent slopes and the loamy alluvial land-Huerhuero Complex (LvF3) on 9 to 50 percent slopes. The soil series and map symbols underlying the TL666D removal with severe erosion hazard rankings are the Huerhuero loam (HrD2 and HrE2) on 9 to 30 percent slopes and the loamy alluvial land-Huerhuero complex (LvF3) on 9 to 50 percent slopes. The soil series and map symbols underlying the TL666D removal with high wind erodibility rankings are the Carlsbad gravelly loamy sand (CbC), Corallitos loamy sands (CsB, CsC, and CsD), and the Tujunga sand (TuB).

C510

Soils underlying the proposed project's approximately 3,900-foot C510 Conversion to an underground configuration consist of terrace escarpments. Terrace escarpments are considered miscellaneous areas by the NRCS, and as such the NRCS does not provide description of shrink-swell potential, erosion hazard, WEG, or drainage for this particular line.

C738

Soils underlying the approximately 630-foot C738 Conversion duct bank consist of made land. Made land is considered a miscellaneous area by the NRCS, and as such the NRCS does not provide descriptions of shrink-swell potential, erosion hazard, WEG, or drainage for this particular line.

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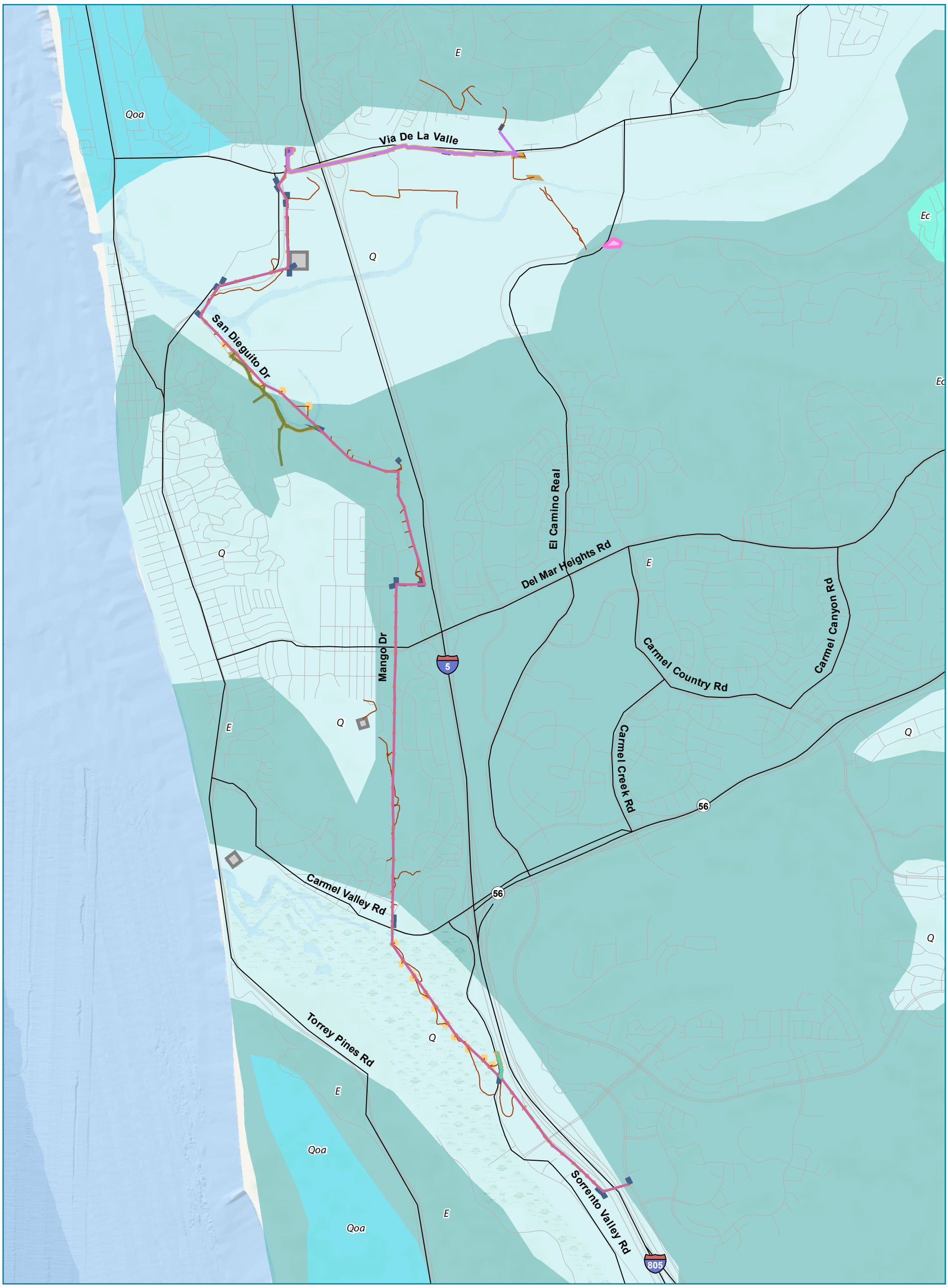

Proposed Project Components
- C510 Conversion
- C738 Conversion
- TL666D Removal
- TL674A Reconfiguration
- Access Road
- Drop Zone
- Fly Yard
- Staging Yard
- Stringing Site
- Work Area

Geology
- E: Marine Sedimentary Rocks
- Ec: Nonmarine (Continental) Sedimentary Rocks
- Q: Marine and Nonmarine (Continental) Sedimentary Rocks
- Qoa: Marine and Nonmarine (Continental) Sedimentary Rocks

Sources: San Diego Gas and Electric (SDG&E) 2018; CAL DOC 2013; Earth System Research Institue (ESRI) 2018

Figure 5.6-1
Geology in the Proposed Project Vicinity
TL 674A Reconfiguration and TL666D Removal
San Diego County, California
June 2018

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0 0.5 1 Kilometers

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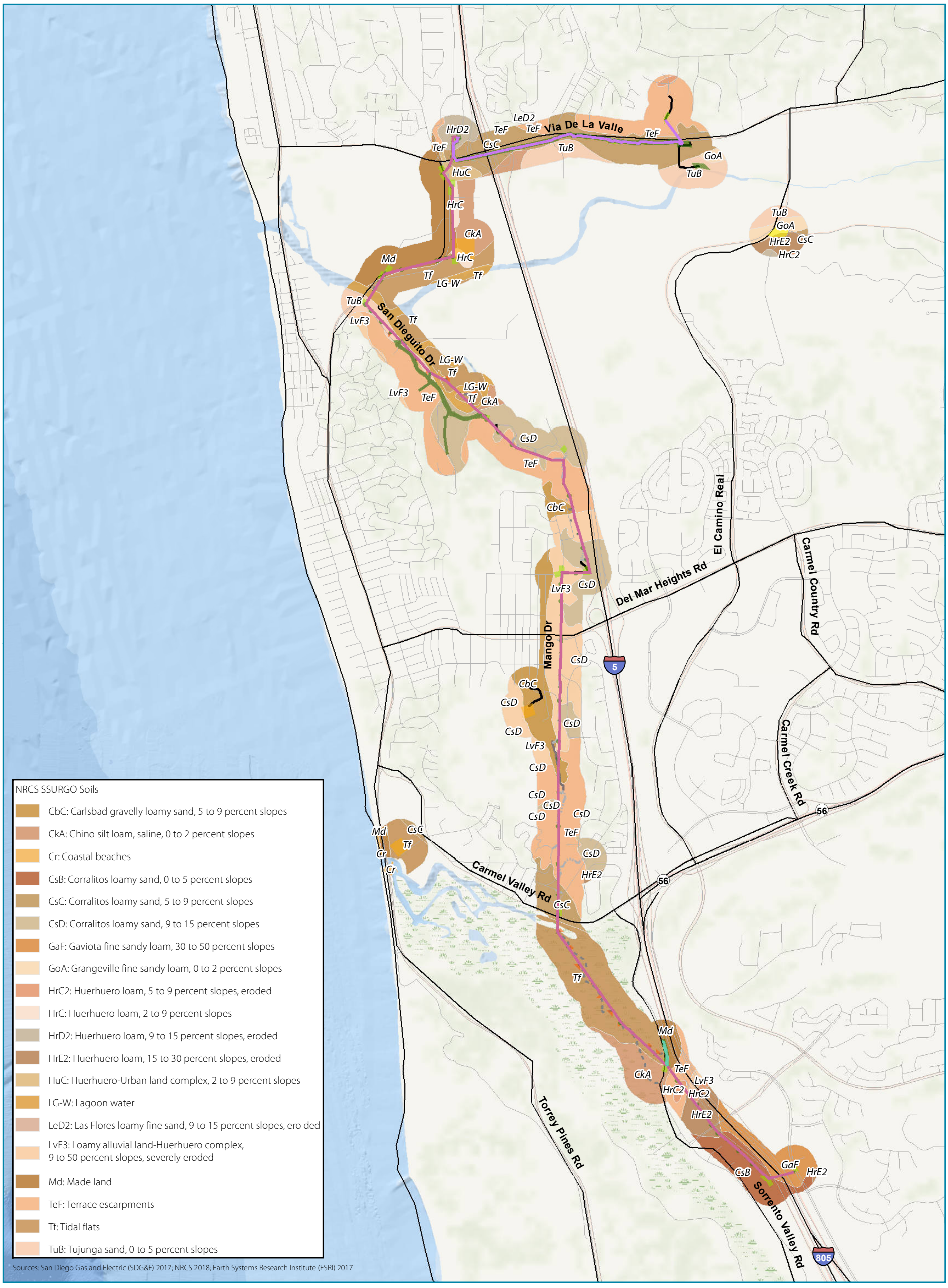

Proposed Project Components
- C510 Conversion
- C738 Conversion
- TL666D Removal
- TL674A Reconfiguration
- Drop Zone
- Fly Yard
- Staging Yard
- Stringing Site
- Work Area
- Existing Access Road
- Existing Footpath
- Existing Footpath/ATV Access
- Temporary Footpath

Figure 5.6-2
Soils in the Proposed Project Vicinity
TL 674A Reconfiguration and TL666D Removal
San Diego County, California
February 2018

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0 0.5 1 Kilometers

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Geologic Hazards: Faulting and Seismicity

The Alquist–Priolo Earthquake Fault Zoning Act (Public Resources Code Division 7, Chapter 2.5) requires the delineation of earthquake faults for the purpose of protecting public safety. Faults included in the Alquist–Priolo Earthquake Fault Zoning Program are classified by activity as follows (DOC 2007):

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

Alquist-Priolo earthquake fault zones are designated areas within 500 feet of a known active fault trace. According to the California Geological Survey (CGS) online Alquist-Priolo fault zone mapping index, no Alquist-Priolo fault zone maps are available for the project area; therefore, no Alquist-Priolo fault zones cross any of the project components (DOC 2015).

The only active or potentially active fault underlying any project component is an unnamed Quaternary fault that crosses the TL666D project component near its center (Figure 5.6-3). In addition, a number of active and potentially active faults are located near the TL666D project component, which have the potential to cause strong ground shaking in the project area as a result of an earthquake. Active and potentially active faults near the TL666D project component are listed and summarized below. Active and potentially active faults within 25 miles of the proposed project are shown on Figure 5.6-3.

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

- The Coronado Bank Fault Zone is located approximately 14 to 17 miles southwest of the TL666D utility corridor; a maximum moment magnitude[1] of 7.6 has been recorded along this fault zone.
- The Newport-Inglewood-Rose Canyon Fault Zone is located approximately 2 to 14 miles west of the TL666D utility corridor; a maximum moment magnitude of 7.1 is recorded along this fault zone. (Cao et al. 2003; Jennings and Bryant 2010)

[1] Maximum moment magnitude (Cao et al. 2003). The moment magnitude is a measure of the size of an earthquake in terms of energy released. An increase in moment magnitude represent a higher energy release.

Seven additional faults for which earthquake forecasting data (maximum moment magnitude) are not available are identified near the TL666D removal project component: the Florida Canyon Fault, Mission Gorge Fault, Murphy Canyon Fault, La Nacion Fault Zone, Point Loma Fault Zone, San Mateo-San Onofre-Carlsbad Fault Zone, and Texas Street Fault. The range in proximity of the seven faults to the TL666D removal project component is approximately 9 to 19 miles south. (Cao et al. 2003; Jennings and Bryant 2010)

Seismic hazards in a region are estimated by statistical analysis of earthquake occurrence to determine the level of potential ground motion. Magnitudes of historical earthquakes range up to moment magnitude 7.0. Four historical earthquakes over moment magnitude 4.0 have occurred within 25 miles of the project area. The locations of historical earthquakes and active or potentially active faults are shown on Figure 5.6-3.

A common parameter used for estimating ground motion at a particular location is peak ground acceleration (PGA). PGA is a measure of earthquake intensity; it indicates how hard the earth shakes at a given location during the course of an earthquake. PGA values are typically expressed as a percentage of acceleration due to gravity: the higher the PGA value, the more intense the ground shaking.2 PGA values in the project area were calculated by the CGS based on historical earthquake occurrence, known damage from historic earthquakes, slip rates of major faults, and geologic materials. The PGA values described below were obtained through the CGS online ground motion interpolator (DOC 2008).

The PGA values calculated by the CGS in the project area range from 0.492 to 0.525 times the force of gravity (g) with a 2 percent chance of being exceeded in 50 years. The PGA values calculated by the CGS with a 10 percent chance of being exceeded in 50 years range from 0.262 to 0.270 g. These PGA values represent low to moderate potential for ground shaking. PGA values vary throughout the project area and would be assessed as part of a site-specific geotechnical analysis. The assessed PGA values would be used to ensure that the proposed project structures are designed in compliance with applicable building codes.

Erosion

Water and wind are the processes responsible for most soil erosion within the proposed project area. Increased erosion could occur in the proposed project area where surface-disturbing activities occur, such as the use of access roads and trails; clearing vegetation; the burial of the duct bank in the TL674A conversion; and the conversion of overhead distribution lines to underground configurations in the C510 and C738 conversions.

[2] The acceleration due to gravity is relatively constant at the earth's surface: 980 centimeters per second per second (cm/sec/sec). An acceleration of 16 feet per second is 16*12*2.54 = 487 cm/sec/sec. Therefore, an acceleration of 16 feet per second = 487/980 = 0.50 g.

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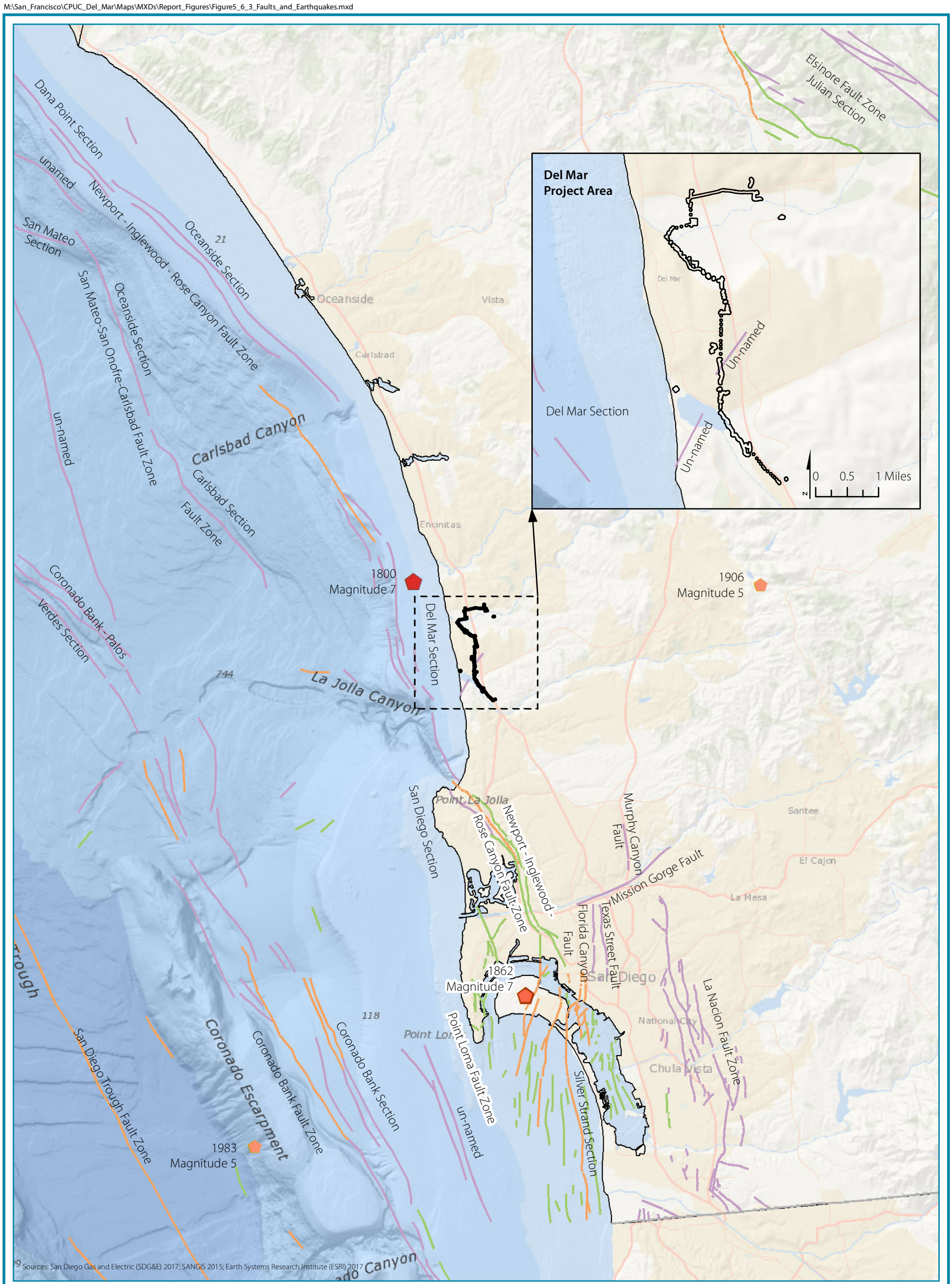

Del Mar Proposed Project Components

USA Historic Earthquakes Over Magnitude 4.0 With Year and Magnitude Noted

- 6.1 - 7.0
- 5.1 - 6.0
- 4.1 - 5.0

Faults

- Holocene
- Late Quaternary
- Quaternary

Figure 5.6-3
Active and Potentially Active Faults and Historic Earthquakes in the Proposed Project Vicinity
TL 674A Reconfiguration and TL666D Removal
San Diego County, California

February 2018

0 3 6 Miles

0 3 6 Kilometers

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The NRCS assigns soils to WEGs. The susceptibility of the soils in the project area to wind erosion ranges from WEG 1 (highly susceptible) to WEG 8 (slightly susceptible), and most soils possess either high or low susceptibility. Soils that are highly susceptible to wind erosion are located at various locations along the 674A reconfiguration, TL666D removal, and C510 conversion (Figure 5.6-2). The NRCS ranks the erosion hazard of soils for roads and trails at the site ranging from slight to severe. Soils that rank with a higher than moderate erosion hazard are present at various locations along the TL674A conversion and TL666D removal (Figure 5.6-2). Soil characteristics in the project area are summarized in Table 5.6-2, above.

Landslides

Landslides may be naturally occurring or may result from construction activities that remove stabilizing vegetation, create over-steepened slopes, or concentrate runoff onto existing landslides or areas susceptible to landslides. The San Diego County Multi-jurisdictional Hazard Mitigation Plan (Hazard Mitigation Plan) maps landslides, landslide susceptibility, and slide-prone formations in San Diego County. The eastern terminus of the TL674A project component is located near, but not within, an area mapped as having slide-prone formations. No project components would cross areas mapped as susceptible to landslides, having known landslides, are or slide-prone formations, according to the Hazard Mitigation Plan. (CSDOES and SDCUDC 2010)

The CGS maps landslides on its California landslide inventory. (DOC 2016) The CGS does not map landslides beneath any project component, and thus does not include any mapped lands that accommodate project infrastructure. The U.S. Geological Survey (USGS) maps the entire project area as having low landslide susceptibility. (USGS 2010) Landslide susceptibility and occurrence areas are shown on Figure 5.6-4.

Liquefaction

Liquefaction occurs when seismic ground motion causes saturated sediments to flow like a fluid, resulting in sand boils or lateral spreading, both of which may cause a decrease in structural bearing capacity that can result in structural settlement or collapse. Liquefaction can occur during an earthquake in areas where unconsolidated sediments and a shallow water table are present, especially in lowland areas with saturated, sandy soil. The Hazard Mitigation Plan maps liquefaction risk and liquefiable soils (labeled on the plan map as liquefaction layers) in San Diego County. Portions of the TL666D project component cross areas of liquefiable soil within the San Dieguito River flood plain and the flood plain adjacent to Los Peñasquitos Lagoon. The fly yard located near Los Peñasquitos Lagoon is the only portion of the proposed project that would be located in an area mapped as having high liquefaction risk. All other project components would be located in areas mapped as having low liquefaction risk.

Subsidence/Collapsible Soil

Land subsidence can occur where large volumes of fluids are pumped out of the ground, such as in the case of groundwater wells or oil fields. Land subsidence occurs because the fluids present in subsurface pore spaces partially provide bearing capacity to support rock or sediments. When large volumes of fluids are pumped from the subsurface, land subsidence can result when rock or sediment partially collapses

under its own weight into pore spaces previously occupied by fluids. Some soil may also collapse if it is irrigated after remaining dry for long periods of time. The County of San Diego General Plan does not discuss land subsidence or the presence of collapsible soil as hazards in the county. The Hazard Mitigation Plan does not consider land subsidence or collapsible soils as significant hazards in the county. Land subsidence was not considered in the risk assessment portion of the Hazard Mitigation Plan because there is no historical record of land subsidence in the county and because it presents only a minor threat to limited parts of the county.

Expansive Soil

Some soils contain certain clay minerals that may cause them to swell when moist and shrink as the soil dries. These soils are known as expansive soils and have the potential to disturb and/or damage structures, including power poles, vaults, transmission lines, and underground duct bank upon expansion. Table 5.6-2 lists the soil types and characteristics of soils underlying the proposed project, including shrink-swell potential. Project components that are at least partially underlain by soils with high shrink-swell potential include the TL674A reconfiguration and the TL666D removal. The TL666D removal does not include construction of structures that would be affected by expansive soils. The extent of various soil series below the proposed project is shown on Figure 5.6-3. Special design features may be required in areas where the proposed project would be underlain by soils with high shrink-swell potential.

5.6.2 Regulatory Setting

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

Federal

Clean Water Act

The Clean Water Act of 1972 (33 United States Code §1251 et seq.) requires states to set standards to protect water quality, including the regulation of stormwater and wastewater discharge during construction and operation of a facility. This act also created the National Pollutant Discharge Elimination System (NPDES), a system that requires states to establish discharge standards specific to water bodies and that regulates stormwater discharge from construction sites through the implementation of a Stormwater Pollution Prevention Plan (SWPPP). The applicant will be required to compile a SWPPP for the proposed project, in compliance with NPDES. Erosion and sedimentation control measures are fundamental components of SWPPPs. In California, the NPDES permit program is implemented and administered by Regional Water Quality Control Boards (RWQCBs). Refer to Section 5.9, “Hydrology and Water Quality,” for further information.

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Proposed Project Components
- C510 Conversion
- C738 Conversion
- TL666D Removal
- TL674A Reconfiguration
- Drop Zone
- Fly Yard
- Staging Yard
- Stringing Site
- Work Area

- Existing Access Road
- Existing Footpath
- Existing Footpath/ATV Access
- Temporary Footpath
- Low Landslide Susceptibility
- California Landslide Inventory

Figure 5.6-4
Landslides and Landslide Susceptibility in the Proposed Project Vicinity TL 674A Reconfiguration and TL666D Removal
San Diego County, California

February 2018

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State

California Department of Industrial Relations, Occupational Safety and Health Regulations

Worker safety on construction projects, in particular where grading, trenching, and earthmoving are involved, is the responsibility of the California Department of Industrial Relations, Occupational Safety and Health Administration, which establishes and enforces regulations for excavation and trenching permits and for worker safety. Certain elements of the proposed project would include grading, trenching, and earthmoving.

Alquist-Priolo Earthquake Fault Zoning Act

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act of 1972 is to regulate development near active faults to mitigate the hazard of surface fault rupture. Development near active faults would include any permanent construction such as the underground transmission lines that are part of the proposed project. This act requires disclosure to potential real estate buyers and a 50-foot setback for new occupied buildings. While it does not specifically regulate overhead power lines, it does help define areas where fault rupture would most likely occur. Under the act, the State of California defines an active fault as one exhibiting evidence that surface rupture has occurred within Holocene time (the last 11,700 years). The state has identified active faults within California and has delineated “earthquake fault zones” along active faults.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 provides a statewide seismic hazard mapping and technical advisory program to assist cities and counties in fulfilling their responsibilities for protecting public health and safety from the effects of strong ground shaking, liquefaction, landslides, or other ground failure and seismic hazards caused by earthquakes. The proposed project would include installation of poles on the TL674A, C510 and C738 project components that could pose public health and safety risks from the effects of strong ground shaking, liquefaction, landslides, or other ground failure and seismic hazards caused by earthquakes. Mapping and other information generated pursuant to this act is to be made available to local governments for planning and development purposes. The state requires that local governments incorporate site-specific geotechnical hazard investigations and associated hazard mitigation as part of the local construction permit approval process.

California Government Code

California Government Code Sections 65302(f) and 65302 require cities to take seismic and other natural hazards into account in their planning programs and to outline them in their general plans.

California Building Standards Code

The California Building Standards Commission is responsible for coordinating, managing, adopting, and approving building codes in California. Chapter 18 of the 2013 California Building Standards Code regulates the excavation of foundations and retaining walls and specifies when geological reports are required. Appendix J of the California Building Standards Code regulates grading activities, including drainage and erosion control and construction on unstable soils, such as expansive soils and areas subject to liquefaction.

California Public Utilities Commission General Orders 95, 128, and 165

California Public Utilities Commission (CPUC) General Order (G.O.) 95 Rules for Overhead Line Construction provides general standards for the design and construction of overhead electric transmission lines. CPUC G.O. 128 (Rules for Construction of Underground Electric Supply and Communication Systems) provides general standards for the construction of underground electric and communication systems. Additionally, CPUC G.O. 165 (Inspection Requirements for Electric Distribution and Transmission Facilities) establishes inspection requirements for electric distribution and transmission facilities (excluding facilities contained in a substation) to ensure safe and high quality electrical service. The proposed project would be designed and constructed in accordance with standards outlined in CPUC G.O. 95, CPUC G.O. 128, and CPUC G.O. 165.

Regional and Local

CPUC General Order 131-D, Section XIV.B

CPUC General Order 131-D states that "local jurisdictions acting pursuant to local authority are preempted from regulating electrical power line projects, distribution lines, substations or electrical facilities constructed by public utilities subject to the Commission's jurisdiction. However, in locating such projects the public utilities shall consult with local agencies regarding land use matters."

Regional Water Quality Control Board

The San Diego RWQCB manages water quality for the cities of San Diego and Del Mar because construction activities would occur within an area in excess of 1 acre, the applicant would be required to obtain a NPDES permit from the RWQCB. To acquire this permit, the applicant would prepare a SWPPP that would include information about the proposed project; monitoring and reporting procedures; and best management practices, including those for erosion, sedimentation, and stormwater runoff control. The SWPPP would be based on final engineering design. Refer to Section 5.9, "Hydrology and Water Quality," for further information.

Local

The County of San Diego General Plan contains several policies related to geological hazards and development. These policies are directed at meeting the county's goal to minimize the loss of life, injury, and property damage due to seismic and geologic hazards. These policies are not applicable to the proposed project, [Note to reviewer: this statement will be resolved in the next draft.] given the absence of expansive soils in the project area, Alquist-Priolo Fault Zone, and potential landslide hazard. (County of San Diego 2011)

5.6.3 Environmental Impacts and Assessment

Information for this section—including journals, maps, and databases—is sourced from the County of San Diego, NRCS, Northern California Earthquake Data Center, San Diego Gas & Electric (SDG&E), and the USGS and is evaluated within the context of applicable federal, state, and local laws, regulations, standards, and policies.

Applicant Proposed Measures

The only applicant-proposed measure (APM) applicable to this section is APM GEO-1, which has been evaluated for its potential to reduce the magnitude of project seismicity impacts. Implementation of APM GEO-1 would ensure multiple potential impacts pertinent to soils and geology would not rise to significant levels. Therefore, as a project design feature, no mitigation measures would be required because project geological impacts would be less than significant.

APM GEO-1: SDG&E will consider the recommendations and findings of a final geotechnical investigation and the contractor's Geotechnical Engineer regarding the potential for seismic activity, landslides, expansive soils, slope instability, and differential settling. SDG&E will incorporate those recommendations, as appropriate, into the final design of the proposed project. The final project design will be reviewed and approved by a Professional Engineer registered in the State of California prior to construction.

Significance Criteria

Table 5.6-3 includes the questions from Appendix G of the California Environmental Quality Guidelines for geology and soils to evaluate the environmental impacts of the proposed project.

Table 5.6-3 Geology and Soils Checklist

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☒	☐
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☐	☒	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☒	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems	☐	☐	☐	☒

Table 5.6-3 Geology and Soils Checklist

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
where sewers are not available for the disposal of waste water?				

a. Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i. Rupture of a known fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

None of the project components would be located or are currently located within an Alquist-Priolo fault zone. Therefore, there would be no impact resulting from surface rupture of a known earthquake fault.

ii. Strong seismic ground shaking?

The existing circuits and additional project components would be implemented in an area of high seismic activity. Therefore, workers and the various project facilities could experience strong seismic ground shaking, although the proposed project would not exacerbate the existing seismic conditions in the area. The proposed project would be designed in accordance with all applicable regulations, including the California Building Code, during grading activities. Impacts to transmission lines, transmission poles, vaults, and duct banks may be significant given that they would be facilities that could be damaged during strong seismic ground shaking. Location-specific seismic analysis would be conducted during the project's final design phase. Final design would be reviewed by the various jurisdictions such as the CPUC, City of San Diego, City of Del Mar, California Department of Transportation, etc., and the final design of the proposed project would incorporate recommendations, as appropriate, from the geotechnical study, as described in APM GEO-1. Impacts associated with the risk of loss, injury, or death involving strong seismic ground shaking during construction and operation/maintenance of the proposed project would be less than significant with the implementation of the geotechnical study, incorporation of recommendations from the study, and compliance with all applicable regulations.

The existing circuits and additional project components would be implemented in an area of high seismic activity. Therefore, workers and the various project facilities could experience strong seismic ground shaking, although the proposed project would not exacerbate the existing seismic conditions in the area. The proposed project would be designed in accordance with all applicable regulations, including the California Building Code, during grading activities. Impacts to transmission lines, transmission poles, vaults, and duct banks may be significant given that they would be facilities that could be damaged during strong seismic ground shaking. Location-specific seismic analysis would be conducted during the project's final design phase. Final design would be reviewed by the various jurisdictions such as the CPUC, City of San Diego, City of Del Mar, California Department of Transportation, etc., and the final

design of the proposed project would incorporate recommendations, as appropriate, from the geotechnical study, as described in APM GEO-1. Impacts associated with the risk of loss, injury, or death involving strong seismic ground shaking during construction and operation/maintenance of the proposed project would be less than significant with the implementation of the geotechnical study, incorporation of recommendations from the study, and compliance with all applicable regulations.

iii. Seismic-related ground failure, including liquefaction?

The fly yard that would be located near Los Peñasquitos Lagoon is the only element of any project component that would be located in an area mapped as having high liquefaction risk. However, the fly yard would not involve construction of permanent or staffed facilities that would expose people or structures to potential substantial adverse effects related to liquefaction, and its use would be restricted to the construction phase of the proposed project.

Two poles would be installed as part of the TL674A project component. The new poles would be installed in an area that currently already has existing utility poles and other infrastructure present. As part of APM GEO-1, the applicant would conduct a geotechnical investigation that assesses the potential for lateral spreading and other geologic hazards at this site and throughout the project area. APM GEO-1 would require the applicant to prepare a geotechnical report, which would include design measures to minimize potential for ground failures. The geotechnical report would provide recommendations for engineering and design measures to incorporate into the proposed project to minimize impacts to structural components associated with geologic hazards. Final design would be reviewed by various jurisdictions, and the final design of the proposed project would incorporate recommendations, as appropriate, from the geotechnical study. Impacts associated with exposure of people or structures to potential substantial adverse effects, such as the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction during construction and operation/maintenance of the project would be less than significant with the implementation of the geotechnical study, incorporation of recommendations from the study, and compliance with all applicable regulations.

iv. Landslides?

None of the project components would be located in a landslide-prone area. All project components would be located in areas mapped as having low landslide susceptibility.

As part of **APM GEO-1**, the applicant would conduct a geotechnical investigation that assesses the potential for landslides and other geologic hazards. **APM GEO-1** would require the applicant to prepare a geotechnical report, which would include design measures to minimize potential for ground failures. The geotechnical report would provide recommendations for engineering and design measures to incorporate into the proposed project, including techniques for grading and pole installations, to minimize impacts associated with geologic hazards. Final design of the proposed project would incorporate recommendations, as appropriate, from the geotechnical study. Impacts associated with exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides during construction and operation/maintenance of the proposed project would be less

than significant with the implementation of the geotechnical study, incorporation of recommendations from the study, and compliance with all applicable regulations.

Significance: Less than Significant

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

Soils within the project area have an erosion hazard rating of slight to severe. The majority of ground disturbance would occur during construction of duct banks, vaults, underground transmission lines, power poles, and foot paths, and improvements to drop zones, fly yards, staging yards, stringing sites, work areas, access roads, and existing foot paths. Erosion at these sites would occur as a result of wind, water, and tracking from construction vehicles and equipment that could cause topsoil to be blown away from the sites. Construction of the proposed project could potentially cause significant effects if the work areas are not properly stabilized and substantial erosion were to occur. Because the proposed project would disturb more than 1 acre, the applicant would be required to apply for coverage under the NPDES permit and obtain a Waste Discharge Identification. To obtain this permit, the applicant would be required to submit a project-specific SWPPP to the State Water Resources Control Board for approval. The applicant would use information about the physical properties of subsurface soils, soil resistivity, and slope stability data from the geotechnical study to inform development of the SWPPP, which is required for the proposed project, in compliance with NPDES.

The SWPPP would include a variety of erosion and sediment controls to reduce the potential for increased erosion and sedimentation that could result from construction of the proposed project. Erosion controls consist of source control measures that are designed to prevent soil particles from detaching and being transported in storm water runoff (e.g., applying soil binders, as appropriate, to areas that would remain disturbed for more than two weeks or scheduling major grading operations during non-rainy periods). The SWPPP would also require the applicant to install erosion control devices, where appropriate, such as straw mulch, geotextiles and mats, earth dikes and drainage swales, velocity dissipation devices (at culvert outlets), and slope drains to reduce erosion potential during construction.

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

During operation and maintenance, the potential for soil erosion related to the proposed project would be low, due to adequate site drainage and surfacing improvements that would be installed as part of construction. In addition, temporary construction areas would be restored to preconstruction conditions following the completion of construction. Routine operation and maintenance would not require significant grading or other ground disturbing activities, and further loss of topsoil would not occur. Long-term use of access roads may lead to rutting, which could concentrate runoff and increase rill

erosion. However, the applicant would maintain erosion control features that were implemented as part of the SWPPP during the construction phase as needed during operations. Therefore, the proposed project would not result in substantial topsoil erosion or the loss of topsoil during operation and maintenance, so impacts would be less than significant under this criterion.

Significance: Less than Significant

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

The Hazard Mitigation Plan does not consider land subsidence or collapsible soils as significant hazards in San Diego County. The impact from land subsidence and collapsible soils would be less than significant. Areas where the natural slope is steep and where landslides are known to occur, such as the landslide occurrence areas mapped by the USGS and the slide-prone formations mapped in the Hazard Mitigation Plan, could have increased landslide and lateral spreading susceptibility. However, none of the [project components would be located on a landslide, in an area mapped as susceptible to landslides, or in an area of slide-prone formations. Thus, the impact from landslides would be less than significant.

Liquefaction and lateral spreading could occur in lowland areas where saturated, sandy soil loses strength and cohesion due to ground shaking during an earthquake, such as in soils underlying project components that would span San Dieguito River and Los Peñasquitos Lagoon flood plains. Lateral spreading as a result of the proposed project is possible during an earthquake in areas where grading or excavation activities increase localized slope angles. The fly yard near Los Peñasquitos Lagoon is the only project component or work area that would be located in an area mapped as having high liquefaction risk. Except for the fly yard, liquefiable soils are present within the project area only in areas mapped as having low liquefaction potential.

As part of **APM GEO-1**, the applicant would conduct a geotechnical investigation that assesses the potential for liquefaction, lateral spreading, and other geologic hazards. The geotechnical report would include recommendations for engineering and design measures to incorporate into the proposed project to minimize impacts associated with geologic hazards. Final design of the proposed project would incorporate recommendations, as appropriate, from the geotechnical study. Impacts associated with the location of the proposed project on a geologic unit that is unstable, or that would become unstable as a result of the proposed project, and potentially result in liquefaction or lateral spreading during construction and operation/maintenance of the proposed project, would be less than significant with the implementation of the geotechnical study, incorporation of recommendations from the study, and compliance with all applicable regulations.

Significance: Less than Significant

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

Expansive soils can cause structural failure of foundations such as those associated with permanent facilities such as duct banks, vaults, transmission poles, and transmission lines that would be built as part of the proposed project. The shrink-swell potential is an indicator of the potential for encountering expansive soil within a soil map unit. Project components that are at least partially underlain by soils with high shrink-swell potential are the TL674A reconfiguration and the TL666D removal. However, the TL666D removal does not include the construction of new structures that could be affected by expansive soil. If the site soils are not properly engineered, swelling and shrinking could result in ground failure and impacts would be significant. Two poles would be installed aboveground as part of the TL674A project component. The new poles would be installed in an area that currently already has existing utility poles and other infrastructure present. Further, the poles would follow recommendations for engineering and design measures, including techniques for grading and pole installations, to minimize impacts associated with geologic hazards on expansive soils.

As part of **APM GEO-1**, the applicant would conduct a geotechnical investigation that assesses the potential for expansive soil and other geologic hazards provides recommendations for engineering and design measures to incorporate into the proposed project to minimize impacts associated with identified hazards. Final design of the proposed project would incorporate recommendations, as appropriate, from the geotechnical study. Impacts associated with the location of the proposed project on expansive soil, creating substantial risks to life or property during construction and operation/maintenance of the proposed project, would be less than significant with the implementation of the geotechnical study, incorporation of recommendations from the study, and compliance with all applicable regulations.

Significance: Less than Significant

e. Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water?

No septic tanks or alternative wastewater disposal systems are proposed to be constructed as part of the proposed project; thus, there would be no impact under this criterion.

Significance: No Impact

References

California Department of Conservation (DOC). 2002. California Geological Survey. California Geomorphic Provinces, Note 36.

_____. 2007. California Geological Survey. Fault Rupture Hazard Zones in California, Special Publication 42. Interim Revision 2007.

_____. 2008. California Geological Survey. Ground Motion Interpolator. http://www.quake.ca.gov/gmaps/PSHA/psha_interpolator.html. Accessed February 7, 2018.

_____. 2015. California Geological Survey. Alquist-Priolo Fault Zone Mapping Index. http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps. Accessed February 7, 2018.

_____. 2016. California Geological Survey. California Landslide Inventory. http://www.conservation.ca.gov/cgs/geologic_hazards/landslides#calsi. Accessed January 9, 2018.

California Geological Survey (CGS). 2010.

Cao, Tianqing, William A. Bryant, Badie Rowshandel, David Branum, and Christopher J. Wills. 2003. The Revised 2002 California Probabilistic Seismic Hazard Maps.

County of San Diego. 2011. County of San Diego General Plan. https://www.sandiegocounty.gov/pds/generalplan.html. Accessed January 16, 2018.

County of San Diego Office of Emergency Services and San Diego County Unified Disaster Council (CSDOES and SDCUDC). 2010. Multi-jurisdictional Hazard Mitigation Plan, San Diego County, California. August.

Earth Systems Research Institute (ESRI). 2012. "Detailed Counties." Data & Maps for ArcGIS® version 10.1. Redlands, California.

Jennings and Bryant. 2010. Fault Activity Map of California, Charles W. Jennings and William A. Bryant, California Geological Survey, Geological Data Map Series, Map Number 6, Scale 1:750,000.

Jennings et. al. 2010. Charles W. Jennings with modifications by Gutierrez, C., Bryant, W., Saucedo, G., and Wills, C. Geologic Map of California. California Geological Survey, Geologic Data Map No. 2, Scale 1:750,000.

Northern California Earthquake Data Center. 2014. Historical Earthquake Locations and Magnitudes. Data Set doi:10.7932/NCEDC. https://earthquake.usgs.gov/data/comcat/. Accessed January 9, 2018.

San Diego Gas & Electric (SDG&E). 2017. Georeferenced Project Components and Aerial Photographic Base Map for TL674A Reconfiguration and TL666D Removal Project.

SANGIS. 2015. San Diego County Geographic Information System 2015. San Diego County Public GIS Data Portal. Available at: http://www.sangis.org/. Accessed 2015

United States Department of Agriculture, Natural Resource Conservation Service (NRCS). 2017. Soil Survey Geographic Data. 14 February. https://datagateway.nrcs.usda.gov/. Accessed January 9, 2018.

United States Geological Survey. Not Dated. Topoview Online Access to Topographic Mapping. https://ngmdb.usgs.gov/topoview/viewer/#4/39.98/-99.93. Accessed January 19, 2018.

_____. 2001. Landslide Incidence and Susceptibility in the Conterminous United States. USGS Open file Report 97-289. http://landslides.usgs.gov/html_files/landslides/nationalmap/national.html. Accessed January 9, 2018.

_____. 2007. Preliminary Integrated Databases for the United States - Western States: California, Nevada, Arizona, Washington, Oregon, Idaho, and Utah, Open File Report 2005-1305, Version 1.3. Updated December 2007. https://pubs.usgs.gov/of/2005/1305/. Accessed June 23, 2017.