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## 5.6 GEOLOGY AND SOILS

| Would the project: | | Potentially Significant Impact | Potentially Significant Unless APMs Incorporated | 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, creating substantial risks to life or property? | ☐ | ☐ | ☑ | ☐ |
| e. | Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater? | ☐ | ☐ | ☐ | ☑ |

### 5.6.1 Introduction

This section of the PEA describes existing geologic and soil resources within the Proposed Project area and potential impacts related to these resources that could result from construction, operation, and maintenance of the Proposed Project.

Proposed Project construction activities would comply with all relevant federal, state, and local regulatory requirements. Construction, operation, and maintenance of the Proposed Project facilities in compliance with these requirements are expected to have less than significant impacts related to geologic and soil resources.

## 5.6.2 Methodology

Preparation of this section was primarily based on review of published and unpublished geologic maps and reports, local planning information, evaluation of the Proposed Project route on U.S. Geological Survey (USGS) topographic maps, review of soil maps and data, and analysis of 1:2,400 scale aerial photographs covering the Proposed Project area. Geotechnical studies completed for the Artesian substation and other SDG&E projects have encompassed the areas and facilities affected by the Proposed Project and reports of those studies were reviewed (Benton Engineering, Inc., 1972a and b; Geocon, Inc., 2012a and b and 2013; URS, 2000, 2003, and 2015). A geotechnical investigation was prepared in 2015 specifically for the proposed Artesian Substation expansion, and this report is included as Appendix 5.6-A. The Proposed Project description was reviewed and potential for impacts related to geologic resources and hazards was evaluated based on the existing geologic and soil conditions as determined by the data review.

## 5.6.3 Existing Conditions

### 5.6.3.1 Regulatory Background

#### Federal

There are no applicable federal regulations.

#### State

The key California regulatory requirements relevant to the assessment of Proposed Project impacts related to geologic and soil resources include the following:

a) The Alquist-Priolo Special Studies Act of 1972 (Alquist-Priolo Act) which, in part, required the California Division of Mines and Geology (now the California Geological Survey) to compile maps of the surface traces of all known active faults in the State of California (State); and

b) CPUC General Order 95, which designates rules and regulations for overhead electric line construction.

c) Institute of Electrical and Electronics Engineers (IEEE) 693 Recommended Practice for Seismic Design of Substations

d) 2013 California Building CodeASCE manual 113 Substation Structure Design Guide

While the Alquist-Priolo Act does not impose any requirements on the Proposed Project, the active faults mapped by the State provide information for evaluating potential impacts on a project from surface fault displacement in accordance with the CEQA Initial Study Checklist item 6(a)(i).

An additional relevant regulatory requirement is the State General Permit for stormwater discharges from construction sites (Construction General Permit). The Construction General Permit requires that a Stormwater Pollution Prevention Plan (SWPPP) be prepared and implemented for projects disturbing over 1 acre of land. While the Construction General Permit is a regulatory requirement for water quality protection (see further discussion in Section 5.9,

Hydrology and Water Quality), its requirements for stormwater management BMPs include measures that limit impacts to soils.

**Local**

Because the CPUC has exclusive jurisdiction over the siting, design, and construction of the Proposed Project, the Proposed Project is not subject to local discretionary land use regulations. The following discussion of the local regulations relating to geology and soils is provided for informational purposes. As outlined in the following subsections, the construction and operation of the Proposed Project will not conflict with any environmental plans, policies, or regulations adopted by agencies with jurisdiction over local regulations related to geology and soils.

The San Diego County General Plan Safety Element and Conservation and Open Space Element include the following relevant goals and policies:

- Goal S-1 – Public Safety. Enhance public safety and the protection of public and private property.
    - Policy S-1.2 Public Facilities Location. Advise, and where appropriate require, new development to locate future public facilities with respect to the County's hazardous areas.
- Goal S-7 – Reduced Seismic Hazards. Goal of minimized personal injury and property damage resulting from seismic hazards.
    - Policy S-7.2 Engineering Measures to Reduce Risk. Require all development to include engineering measures to reduce risk in accordance with the California Building Code, Uniform Building Code and other seismic and geologic hazard safety standards.

The *City of San Diego General Plan* Public Facilities Element includes the following goal and policy relevant to the Proposed Project related to geology and soils:

- Seismic Safety Goal – Protection of public health and safety through abated structural hazards and mitigated risks posed by seismic conditions.
    - Ensure that current and future community planning and other specific land use planning studies continue to include consideration of seismic and other geologic hazards. This information should be disclosed, when applicable, in the CEQA document accompanying a discretionary action.

### 5.6.3.2 Topographic Setting

The existing Artesian Substation and the adjacent area of the proposed expansion occur at an elevation of approximately 510 to 525 feet above mean sea level (amsl). The existing substation and proposed substation expansion area are graded with a gentle slope. A graded drainage detention basin occurs adjacent to the west of the existing substation. Roads and development surround the substation to the north, east and south with relatively little topographic relief except for a graded slope to an approximately 545 foot elevation building pad on the adjacent parcel to the south.

Reconductoring between the Artesian and Bernardo Substations would occur in developed areas ranging in elevation from 500 to 740 feet amsl.

The Bernardo Substation is located in an area that has been graded and developed with relatively flat parcels separated by low terracing. The substation occurs at an elevation of approximately 740 feet amsl and slopes generally northward.

The Rancho Carmel Substation occurs in terrain that has been graded relatively flat and developed. The substation occurs at an elevation of approximately 820 feet amsl and slopes generally northward.

#### 5.6.3.3 Geologic Setting

**Regional Setting**

The Proposed Project area is located within the southern Peninsular Ranges Physiographic Province, which is characterized by northwest-trending fault-bounded mountain ranges, broad intervening valleys, and low-lying coastal plains. The Proposed Project occurs on a block of basement rock bounded by the Elsinore Fault Zone to the northeast and by the Newport-Inglewood-Rose Canyon fault zone to the west. Neither of these fault zones crosses the Proposed Project alignment.

The Proposed Project is located near the inland boundary of the coastal plain, where near surface geologic materials comprised of Tertiary Period and younger marine and non-marine sediments transition to much older Jurassic Period and Cretaceous Period crystalline and metamorphic bedrock.

**Proposed Project Geologic Setting**

Geologic units that occur along the Proposed Project alignment are summarized in Table 5.6-1, Geologic Units along the Proposed Project. A regional geologic map is provided in Figure 5.6-1, Geologic Map.

The regional geologic map shows the Artesian Substation and the Bernardo Substation overlie locations where the naturally occurring contacts between geologic units are mapped. Grading for the substations has removed shallow materials and as a result has modified geologic contacts in the substation areas. As a result of grading, the existing Artesian Substation and expansion area are underlain by a cut pad of Friars Formation and the Bernardo Substation is underlain by a cut pad of granitic rock. Friars Formation in the Artesian Substation area consists of sandstone with interbedded claystone. The Rancho Carmel Substation occurs on Mission Valley Formation which consists of sandstone and conglomerate. Proposed Project structures would occur on ground underlain by these same units, plus alluvium and metamorphic rock.

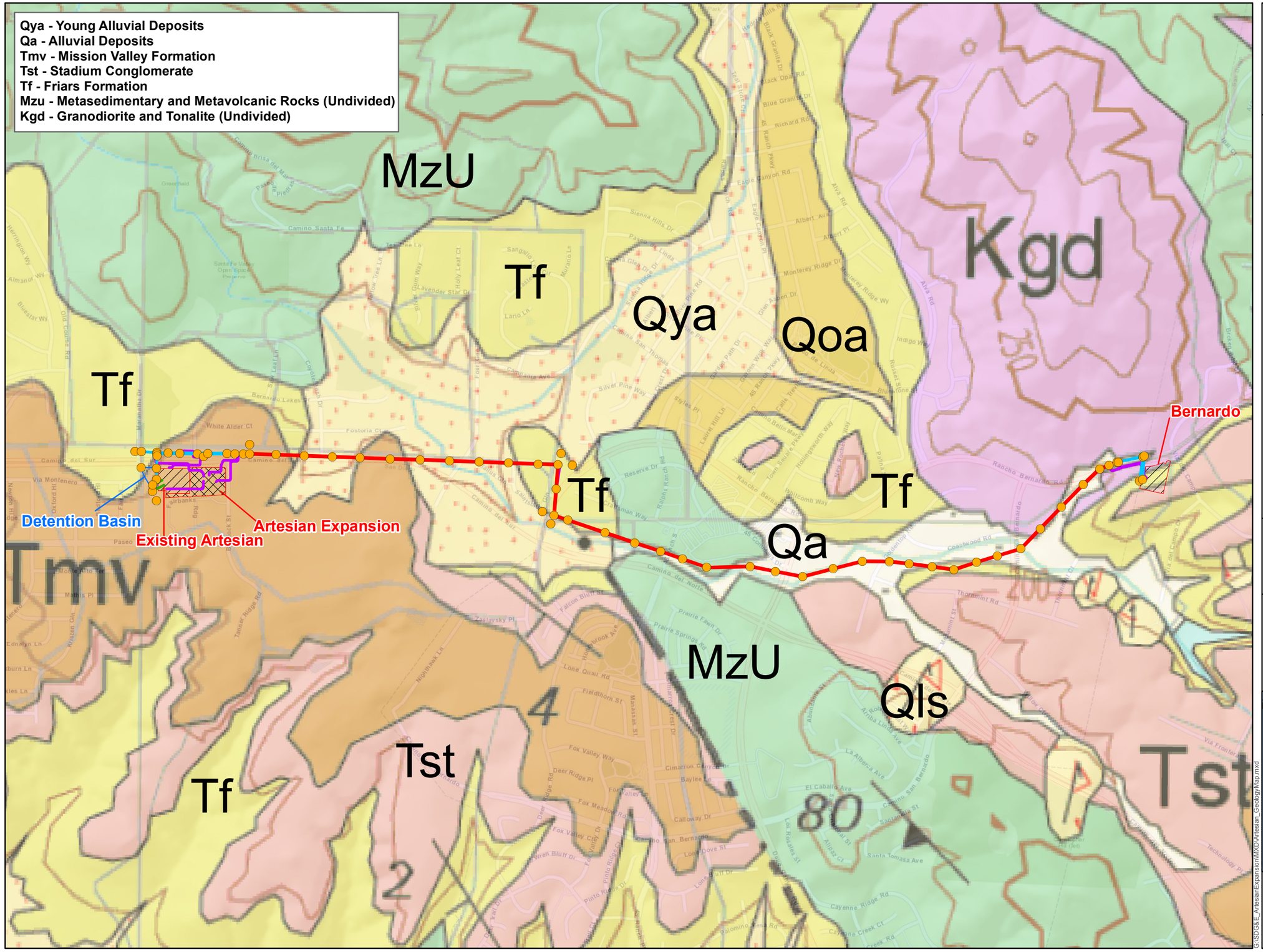
# Artesian 230kV Substation Expansion Project

Geologic Map

**Figure 5.6-1**



**Qya - Young Alluvial Deposits**
**Qa - Alluvial Deposits**
**Tmv - Mission Valley Formation**
**Tst - Stadium Conglomerate**
**Tf - Friars Formation**
**Mzu - Metasedimentary and Metavolcanic Rocks (Undivided)**
**Kgd - Granodiorite and Tonalite (Undivided)**




**Project Features**

- Project Structure
- 69kV Reconductor
- New 230kV Loop-in
- Remove from Service
- New 69kV Underground Getaway
- Detention Basin
- Other Project Areas
- Artesian Expansion Area



TRC

SDGE A Sempra Energy utility

7/29/2016

0 500 1,000 1,500 2,000 Feet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Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.; Kennedy, Michael P. and Siang, S. Tan. 2005. Geologic Map of the Oceanside 30' X 60' Quadrangle, California. California Geological Survey Regional Geologic Map Series (SDSU http://www.geology.sdsu.edu/kmlgeology/kmz/sandiego_30_60/oceanside_30_60.kmz); SDG&E, 2015; TRC, 2015

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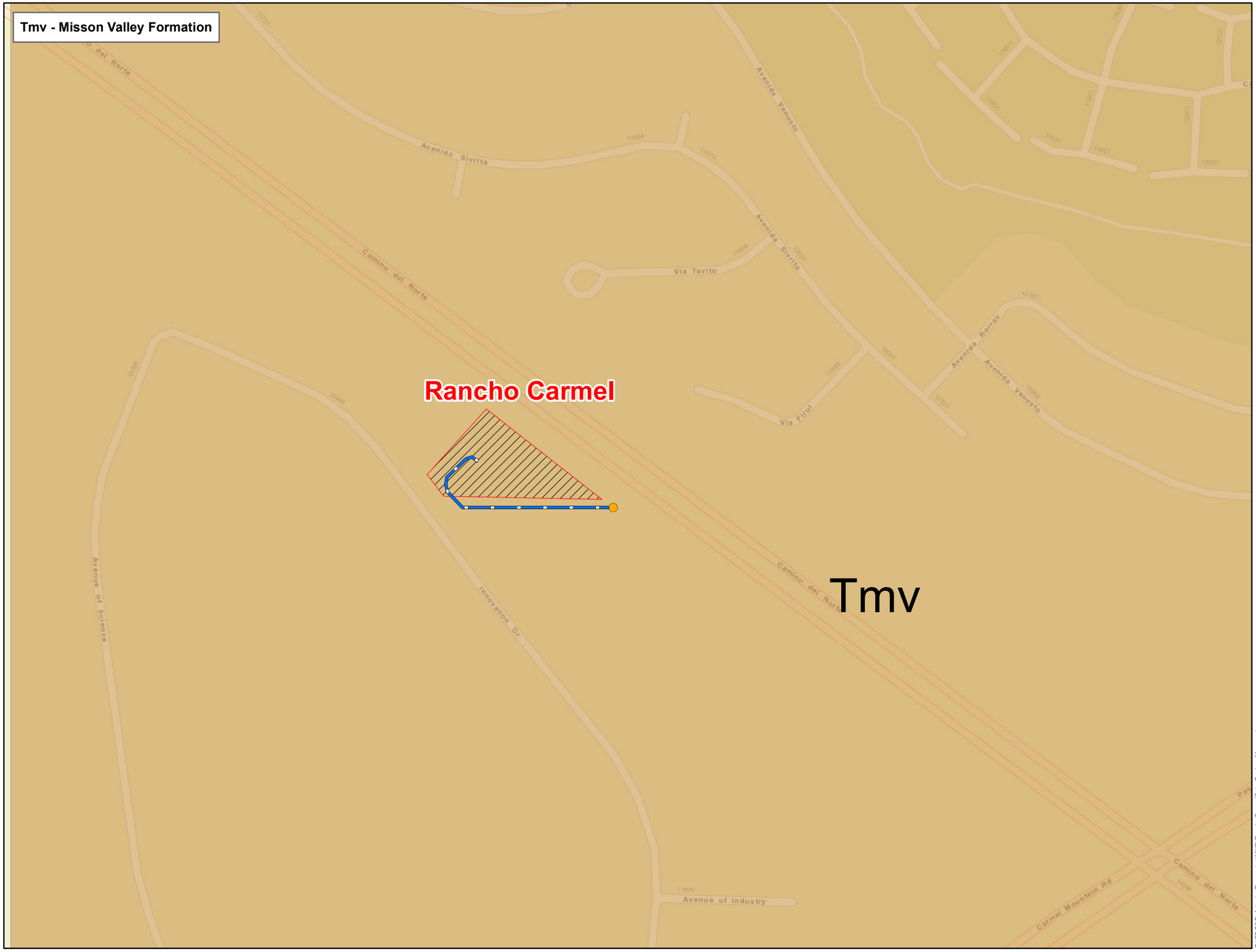
BACK OF FIGURE 5.6-1 (SHEET 1 OF 3)




**Artesian 230kV Substation Expansion Project**
Geologic Map
**Figure 5.6-1**



**Project Features**

- Project Structure
- New Cable in Existing Conduit
- Other Project Areas



TRC

SDGE A Sempra Energy utility

7/30/2016

0 150 300 450 Feet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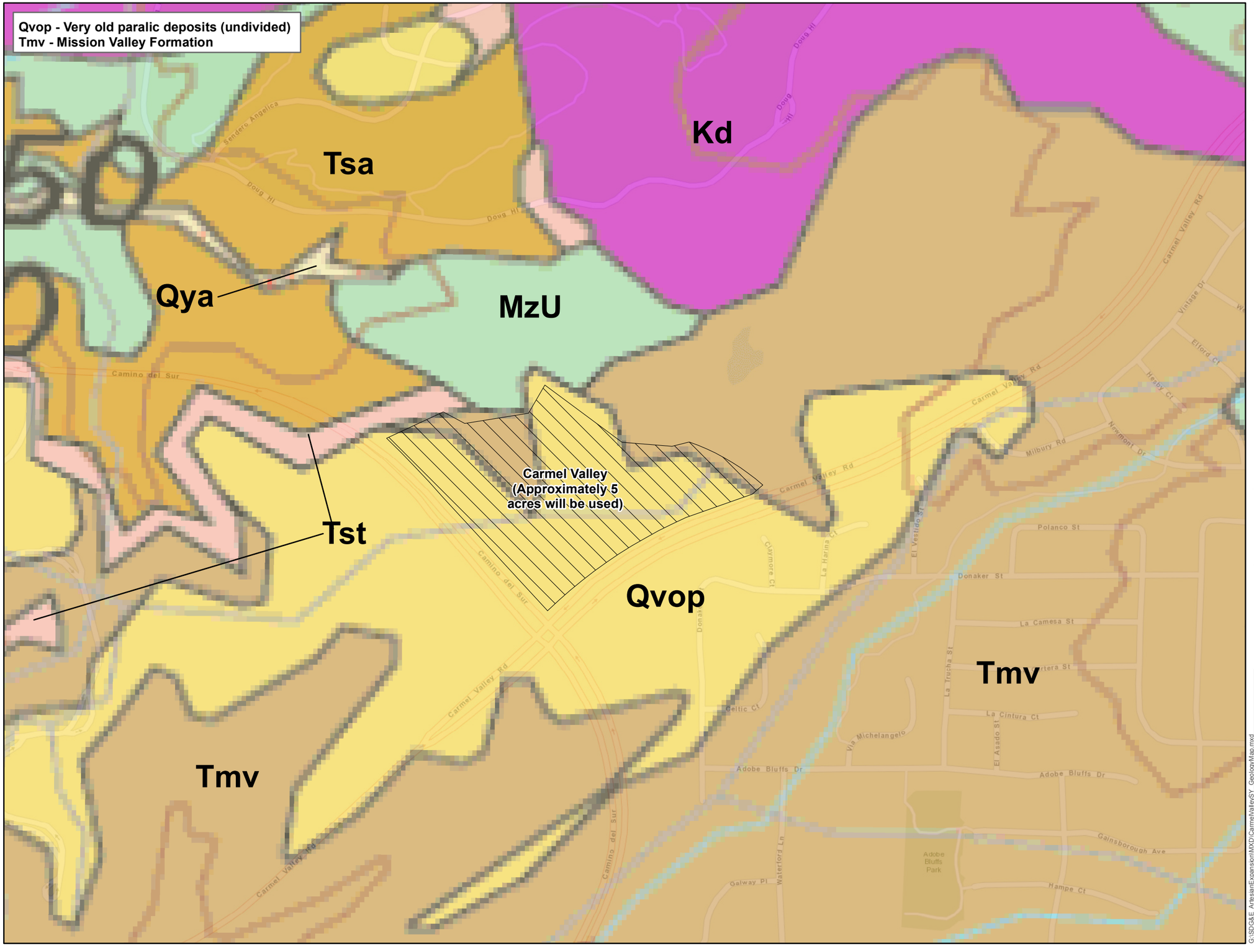
BACK OF FIGURE 5.6-1 (SHEET 2 OF 3)




**Artesian 230kV Substation Expansion Project**
Geologic Map
**Figure 5.6-1**

Sheet 3 of 3

**Project Features**

Staging / Storage Yard



TRC

SDGE A Sempra Energy utility

7/29/2016

0 250 500 750 1,000 Feet


G:\SDG&E Artesian\Expansion\MXD\CarmelValley\SY_GeologyMap.mxd

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp. Kennedy, Michael P. and Siang, S. Tan. 2005. Geologic Map of the Oceanside 30' X 60' Quadrangle, California. California Geological Survey Regional Geologic Map Series (SDSU http://www.geology.sdsu.edu/kmlgeology/kmz/sandiego_30_60/oceanside_30_60.kmz); SDG&E, 2015; TRC, 2015

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BACK OF FIGURE 5.6-1 (SHEET 3 OF 3)

**Table 5.6-1: Geologic Units along the Proposed Project**

| Symbol | Unit Name | Period | Description |
|---|---|---|---|
| **Sedimentary Units** | | | |
| Af | Artificial Fill | Historic | Varies. |
| Qya | Young Alluvial Deposits | Quaternary (Holocene Epoch) | Mostly poorly consolidated, poorly sorted, permeable flood plain deposits |
| Qa | Alluvial Deposits | Quaternary (Holocene) | Unconsolidated sandy, silty or clay-bearing alluvium. |
| Qvop | Very Old Alluvial Deposits | Quaternary (Middle to Early Pleistocene) | Marine terrace deposits consisting of sands and gravels covered by colluvium and alluvium |
| Tmv | Mission Valley Formation | Tertiary (Middle Eocene Epoch) | Predominately light olive-grey soft and friable fine- to medium-grained marine and nonmarine sandstone with cobble conglomerate tongues. |
| Tst | Stadium Conglomerate | Tertiary (Eocene Epoch) | Massive cobble conglomerate with yellowish-brown sandstone matrix |
| Tf | Friars Formation | Tertiary (Middle Eocene Epoch) | Yellowish green to gray medium-grained sandstone with claystone interbeds and cobble conglomerate |
| **Igneous and Metamorphic Units** | | | |
| Mzu | Metasedimentary and Metavolcanic Rocks (Undivided) | Mid-Cretaceous | Mostly massive, medium- to course-grained, dark gray hornblende and diorite and quartz-bearing diorite |
| Kgd | Granodiorite and Tonalite (Undivided) | Cretaceous | Metavolcanic and metasedimentary rocks mostly consisting of volcaniclastic breccia and metaandesitic flows, tuffs and tuff-breccia |

Source: *Kennedy and Siang, 2001, 2005.*

**Faulting and Seismicity**

The Alquist-Priolo Act required the California Division of Mines and Geology (now the California Geological Survey) to compile maps of the surface traces of all known active faults in the State. By definition, an active fault is one that is "sufficiently active and well-defined," with evidence of surface displacement within the Holocene epoch time (within approximately about the last 11,000 years). Active fault zones are the locations in the State with the most potential for surface fault rupture. A potentially active fault is one that has evidence of displacement within the Quaternary Period (last 1.6 million years). Potentially active faults are considered to also represent possible surface rupture hazards, although to a lesser degree than active faults. In

contrast to active or potentially active faults, faults considered inactive have not moved in the last 1.6 million years.

The Proposed Project occurs within the area of three USGS 7.5 minute quadrangle maps: (1) Rancho Santa Fe Quadrangle; (2) Escondido Quadrangle; and (3) Poway Quadrangle. There are no known active or potentially active faults or Alquist-Priolo Act earthquake fault zones in these quadrangles. The closest known active and potentially active faults are located offshore and associated with the Newport-Inglewood-Rose Canyon Fault Zone. Both active and potentially active surface traces of the fault zone are mapped to occur more than 10 miles west of the Proposed Project. This fault zone has an estimated slip rate of 1.5 to 2 millimeters per year (Southern California Edison, 2012; California Geological Survey, 2002). The closest active or potentially active faults to the north and east of the Proposed Project are those associated with the Elsinore Fault Zone. Active and potentially active surface traces of the Elsinore Fault Zone occur more than 20 miles to the northeast of the Proposed Project. The Elsinore Fault Zone is a major dextral strike-slip fault zone that is part of the overall San Andreas Fault System that accommodates up to 5 millimeters per year of Pacific-North American plate boundary slip. Other regional faults with the potential to cause strong ground shaking in the Proposed Project area include the offshore Coronado Bank Fault Zone, the Earthquake Valley Fault, and the San Jacinto Fault Zone. Distance from the Proposed Project area and maximum earthquake magnitude (Mw) for each of these faults are provided in Table 5.6-2, Major Faults in the Region.

**Table 5.6-2: Major Faults in the Region**

| Fault Name | Distance and Direction | Maximum Earthquake Magnitude (Mw) |
|---|---|---|
| Newport-Englewood-Rose Canyon Fault Zone (offshore) | >10 miles W | 7.2 |
| Coronado Bank Fault Zone | >20 Miles SW | 7.6 |
| Elsinore (Julian Section) | >20 Miles NE | 7.1 |
| Earthquake Valley | >30 Miles NE | 6.5 |
| San Jacinto (Coyote Creek Section) | >45 Miles E | 6.8 |
| San Jacinto (Anza Section) | >45 Miles NE | 7.2 |
| Sources: *Distance and direction from Jennings and Bryant, 2010; Maximum Earthquake magnitudes from Geocon, Inc., 2012.* | | |

### Fault Rupture

There are no known active or potentially active faults or Alquist-Priolo Act earthquake fault zones within the Proposed Project footprint. Therefore, there are no locations within the Proposed Project footprint area that are prone to surface fault rupture.

### Strong Seismic Shaking

Intensity of seismic shaking during an earthquake is dependent on the distance from the epicenter of the earthquake, the magnitude of the earthquake, and the geologic conditions underlying and surrounding the area. All of southern California is considered to be a seismically active region. The San Diego County area is subject to strong seismic shaking from regional earthquakes that may occur on active faults that occur in the region including, but not limited to, those listed in Table 5.6-2.

## 5.6.3.4 Geologic Hazards

### Subsidence

The primary causes of most subsidence involve human activities, including groundwater or petroleum withdrawal from large alluvial basins with thick accumulations of unconsolidated sediments or drainage of organic soils. Regional lowering of land elevation occurs gradually over time. Subsidence is not a significant risk for the Proposed Project because the Proposed Project does not involve the withdrawal of fluid from geologic materials that could cause subsidence, and because there are no large alluvial basins in the Proposed Project area and Proposed Project facilities are not generally vulnerable to adverse effects from subsidence.

### Landslides

Landslide potential can be high in steeply sloped areas. Human factors such as over-steepening/overloading of slopes or introduction of excessive water in soil pores or joints and fractures in rock can also lead to landslides. The principal natural factors contributing to landslides are topography, geology and precipitation. The Friars Formation, which underlies the existing Artesian Substation and the expansion area, can be prone to sliding in some areas, but geotechnical investigations have determined that no landslide hazards affect the site. A geotechnical investigation will be completed for proposed transmission and power line structures and such investigation would consider geotechnical conditions. The Proposed Project final transmission and power line structure designs will account for any substantive risks identified by the geotechnical study.

### Liquefaction and Lateral Spreading

Liquefaction is a seismic phenomenon in which loose, saturated, soils with low cohesion behave similar to a fluid when subjected to high-intensity ground shaking. An increase in pore pressure occurs as the soil attempts to compact in response to the shaking, resulting in less grain-to-grain soil contact and, therefore, loss of strength. Liquefaction occurs when three general conditions exist: shallow groundwater (40 feet below ground surface or less); low-density, fine-grained sandy soils; and high-intensity ground motion. Effects of liquefaction on level ground can include sand boils, settlement, and bearing capacity failures below structural foundations.

Lateral spreads involve lateral displacement of large, intact soil blocks down gentle slopes or in the direction of a steep free face such as a stream bank. Lateral spreading can occur in fine-grained, sensitive soils such as quick clays, particularly if remolded or disturbed by construction and grading. Loose, granular soils present on gentle slopes and underlain by a shallow water table commonly produce lateral spreads through liquefaction. Conditions susceptible to lateral spreading can be found along stream banks, canals, or cut slopes in recent alluvial or deltaic deposits.

The young alluvial deposits (Qya) unit is the only geologic unit in the Proposed Project area that might be susceptible to liquefaction. No new structures are proposed in this unit. Furthermore, unsupported free face slope conditions potentially susceptible to lateral spreading do not occur at any of the substations affected by the Proposed Project. A geotechnical investigation would be completed for the proposed transmission and power line structures that would consider the stability of any slopes. The Proposed Project final transmission and power line structure designs would account for any substantive slope risks identified by the geotechnical study.

**Soil Collapse**

Soil collapse occurs when added moisture causes bonds between soil particles to weaken, which allows the soil structure to collapse and the ground surface to subside. Collapsible soils are generally low-density, fine-grained combinations of clay and sand left by mudflows that have dried, resulting in the formation of small air pockets in the subsurface. The addition of moisture reduces the strength of the soil, resulting in collapse or subsidence. With the Proposed Project occurring in areas that have been previously graded and developed, it is unlikely that conditions susceptible to soil collapse are present. The substations included in the Proposed Project are located on graded pads where native soils have been removed and there is no risk of soil collapse. A geotechnical study will be completed for the proposed transmission and power line structures that would evaluate structure locations for soils that could affect construction or foundation conditions. The final designs for proposed new structures would account for any substantive risks identified by the geotechnical study.

### 5.6.3.5 Soils

Table 5.6-3, Soils in the Proposed Project Footprint, identifies soil types that occur within the Proposed Project footprint. Soils range from rocky sandy loam to clay. Soil symbols and names in Table 5.6-3 correspond to the USDA Soil Conservation Service mapping program. The substations and other portions of the Proposed Project area have been graded and developed and the native soils have generally been removed.

**Table 5.6-3: Soils in the Proposed Project Footprint**

| Symbol | Name | Drainage Class | Typical Slope (%) |
|---|---|---|---|
| CmE2 | Cieneba Rocky Coarse Sandy Loam | Somewhat Excessively Drained | 9—30 |
| DaC | Diablo Clay | Well Drained | 2—9 |
| DaD | Diablo Clay | Well Drained | 9—15 |
| DaE | Diablo Clay | Well Drained | 15—30 |
| DoE | Diablo-Olivenhain | Well Drained | 9—30 |
| HrC | Huerhuero Loam | Moderately Well Drained | 2—9 |
| HrC2 | Huerhuero Loam | Moderately Well Drained | 5—9 |
| HrE2 | Huerhuero Loam | Moderately Well Drained | 15—30 |
| LeD | Las Flores loamy find sand | Moderately Well Drained | 9—15 |
| OhC | Olivenhain Cobbly Loam | Well Drained | 2—9 |
| PfA | Placentia Sandy Loam | Moderately Well Drained | 0—2 |
| PfC | Placentia Sand Loam | Moderately Well Drained | 2—9 |
| RdC | Redding Gravelly Loam | Well Drained | 2—9 |
| SbC | Salinas Clay Loam | Well Drained | 2—9 |
| SmE | San Miguel Rocky Silt Loam | Well Drained | 9—30 |
| VsC | Vista Coarse Sandy Loam | Well Drained | 5—9 |

Source: *USDA Web Soil Survey*: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Site visited on October 8, 2015.

### 5.6.4 Potential Impacts

#### 5.6.4.1 Significance Criteria

Thresholds of impact significance were derived from Appendix G of the *CEQA Guidelines*. Under these guidelines, the Proposed Project could have a potentially significant impact to geology and soils if it would:

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

i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault (refer to Division of Mines and Geology Special Publication 42);
ii. Strong seismic ground shaking;
iii. Seismic-related ground failure, including liquefaction; or
iv. Landslides;

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

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

d) Be located on expansive soil, as defined by article 1803.5 of the California Building Code (CBC), creating substantial risk to life or property; or

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

### 5.6.4.2 Question 6a(i) – Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

**Construction and Operation & Maintenance – No Impact**

No portion of the Proposed Project is located in an Alquist-Priolo Act earthquake fault zone. There are no active or potentially active faults crossing the Proposed Project route. The closest known active fault is part of the Newport-Inglewood-Rose Canyon Fault Zone located more than 10 miles to the west of the Proposed Project. No recognized active faults underlie the Proposed Project area; therefore, no impacts from fault rupture are expected.

### 5.6.4.3 Question 6a(ii) – Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

**Construction – Less than Significant Impact**

As noted above, no portion of the Proposed Project is located in an Alquist-Priolo Act earthquake fault zone, there are no active or potentially active faults crossing the Proposed Project route, the closest known active fault is part of the Newport-Inglewood-Rose Canyon Fault Zone located more than 10 miles to the west of the Proposed Project. Nonetheless, all of southern California is considered to be a seismically active region, and the San Diego County area is subject to strong seismic shaking from regional earthquakes that may occur on active faults that occur outside of the Proposed Project area. However, because of the short (approximately 30 months) construction period and the low likelihood of a moderate to large earthquake to occur during this time, the potential for project structures, construction personnel,

or members of the general public to experience strong seismic ground shaking is less than significant.

**Operation & Maintenance – Less than Significant Impact**

Underground electric transmission facilities are generally not subject to direct effects of shaking because they are confined by surrounding soil. Design and construction of overhead facilities would conform to CPUC General Order 95, industry practice, and SDG&E internal structural design requirements. These transmission design requirements for wind loading combined with broken phase loading exceed those for seismic accelerations. With the application of engineering principles and compliance with design standards outlined in General Order 95 applied to minimize damage from seismic shaking, the risk of damage to the Proposed Project facilities is less than significant.

Additionally, SDG&E currently maintains and operates electric transmission, power, distribution and substation facilities throughout the Proposed Project area. The substations, power lines, and transmission line included in the Proposed Project are currently part of SDG&E operations and maintenance existing conditions. SDG&E's existing facilities and operations and maintenance activities constitute the baseline, under CEQA, against which the impacts of the Proposed Project are evaluated. Operations and maintenance activities for the Proposed Project would be similar to baseline conditions with new structures adhering to current seismic design standards. Considering that operations and maintenance activities would be similar to baseline conditions, the related seismic risk to people would not be materially different from existing conditions.

### 5.6.4.4 Question 6a(iii) – Expose people or structures to potential substantial adverse effects, including seismic-related ground failure, including liquefaction?

**Construction – Less Than Significant Impact**

Liquefaction could occur only as a secondary effect of strong seismic ground shaking. Secondary effects by definition have a lower probability of occurrence because they require the alignment of more than one event. The substations included in the Proposed Project and the proposed new power line and transmission line structures would occur in geologic units that are not susceptible to liquefaction. The substations are located in areas of Tertiary and older rock that is lithified. Some of the proposed new power line structures are located in Quaternary alluvium (Qa) that is not lithified, but considering the location and limited extent of the Qa geologic unit in the Proposed Project (Refer to Figure 5.6-1), the soil and groundwater conditions necessary for liquefaction to occur are unlikely to be present. Geotechnical studies that were conducted for past SDG&E projects in the area have not identified soils susceptible to liquefaction in the areas where the Proposed Project would occur. A geotechnical investigation will be completed for the proposed new transmission and power line structures and that study would consider geotechnical conditions. The final designs would account for any substantive risks identified by the geotechnical study. Considering the low likelihood of a large earthquake occurring during the approximately 24-month construction period and the absence of conditions susceptible to liquefaction, the risk of project structures, construction personnel, or the general public being exposed to earthquake-induced liquefaction is less than significant.

**Operation & Maintenance – Less Than Significant Impact**

The Proposed Project substations are not located in areas susceptible to liquefaction. As described in Section 5.6.3.4, Geologic Hazards, a geotechnical investigation will be completed for the Proposed Project that would consider geotechnical conditions at proposed new transmission line and power line structure locations. The final designs would account for any substantive risks identified by the geotechnical study in accordance with CPUC General Order 95, industry practice, and SDG&E internal requirements, so that the potential for damage to the proposed transmission line and power line facilities from earthquake-induced liquefaction would be less than significant.

Additionally, SDG&E currently maintains and operates electric transmission, power, distribution and substation facilities throughout the Proposed Project area. The substations and transmission and power lines included in the Proposed Project are currently part of SDG&E operations and maintenance existing conditions. SDG&E's existing facilities and operations and maintenance activities constitute the baseline, under CEQA, against which the impacts of the Proposed Project are evaluated. Operations and maintenance activities for the Proposed Project would be similar to baseline conditions. Therefore, the operations and maintenance-related risk to people and existing structures would not be materially different from existing conditions.

### 5.6.4.5 Question 6a(iv) – Expose people or structures to potential substantial adverse effects, including landslides?

**Construction – Less than Significant Impact**

Most of the Proposed Project facilities occur in terrain with limited topographic relief that is not susceptible to landslides. Nevertheless, at limited locations where proposed new transmission or power line structures are located adjacent to locally steep terrain, there is potential for landslides and other mass wasting (i.e. slope mobilization events) to occur. Slope stability issues can be exacerbated by changes to grading, drainage or infiltration characteristics if proper precautions are not taken.

The Proposed Project would result in minimal change to surface grades, drainage or infiltration characteristics. Work would occur in areas with existing access roads. Minor grading could be required at a few structures. Stringing sites and staging yards would be selected to utilize areas that would require little or no grading. Construction disturbances would be stabilized when work is complete. Due to the minor nature of grading and land disturbance the Proposed Project would have a less than significant effect on slope stability. The substations are located in graded and developed areas and geotechnical studies have not identified slope stability to be a risk. A geotechnical investigation will be completed for proposed new transmission and power line structures that would consider slope conditions in proximity to proposed structure locations. The final design would be in accordance with CPUC General Order 95, industry practice, and SDG&E internal requirements, and would account for any substantive risks identified by the geotechnical study so that the potential for landslide-related impacts to people and structures from Proposed Project construction would be less than significant.

**Operation & Maintenance – Less Than Significant Impact**

As previously described, the Proposed Project would result in minimal change to surface grades, drainage or infiltration characteristics and construction disturbances would be stabilized when work is complete. The minimum grading and prompt stabilization of construction disturbances would minimize the potential for the Proposed Project to adversely affect natural slope stability during the operation and maintenance phase of the Proposed Project. The substations are located in graded and developed areas and geotechnical studies have not identified slope stability to be a risk. A geotechnical investigation would be completed for the proposed new transmission and power line structures that will consider geotechnical conditions at proposed structure locations. The final design will be in accordance with CPUC General Order 95, industry practice, and SDG&E internal requirements and will account for any substantive risks identified by the geotechnical study so that the potential for landslide-related impacts to people and structures from operation and maintenance of Proposed Project facilities would be less than significant.

Additionally, SDG&E currently maintains and operates electric transmission, power, distribution and substation facilities throughout the Proposed Project area. SDG&E's existing facilities and operations and maintenance activities constitute the baseline, under CEQA, against which the impacts of the Proposed Project are evaluated. The Proposed Project does not include physical changes that could materially affect slope stability compared to existing conditions. Because operations and maintenance activities for the Proposed Project would be similar to baseline conditions and the Proposed Project would not affect slope stability, there would be no change in operations and maintenance impact compared to existing conditions.

### 5.6.4.6 Question 6b – Result in substantial soil erosion or the loss of topsoil?

**Construction – Less Than Significant Impact**

Soil erosion or topsoil loss could result from excavation or grading activities during construction. The Proposed Project would result in minimal change to surface grades, drainage or infiltration characteristics. Because the substation areas and areas where underground work is proposed are already developed, there would be little or no disturbance to native soils at these locations. Disturbances at the Bernardo and Rancho Carmel Substations as well as the getaways at the Artesian Substation would ultimately be stabilized to pre-construction conditions. Grading at the Artesian Substation would occur in accordance with a final grading plan and would include expansion of the existing detention basin to control storm water discharges and limit erosion.

Minor grading could be required at a few of the proposed new transmission or power line structures. Stringing sites and staging yards would be selected to utilize areas that would require little or no grading. Construction disturbances would be stabilized when work is complete. Grading for the Proposed Project would result in limited disturbances as summarized in Table 5.6-4, Grading Disturbance Area.

**Table 5.6-4: Grading Disturbance Area**

| Proposed Project Facility | Grading Disturbance Area (acres) | Net Excavation (Cut - Fill) Cubic yards |
|---|---|---|
| Artesian Substation and Expansion | 6.0 | 23,600 |
| Detention Basin Expansion | 0.68 | 5,300 |
| Bernardo Substation | 0 [a] | 0 |
| Rancho Carmel Substation | 0 [a] | 0 |
| Staging Yards | 0 [a] | 0 |
| Artesian and Bernardo Getaways | N/A [b] | 2,700 |
| 69kV Overhead Power Line | N/A [b] | 500 |
| **TOTAL** | 6.0 | 32,100 |

Notes:
[a] Work at these locations is not anticipated to require grading or substantial excavation (cut/fill).
[b] While grading will not occur during these activities, excavation (cut & fill) will occur, resulting in "cut".

Soil erosion and topsoil loss would be controlled by implementing SDG&E's *BMP Manual* during design and construction of the Proposed Project. In addition, the Proposed Project would comply with the Construction General Permit which would include the preparation of a SWPPP (refer to Section 5.9 for additional information on the Construction General Permit). Surface disturbance would be minimized to the extent consistent with safe and efficient completion of the Proposed Project. Topsoil would be salvaged from areas where grading would otherwise result in a loss of topsoil, and the salvaged soil would be used to reclaim areas of temporary construction disturbance. Once temporary surface disturbances are complete, temporary construction impact areas would be stabilized. Considering these measures, impacts from soil erosion and loss of topsoil would be less than significant.

**Operation & Maintenance – No Impact**

SDG&E currently maintains and operates electric transmission, power, distribution and substation facilities throughout the Proposed Project area. SDG&E's existing facilities and operations and maintenance activities constitute the baseline, under CEQA, against which the impacts of the Proposed Project are evaluated. Operations and maintenance activities for the Proposed Project would be similar to baseline conditions. Soil erosion and topsoil loss would be controlled by implementing SDG&E's *BMP Manual* for maintenance of Proposed Project facilities. Considering that operation and maintenance will be similar to existing conditions, and that BMPs will be implemented, there will be no material impacts from soil erosion or loss of topsoil.

### 5.6.4.7 Question 6c – 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-site or off-site landsliding, lateral spreading, subsidence, liquefaction, or collapse?

**Construction – Less than Significant Impact**

The potential for liquefaction and landslide-related impacts are addressed in Sections 5.6.4.4 and 5.6.4.5, respectively.

Construction would have no subsidence impact because the Proposed Project does not involve the withdrawal of subsurface fluids that can cause subsidence, and because Proposed Project facilities are not generally vulnerable to adverse effects from subsidence.

Construction could affect, or be affected by, lateral spreading or soil collapse. The substations are located on graded pads where native soils have been removed and no steep unsupported slopes occur, so collapse risk and lateral spreading are not material risks. Transmission line and power line structures are not typically susceptible to soil collapse and a geotechnical study will be completed for proposed new transmission and power line structures that would evaluate structure locations for soil and slope conditions that could affect construction or foundation conditions. The final design will be in accordance with CPUC General Order 95, industry practice, and SDG&E internal requirements and will account for any substantive risks identified by the geotechnical study. Considering these factors and the low likelihood of a large regional earthquake during the short period of construction, the risk of lateral spreading or issues related to collapsible soils during construction is less than significant.

**Operation & Maintenance – No Impact**

The potential for liquefaction and landslide-related impacts are addressed in Sections 5.6.4.4 and 5.6.4.5, respectively. Operation and maintenance of the Proposed Project would have no subsidence impact because the Proposed Project does not involve the withdrawal of subsurface fluids that can cause subsidence. The substations are located on graded pads where native soils have been removed and no steep unsupported slopes occur so collapse risk and lateral spreading are not material risks. A geotechnical study will be completed for proposed new transmission and power line structures and the final design will be in accordance with CPUC General Order 95, industry practice, and SDG&E internal requirements and will account for any substantive risks identified by the geotechnical study. SDG&E currently maintains and operates existing electric transmission, power, distribution and substation facilities throughout the Proposed Project site. SDG&E's existing facilities and operations and maintenance activities constitute the baseline, under CEQA, against which the impacts of the Proposed Project are evaluated. There is nothing about the Proposed Project operations and maintenance that differs from the existing conditions in terms of collapsible soils or lateral spreading, and thus there are no potential impacts.

#### 5.6.4.8 Question 6d – Be located on expansive soil, as defined by article 1803.5 of the California Building Code, creating substantial risk to life or property?

**Construction – Less Than Significant Impact**

Expansive soils are clayey soils that have a high plasticity index. Some soils in the Proposed Project area can have expansive properties, including the Diablo Clay and Salinas Clay Loam. Expansive soils typically can become a concern if a project includes shallow reinforced concrete spread footing foundations, such as those for buildings and other foundations covering a considerable area of ground. The substations included in the Proposed Project occur on graded pads where soils have been removed by grading, so potentially expansive native soils are generally not present. The proposed transmission and power line facilities do not include spread foundations and are not susceptible to damage from expansive soils. Considering these factors, the potential for expansive soils to occur in the Proposed Project area does not create a substantial risk to life or property and impacts would be less than significant.

**Operation & Maintenance – No Impact**

SDG&E currently maintains and operates existing electric power, distribution and substation facilities throughout the Proposed Project site. SDG&E's existing facilities and operations and maintenance activities constitute the baseline against which the impacts of the Proposed Project are evaluated. There is nothing about the Proposed Project operations and maintenance that differs from the existing conditions in terms of high plasticity soils, and thus there are no potential operation and maintenance impacts.

#### 5.6.4.9 Question 6e – Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

**Construction and Operation & Maintenance – No Impact**

The Proposed Project would not involve the installation of a septic tank or alternative wastewater disposal system; therefore, no impact would occur.

### 5.6.5 Applicant Proposed Measures

The Proposed Project would have no potentially significant impacts relating to geology or soils; therefore, no APMs are proposed.

### 5.6.6 Detailed Discussion of Significant Impacts

Based upon the preceding analysis, no significant impacts relating to geology or soils are anticipated from the Proposed Project.

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