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CHAPTER 4 – ENVIRONMENTAL IMPACT ASSESSMENT

4.6 GEOLOGY, SOILS, AND MINERAL RESOURCES

Would the project:	Potentially Significant Impact	Less-Than-Significant Impact with Mitigation Measures	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?[1]	☐	☐	☑	☐
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 where sewers are not available for the disposal of waste water?	☐	☐	☐	☑

[1] Refers to Divisions of Mines and Geology Special Publication #42

Would the project:	Potentially Significant Impact	Less-Than-Significant Impact with Mitigation Measures	Less-Than-Significant Impact	No Impact
f) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	❒	❒	❒	☑
g) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	❒	❒	❒	☑

4.6.0 Introduction

This section describes existing geologic and pedogenic soil conditions related to the San Diego Gas & Electric Company (SDG&E) South Bay Substation Relocation Project (Proposed Project). Topography and mineral resources are also addressed. Potential geologic hazards, including those associated with strong seismic shaking and the way these conditions and potential hazards could affect the Proposed Project, are discussed. The evaluation concludes that with the implementation of SDG&E's applicant-proposed measures (APMs), construction of the proposed Bay Boulevard Substation, 230 kilovolt (kV) loop-in, 69 kV relocation, 138 kV extension, and the demolition of the existing South Bay Substation, would result in less-than-significant impacts to geology and soils.

4.6.1 Methodology

The existing conditions and potential impacts associated with geologic hazards were obtained from the Geotechnical Investigation prepared by GEOCON Inc.,[2] dated July 20, 2007, which is included in Attachment 4.6-A: Geotechnical Investigation, and through a review of geologic and mineral resource literature relevant to the Proposed Project area. This material included publications from the United States (U.S.) Geological Survey (USGS), the California Department of Conservation, and the California Geological Survey (CGS). Planning documents prepared by the City of Chula Vista Planning and Development Services Department were also reviewed and reconnaissance field investigations were performed. The Geotechnical Investigation Report is provided in Attachment 4.6-A: Geotechnical Investigation.

[2] The Geotechnical Investigation contains outdated Proposed Project component names. Any inconsistencies with the Proponent's Environmental Assessment will be addressed when the Geotechnical Investigation is finalized along with the Proposed Project design.

4.6.2 Existing Conditions

Geologic Setting

The Proposed Project site is situated in the western portion of the Peninsular Ranges geomorphic province of Southern California. This geomorphic province encompasses an area that extends from the Los Angeles Basin and Transverse Ranges south to the tip of Baja California. The geomorphic province varies in width from 30 to 100 miles, most of which is characterized by northwest trending mountain ranges separated by subparallel fault zones. In general, the Peninsular Ranges are underlain by Jurassic-age metavolcanic and metasedimentary rocks and by Cretaceous-age igneous rocks of the Southern California batholith. The westernmost portion of the province in San Diego County generally consists of uplifted Upper Cretaceous-, Tertiary-, and Quaternary-age sedimentary rocks.

Faults, Seismicity, and Related Hazards

Faults

In comparison to other areas of Southern California, the immediate San Diego area has a relatively quiet seismic history. The historical pattern of seismic activity in coastal San Diego has generally been characterized as a broad scattering of small-to-moderate magnitude earthquakes; whereas the surrounding regions of southern California, such as the Imperial Valley, northern Baja California and the nearby offshore regions are characterized by a higher rate of seismicity. The geologic structure of Southern California is dominated by right-lateral strike-slip faulting associated with the movement of two tectonic plates—the Pacific Plate and the North American Plate. The San Andreas Fault system, which lies east of San Diego County, marks the principal boundary element between these plates. The Rose Canyon Fault, located approximately 3.3 miles west of the Proposed Project site, is the closest known active fault. Much of the San Diego coastal area lies within the Rose Canyon fault zone, a zone of right-lateral faults.

Fault Rupture

The on-shore portion of the Rose Canyon Fault zone extends along the northeast flank of Mount Soledad in La Jolla and continues southward along the eastern margins of Mission Bay. Between Mission Bay and San Diego Bay, the zone widens and diverges. Although portions of this fault zone in the Mount Soledad, Rose Canyon, and downtown San Diego areas have been designated as Alquist-Priolo Earthquake Fault Zones, none of the work areas associated with the Proposed Project lie in an Alquist-Priolo Earthquake Fault Zone. The Alquist-Priolo Earthquake Fault Zoning Act of 1972, formerly known as the Special Studies Zoning Act, regulates construction and development of buildings intended for human occupancy to avoid rupture hazards from surface faults. This act does not specifically regulate overhead transmission lines, but it does aid in defining areas where fault rupture is most likely to occur.

Strands of the Rose Canyon fault zone have been mapped within relative close proximity to the Proposed Project. The smaller, but potentially active La Nacion fault zone lies to the east. The Bay Boulevard Substation site is approximately 3.3 miles southeast of the Rose Canyon fault zone, approximately 12.8 miles east of the Coronado Bank fault zone, and approximately 45 to 49 miles west of the Elsinore fault zone. Table 4.6-1: Active Faults lists active earthquake events and estimated site accelerations for the faults considered most likely to subject the Proposed Project area to ground shaking.

Table 4.6-1: Active Faults

Fault	Approximate Distance to Proposed Project (miles)	Fault Length (miles)	Maximum Magnitude Events	
			Maximum Estimated Earthquake Magnitude	Peak Site Acceleration (g)
Rose Canyon Fault Zone	3.3	19	7.2	0.43
Coronado Bank	12.8	56	7.6	0.26
Newport–Inglewood (offshore)	42.5	56	7.1	0.06
Elsinore (Julian)	45.2	112	7.1	0.06
Earthquake Valley	49.1	15	6.5	0.03
Elsinore (Coyote Mountain)	49.2	24	6.8	0.04
Elsinore (Temecula)	53.3	26	6.8	0.04

Sources: GEOCON Inc., 2007; California Department of Conservation, 2010; Southern California Earthquake Data Center, 2010

Strong Ground Motion

Strong ground motion or 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.

An earthquake is commonly described by the amount of energy released, which has traditionally been quantified using the Richter Magnitude scale. However, seismologists have recently begun using a Moment Magnitude scale because it provides a more accurate measurement of a major earthquakes size. The Moment Magnitude and Richter Magnitude scales are almost identical for earthquakes of less than magnitude 7.0. Moment Magnitude scale readings are slightly greater than a corresponding Richter Magnitude scale reading for earthquakes with magnitudes greater than 7.0. The maximum magnitude earthquake is defined as the maximum earthquake that appears capable of occurring under the presently known tectonic framework (California Geological Survey, formerly California Division of Mines and Geology, Notes, Number 43). The estimated maximum magnitude ground acceleration expected at the Proposed Project site was calculated to be approximately 0.43 gravity (g) using the Sadigh, *et al.* (1997)[3], acceleration-attenuation relationships.

The intensity of ground motions induced by earthquakes can be described using peak site accelerations, represented as a fraction of the acceleration of g. CGS Probabilistic Seismic Hazard Assessment (PSHA) maps were used to estimate peak ground accelerations within the vicinity of the Proposed Project area. Considering the uncertainties regarding the size and location of potential earthquakes and resulting ground motions that can affect a particular site, PSHA maps indicate that there is a 10-percent probability of exceeding a peak site acceleration of 0.19g in a 50-year period (Upper Bound Earthquake as defined in the 2001 California Building Code, Chapter 16) using a magnitude weighting factor based on a 7.5 magnitude earthquake, which equals an annual probability of one in 475 of being exceeded each year.

The Modified Mercalli Scale is another common measure of earthquake intensity, which is a subjective measure of earthquake strength at a particular place as determined by its effects on people, structures, and earth materials. Table 4.6-2: Earthquake Intensity Scale presents the Modified Mercalli Scale for Earthquake Intensity, including a range of approximate average peak accelerations associated with each intensity value. Based on the approximate peak accelerations provided, the Proposed Project area would fall within Intensity Range VII, as shown in Table 4.6-2: Earthquake Intensity Scale.

Uniform Building Code Seismic Design Parameters

Seismic design parameter estimation is a subset of structural analysis and is the calculation of the response of a building or other structure to earthquakes. It is part of the process of structural design or structural assessment and retrofit in regions where earthquakes are prevalent. Uniform Building Code (UBC) seismic design parameters applicable for the Proposed Project site are presented in Table 4.6-3: UBC Seismic Design Parameters.

Liquefaction

Liquefaction is the process in which the soil below the water table becomes converted to a fluid state and loses its strength when sufficiently shaken or vibrated during a seismic event. Typically, loose, fine-grained sands and silts below the water table are most susceptible to liquefaction. Medium dense sands and silts below the water table may also liquefy if the shaking is of sufficient severity and duration, such as that associated with a Class A fault zone. Adverse effects of liquefaction include: loss of bearing strength, lateral spreading, sand boils, ground oscillation, and settlement when liquefied ground re-consolidates following the seismic event. The Proposed Project area is not susceptible to liquefaction during a seismic event. Due to the dense and cohesive nature of the underlying soils, the potential for liquefaction occurring in the Proposed Project area is considered low. Additional detail on the soil characteristics is provided in Attachment 4.6-A: Geotechnical Investigation.

[3] Sadigh *et al* (1997) is a ground-motion model that presents acceleration-attenuation relationships.

Table 4.6-2: Earthquake Intensity Scale

Intensity Value	Intensity Description	Average Peak Acceleration Range
I	Not felt except by very few people under especially favorable circumstances.	<0.0017g
II	Felt only by a few people at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	0.0017–0.014g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck.	
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation is like a heavy truck striking building. Standing motor cars rock noticeably.	0.014–0.039g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	0.039–0.092g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moves and plaster falls or chimneys are damaged. Damage slight.	0.092–0.18g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by people driving motor cars.	0.18–0.34g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. People driving motor cars disturbed.	0.34–0.65g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	0.65–1.24g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	>1.24g

Intensity Value	Intensity Description	Average Peak Acceleration Range
XI	Few, if any, masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	>1.24g
XII	Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	

Sources: Bolt, 1988; Wald, 1999

Table 4.6-3: UBC Seismic Design Parameters

Fault	Approximate Distance to Proposed Project (miles)	Source Type (A, B, C)	Maximum Estimated Earthquake Magnitude	Approximate Slip Rate (millimeters/ year)	Fault Type (SS, DS, BT)
Rose Canyon Fault Zone	3.3	B	7.2	1.5	SS
Coronado Bank	12.8	B	7.6	3	SS
Newport–Inglewood (offshore)	42.5	B	7.1	1.5	SS
Elsinore (Julian)	45.2	A	7.1	5	SS
Earthquake Valley	49.1	B	6.5	2	SS
Elsinore (Coyote Mountain)	49.2	B	6.8	4	SS
Elsinore (Temecula)	53.3	A	6.8	5	SS

Source Type:
A – Faults that are capable of producing large-magnitude events and that have of a high rate of seismic activity
B – All faults other than types A and C
C – Faults that are not capable of producing large-magnitude earthquakes and that have a relatively low rate of seismic activity
Fault Type:
SS – strike slip, DS – dip slip, BT – blind thrust
Sources: CBC, 2001; California Department of Conservation, 2010

Slope Instability

Strong ground motion can result in rockfall hazards and/or slope instability. The slopes most susceptible to earthquake-induced failure include those with highly weathered and unconsolidated materials on moderately steep slopes (especially in areas of previously existing landslides).

Landslides occur when masses of rock, earth, or debris move down a slope, including rock falls, deep failure of slopes, and shallow debris flows. The actuators of landslides can be both natural events, such as earthquakes, rainfall, and erosion, and human activities. Those induced by man are most commonly related to large grading activities that can potentially cause new slides or reactivate old ones when compacted fill is placed on potentially unstable slopes.

Excavation operations can also contribute to landslides when lateral support near the base of unstable hillside areas is removed. Conditions to be considered in regard to slope instability include slope inclination, characteristics of the soil materials, the presence of groundwater and degree of soil saturation. The Proposed Project area is relatively flat with slopes of less than two percent, and is not likely to experience landslides or other forms of slope failure.

Differential Settlement

If the soil beneath a structure settles non-uniformly, the structure can be damaged. The reasons for differential settlement are usually traced to differences in bearing characteristics of the soils. Alternatively, a portion of the soil beneath a structure may lose strength during an earthquake due to liquefaction. If liquefaction occurs non-uniformly, differential compaction will occur. Unconsolidated or weakened geologic units in the Proposed Project area may be subject to differential settlement. These include areas of undocumented fill and alluvium.

Subsidence

Subsidence occurs most often when fluids are withdrawn from the ground, removing partial support for previously saturated soils. More rarely, subsidence occurs due to tectonic down-warping during earthquakes. Neither source of subsidence appears to be present in the Proposed Project area, making the probability of damage due to subsidence very low.

Soils

The soils directly underlying the Bay Boulevard Substation site consist of undocumented fill and alluvium. The upper soils consist of loose-to-medium dense silty and clayey sand, and soft to firm sandy clay. The fill and alluvium are underlain by the Pleistocene-age Bay Point Formation consisting of very stiff clay, silty clay, sandy clay; dense sand; and silty and clayey sand. The Pilocene-age San Diego Formation underlies the Bay Point Formation and consists predominantly of silty, fine- to coarse-grained sand with minor claystone and gravel interbeds. The San Diego Formation is underlain at a depth of approximately 300 feet by Oligocene and Eocene sedimentary rock that extends to depths of approximately 3,800 feet.

Expansive or Collapsible Soils

Expansive soils are characterized by the ability to undergo significant volume change (shrink and swell) as a result of variation in soil moisture content. Soil moisture content can change due to many factors, including perched groundwater, landscape irrigation, rainfall, and utility leakage. The Proposed Project site has a low expansion potential (Expansion Index [EI] less than 50) as defined by the California Building Code Table 18-I-B. The EI is used to measure a basic index property of soil; therefore, the EI is comparable to other indices, such as the liquid limit, plastic limit, and plasticity index of soils. Expansive soils are commonly very fine-grained with a high to very high percentage of two to one clays. Although there is a low expansion potential for the soils at the Proposed Project site, the clay portions of the Bay Point Formation may be potentially expansive.

Mineral Resources

Based on review of published sources and data from the USGS Mineral Resources Data System, no active mining operations are crossed by the Proposed Project. In addition, no significant economic mineral resources have been discovered within the limits of the Proposed Project. The Proposed Project is however, directly adjacent to the east side of Western Salt Works. Additionally, a past salt producer site—Chula Vista Evaporators—is located approximately 0.75 mile south of the Proposed Project.

4.6.3 Impacts

Significance Criteria

Standards of significance were derived from Appendix G of the California Environmental Quality Act Guidelines. These standards are summarized as follows:

Geology and Soils

- Impacts to geology and soils would be considered significant if the Proposed Project:
- Exposes people or structures to potential substantial adverse effects involving strong seismic ground shaking, fault rupture, liquefaction, or landslides
- Results in substantial soil erosion or the loss of topsoil
- Is located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Proposed Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse
- Is located on expansive soil, as defined in Table 18-1-B of the UBC (1994), creating substantial risks to life or property
- Is located on 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

Mineral Resources

Impacts to mineral resources would be considered significant if the Proposed Project:

- Results in the loss of availability of a known mineral resource that may be of value to the region and the residents of the state
- Results in the loss of availability of a locally important mineral resource recovery site that is delineated on a local general plan, specific plan, or other land use plan

Question 4.6a – Human Safety and Structural Integrity – *Less-than-Significant Impact*

i. Earthquake Fault Rupture

The Proposed Project would not cross nor be in close proximity of any active faults. The closest known fault zone is the Rose Canyon Fault Zone, which is located approximately 3.3 miles to the northwest of the Proposed Project. Although there is a potential to incur damage to the Proposed Project components from ground movement, the Proposed Project would be configured according to the Institute of Electrical and Electronics Engineers (IEEE) 693 Recommended Practices for Seismic Design of Substations, in order to withstand anticipated ground motion. Therefore, the affects of fault rupture at the Bay Boulevard Substation, 230 kV loop-in, 69 kV relocation, and 138 kV extension sites are anticipated to be less than significant.

ii. Strong Seismic Shaking

Earthquakes on faults closest to the Proposed Project area or rupturing in the direction of the Proposed Project area would most likely generate the largest ground motion or shaking. However, the Bay Boulevard Substation, 230 kV loop-in, 69 kV relocation, and 138 kV extension would be engineered to withstand strong ground movement and moderate ground deformation. The IEEE 693 Recommended Practices for Seismic Design of Substations has specific requirements to mitigate substation equipment damage. When these requirements are followed, very little structural damage from horizontal ground accelerations approaching 1.0 g is anticipated. Incorporation of these standard engineering practices as required by APM-GEO-01 in Section 4.6.4 Applicant-Proposed Measures, as well the recommendations in Attachment 4.6-A: Geotechnical Investigation, would ensure that people or structures would not be exposed to hazards associated with strong seismic ground shaking. As a result, impacts would be less than significant.

iii. Ground Failure

Liquefaction is not known to have occurred historically in the San Diego area, as seismic shaking levels have not been sufficient to trigger liquefaction. As discussed in Attachment 4.6-A: Geotechnical Investigation, the site is generally not susceptible to liquefaction during a seismic event. The evaluation included borings and laboratory testing indicating that the majority of the soils have fine contents above 60 percent and plasticity data indicating non-liquefiable materials. The borings show that the soils below the water table are medium-dense to very-dense Bay Point formation. Due to the dense and cohesive nature of the underlying soils, the potential for liquefaction occurring at the site is considered low. As a result, impacts would be less than significant.

iv. Landslides

Hazards related to slope instability and landslides are generally associated with foothill areas and mountain terrain, as well as steep riverbanks and levees. The Proposed Project would be located in areas that contain flat coastal terrain. There are no slopes greater than two percent, with the exception of the containment berms, which would be removed. As the Proposed Project area is not susceptible to geologic instability or landslide hazards, there would be no impact.

Question 4.6b – Soil Erosion or Topsoil Loss

Construction – Less-than-Significant Impact

The walled area of the Bay Boulevard Substation would occupy approximately 10 acres, which would be graded during construction. Grading would expose soil to erosion by removing the vegetative cover and compromising the soil structure. Rain and wind may potentially further detach soil particles and transport them off site. As discussed in response to Question 4.6ai, the sediment risk (i.e., soil loss) was calculated to be low. With the implementation of the Proposed Project's Stormwater Pollution Prevention Plan (SWPPP) and Water Quality Construction Best Management Practices Manual, soil erosion would be minimized and impacts would be reduced to a less-than-significant level (see Section 4.8 Hydrology and Water Quality for more details regarding the SWPPP and Water Quality Construction BMP Manual). In addition, as previously discussed, the Proposed Project site is disturbed and does not contain valuable topsoil. As a result, impacts would be less than significant.

Construction of the other Proposed Project components would result in minimal loss of topsoil and soil erosion. Grading may be required for the pole work areas and underground work areas. As previously mentioned for the Bay Boulevard Substation, impacts to topsoil would be minor considering the current use and production value. Because impacts to erosion would be temporary and controlled through the use of BMPs, impacts would be less than significant.

Operation and Maintenance – Less-than-Significant Impact

Operation and maintenance of the Proposed Project components would not typically involve ground-disturbing activities or grading. If grading is required, SDG&E would implement the Proposed Project SWPPP and associated BMPs. Furthermore, operation and maintenance activities at the Bay Boulevard Substation would occur in a similar manner to those which presently occur at the existing South Bay Substation. Additionally, maintenance vehicles would utilize a proposed access road for routine operation and maintenance activities at the Bay Boulevard Substation and would used existing paved and dirt access roads currently used by SDG&E to access the transmission lines. Therefore, impacts to soil erosion or topsoil would be less than significant.

Question 4.6c – Geologic Unit Instability – *Less-than-Significant Impact*

The Geotechnical Investigation prepared by GEOCON Inc. and evaluation of the Bay Boulevard Substation site concludes that the soil and geologic conditions are such that geologic instability is not expected to affect the Proposed Project. The probability of other geologic hazards, such as slope instability, landslide, lateral spreading, subsidence, collapse, differential settling and/or flooding affecting the Bay Boulevard Substation site is considered low. APM-GEO-01 in

Section 4.6.4 Applicant-Proposed Measures, would ensure that undocumented fill within the footprint of the Bay Boulevard Substation is considered in development of the grading plans. With implementation of APM-GEO-01, impacts from geologic instability would be less than significant.

The Proposed Project area is subject to relatively strong seismic shaking due to earthquakes. However, as described previously in the response to Question 4.6a, the Proposed Project components would be engineered to withstand strong ground movement and moderate ground deformation. The Proposed Project component sites are not located in an area susceptible to liquefaction and are not likely to be subject to subsidence because operation and maintenance activities at these sites would not involve the withdrawal of substantial groundwater.

The Proposed Project components would be located on relatively flat coastal terrain; therefore, little potential exists for slope failure. There are no slopes greater than two percent, with the exception of the containment berm, which would be removed. As a result, no impacts are anticipated.

Question 4.6d – Expansive Soils – *Less-than-Significant Impact*

As discussed in Attachment 4.6-A: Geotechnical Investigation, the surficial native soils encountered at the Proposed Project site have a low expansion potential. However, the Bay Point formation soil may contain clayey horizons, which are potentially expansive. Implementation of APM-GEO-01 in Section 4.6.4 Applicant-Proposed Measures, which includes the incorporation of design recommendations in accordance with the Geotechnical Investigation prepared by GEOCON Inc., would reduce risks associated with expansive soils to a less-than-significant level.

Question 4.6e – Septic Suitability – *No Impact*

Soil permeability is a consideration for projects that require septic system installation. Because the Proposed Project would not involve the installation of a septic tank or alternative wastewater disposal system, no impacts would occur.

Question 4.6f – Loss of Regional- or State-Valued Mineral Resources – *No Impact*

No active mining operations or known areas designated or delineated for mineral resource recovery are within the Proposed Project area. In addition, no known mineral resources that have noted value to the region and to the residents of the state would be impacted by the Proposed Project. As a result, the Proposed Project would have no impact on mineral resources.

Question 4.6g – Loss of Locally Important Mineral Resources – *No Impact*

There are no known locally important mineral sources within the Proposed Project site. However, the Western Salt Works operation is located directly adjacent to the east side of the Proposed Project site. All activities associated with the construction and operation and maintenance of the Proposed Project would be located on the Proposed Project parcel and would not impact the Western Salt Works facility. As a result, there would be no impact to locally important mineral resources.

4.6.4 Applicant-Proposed Measures

The following APM would ensure that impacts associated with expansive soils or other geological hazards would be reduced to a less-than-significant level:

- APM-GEO-01: SDG&E would consider the recommendations and findings of the Geotechnical Investigation prepared by GECON Inc. and the contractor's Geotechnical Engineer in the final design of all Project components to ensure that the potential for expansive soils and differential settling is compensated for in the final design and construction techniques. SDG&E would comply with all applicable codes and seismic standards. In addition, the Proposed Project would be configured according to the IEEE 693 "Recommended Practices for Seismic Design of Substations" in order to withstand anticipated ground motion. The final design would be reviewed and approved by a Professional Engineer registered in the State of California prior to construction.

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ATTACHMENT 4.6-A: GEOTECHNICAL INVESTIGATION