2.6 GEOLOGY, SOILS, AND SEISMICITY

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
GEOLOGY, SOILS, AND SEISMICITY— Would the proposed project:				
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 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 wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒

SETTING

The surface geology along the proposed project route has been mapped as primarily artificial fill, with some bedrock (serpentinite) and a small amount of alluvium. A major portion of the proposed project is within the Islais Creek Basin. Prior to the late 1800s, the Islais Creek Basin consisted of a small bay and tidal marsh surrounded by hills. Since that time, the marshland and bay have been extensively filled. Significant portions were graded by excavating rock outcrops and soil overburden and using excavated material to fill low lying areas and the bay. The fill overlying bedrock is mostly excavated serpentinite of variable compactness with some areas of poorly to moderately compacted sand and/or clay. The original shoreline along the south side of Islais Creek Basin extended approximately along Evans Avenue.

The proposed project is located in an area of very high seismic risk, since it is adjacent to a major tectonic plate interface between the North American and Pacific crustal plates. Relative movements of these plates along their interface at the San Andreas Fault occurs not as a continuous drifting, but rather as a series of intermittent slips which are felt as earthquakes. In addition to the main trace of the San Andreas Fault, strain buildup resulting from movements along the plate interface is relieved by earthquakes occurring on many smaller faults throughout the Bay Area.

The proposed project is located within existing roadways, a paved parking lot, a vacant lot, and existing switchyards in the Potrero Hill / Hunters Point area of San Francisco.

REGULATORY CONTEXT

ALQUIST-PRIOLO EARTHQUAKE FAULT ZONING ACT

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zones Act), signed into law in December 1972, requires the delineation of zones along active faults in California. The purpose of the Alquist-Priolo Act is to regulate development on or near fault traces to reduce the hazard of fault rupture and to prohibit the location of most structures for human occupancy across these traces. Cities and counties must regulate certain development projects within the zones, which includes withholding permits until geologic investigations demonstrate that development sites are not threatened by future surface displacement (Hart, 1997). Surface fault rupture is not necessarily restricted to the area within a Fault Rupture Hazard Zone, as designated under the Alquist-Priolo Act. The project area is not located within such a zone.

SEISMIC HAZARDS MAPPING ACT

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. Geotechnical investigations conducted within Seismic Hazard Zones must incorporate standards specified by Council for Geoscience Special Publication 117, Guidelines for Evaluating and Mitigating Seismic Hazards (CGS, 1997). The California Geologic Society (CGS) has completed seismic hazard mapping for portions of California that are most susceptible to liquefaction and earthquake-induced landsliding, including San Francisco.

CALIFORNIA BUILDING STANDARDS CODE

The California Building Standards Code is another name for the body of regulations known as the California Code of Regulations (CCR), Title 24. CCR Title 24 is assigned to the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in CCR Title 24 or they are not enforceable (Bolt, 1988).

Published by the International Conference of Building Officials (ICBO), the Uniform Building Code (UBC) is a widely adopted model building code in the United States. The California Building Code incorporates by reference the UBC with necessary California amendments. About one-third of the text within the California Building Code is tailored for California earthquake conditions (ICBO, 1997). The project area is located within Zone 4, which, of the four seismic zones designated in the United States, is expected to experience the greatest effects from earthquake ground shaking and therefore has the most stringent requirements for seismic design. Notwithstanding, the national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies.

CPUC GENERAL ORDER NO. 128

The CPUC General Order No. 128, Rules for Construction of Underground Electric Supply and Communication System, 1998, establishes general rules that govern the construction of underground electric and communication lines to promote and safeguard public health and safety. The Order focuses on standard design, construction, and maintenance criteria of these lines.

SAN FRANCISCO GENERAL PLAN COMMUNITY SAFETY ELEMENT

A revised version of the San Francisco General Plan Community Safety Element was adopted by the Planning Commission on April 27, 1997, and approved by the Board of Supervisors on August 11, 1997. The updated Element contains current policies that require new structures built in areas where site conditions could pose hazards, such as liquefaction or landslide, to be constructed in ways that reduce those hazards. Policy 2-3 is to “consider site soils conditions when reviewing projects in areas subject to liquefaction or slope instability.” Policy 2-9 is to “consider information about geologic hazards whenever City decisions that will influence land use, building density, building configuration or infrastructure are made” (City of San Francisco, 1997).

To implement the life safety policies of the Community Safety Element, as well as the Seismic Hazard Mapping Act, engineers and inspectors at the City and County of San Francisco Department of Building Inspection (DBI) should work closely with a geotechnical team to ensure that all life safety issues are addressed by special site investigations and that appropriate recommendations are included in a geotechnical report, if needed. The recommendations are incorporated in the permit requirements for proposed construction. Each proposed construction site is evaluated individually, based on its actual surface and subsurface conditions.

IMPACTS DISCUSSION OF GEOLOGY, SOILS, AND SEISMICITY

METHODOLOGY AND SIGNIFICANCE CRITERIA

The analysis of the potential intensity of impacts to geology and soils was derived from available soil maps, technical publications, test data, and other relevant publications that characterize the project area. This information was compared with the construction and design criteria of the proposed project. To determine the level of significance of the impacts anticipated from the proposed project, the proposed project's effects were evaluated as provided under the CEQA Guidelines. These significance criteria, as set forth in CEQA Guidelines Appendix G, are summarized in the checklist provided at the beginning of this section.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The project site is located in the Coast Ranges Geomorphic Province, which is an area of relatively high seismic activity. Several major northwest-trending fault zones are anticipated to generate major earthquakes that could induce significant ground shaking at the site, including the San Andreas Fault Zone (the dominant fault zone in California), and a number of smaller fault zones are located within 40 miles of the project site. In addition to the San Andreas and Hayward faults listed in **Table 2.6-1**, a major earthquake on any of the faults listed in **Table 2.6-1** could produce strong ground shaking at the site, affecting the proposed facilities. Shaking amplification is rated as "Extremely High" (8 on a scale of 1 to 8, with 8 rating the highest amplification) and the modified Mercalli intensity rating as high as IX-Violent (9 on a scale of 1 to 10, with 10 rating as very violent) for a major earthquake on the entire San Andreas Fault (ABAG, 2004). In an earthquake of that magnitude, damage to structures, roads, and infrastructure would be heavy throughout the project area. Geologic and seismic hazards that present the greatest potential impact to the proposed project include strong ground shaking and seismically induced ground deformations due to liquefaction, lateral spreading, and differential settlement.

TABLE 2.6-1
FAULTS IN THE PROJECT VICINITY

Fault	Activity[a]	Distance (miles)	MCE[b]
San Andreas	Holocene (Active)	7.5	8.3
Hayward	Holocene (Active)	11	7.0
Seal Cove – San Gregorio	Holocene (Active)	10.5	7.1
Calaveras	Holocene (Active)	21	7.0

[a] Age is the period of recorded or most recent geologic evidence of earthquake displacement on a fault.
[b] MCE is the Maximum Credible Earthquake, Richter magnitude, an estimate of the largest earthquake that is judged by geologic studies to be capable of occurring on a fault or segment of a fault.

SOURCE: USGS (2004)

Impact GEO-1: Structural damage could occur over a long period of time, usually the result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils. This would be a less than significant impact with implementation of Mitigation Measure GEO-1.

Expansive soils possess a "shrink-swell" behavior. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying. Structural damage may occur over a long period of time, usually the result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils.

> **Mitigation Measure GEO-1: A site-specific, design level geotechnical investigation shall be performed to assess the extent and consequence of the expansive soils. The sub grade shall be prepared and foundations constructed as recommended in the investigation to limit the impact due to expansive soils to less than significant. Recommendations and conclusions determined by a registered geotechnical engineer or qualified civil engineer shall be incorporated in the final design as part of the project. The design measures selected to mitigate expansive soil hazards shall be submitted to and approved by PG&E and the CPUC.**

Impact GEO-2: The proposed project could result in increased erosion, especially in areas that are underlain by Bay Mud and other fine-grained material and also where the soil would be exposed during construction. This would be a less than significant impact with implementation of Mitigation Measure GEO-2.

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering, mass wasting, and the action of waves, wind, and underground water. Soils containing high amounts of fine sands or silt can be easily erodible, while clay soils are less susceptible. Excessive soil erosion can eventually lead to damage of building foundations and roadways. At the project site, areas that are susceptible to erosion are those that are underlain by Bay Mud and other fine-grained material and also areas where the soil would be exposed during the construction phase. Typically, the soil erosion potential is reduced once the soil is covered with concrete, structures, or asphalt.

> **Mitigation Measure GEO-2: During construction and grading, erosion and sediment control measures shall be conducted in accordance with best management practices for the reduction of pollutants in runoff (refer to Section 2.8, *Hydrology and Water Quality*). The components of the proposed project would be subject to NPDES requirements and would require the acquisition of a NPDES general construction permit. Erosion of soil materials to local waterways and its affects on water quality are further discussed in Section 2.8, *Hydrology and Water Quality*. Best management practices for sediment and dust control shall be implemented to limit the impact due to erosion to a less than significant level. Best management erosion control measures shall also be implemented in unpaved areas, including the property between Cesar Chavez and Marin Streets.**

Impact GEO-3: The proposed project could be adversely affected by differential settlement, fault rupture, liquefaction, and seismic-related ground failure. This would be a less than significant impact with implementation of Mitigation Measure GEO-3.

Differential Settlement

If not properly engineered, loose, soft, soils comprised of sand, silt, and clay have the potential to settle after a building or other load is placed on the surface. Differential settlement of the loose soils generally occurs slowly, but over time can result in damage to most structures. The weak and compressible nature of Bay Mud and the artificial fills that have not been placed using good engineering practices provide poor support for structure and infrastructure. Differential settlement can damage buildings and their foundations, roads and rail lines, and result in breakage of underground pipes. Implementation of **Mitigation Measure GEO-3** would reduce any impacts related to differential settlement to a less than significant level.

Fault Rupture

Ground fault rupture is the direct manifestation of the movement that has occurred along a fault, projected to the ground surface. It consists of concentrated, permanent deformation of the ground surface, and in major earthquakes, can extend along the trace of the fault for many miles. This deformation can be in either a horizontal and/or vertical direction. Depending on the type of soils present at the site, the zone of ground deformation associated with fault rupture may be limited to a band a few inches wide, located directly over the fault, or it may be spread out over several hundred feet. A ground-surface rupture involving more than a few inches of movement within a concentrated area will cause major damage to the structures that cross it. Fault displacements associated with great earthquakes may be as large as 30 feet. In general, the precise location and total length of faults are not known because they are covered by alluvium. Fault displacements produce forces so great the best method of limiting damage to structures is to avoid building in areas close ground traces of faults. Implementation of **Mitigation Measure GEO-3** would reduce any impacts related to fault rupture to a less than significant level.

Liquefaction and Seismic-Related Ground Failure

Liquefaction is a phenomenon whereby unconsolidated and saturated soils lose cohesion and are converted to a fluid state as a result of severe vibratory motion. The relatively rapid loss of soil shear strength during strong earthquake shaking results in the temporary fluid-like behavior of the soil. Four kinds of ground failure commonly result from liquefaction: lateral spread, flow failure, ground oscillation, and loss of bearing strength. *Lateral spreading* is a horizontal displacement of surficial blocks of sediments resulting from liquefaction in a subsurface layer that occurs on slopes ranging between 0.3 and 3 percent and commonly displaces the surface up to tens of meters. *Flow failures* occur on slopes greater than 3 degrees and are primarily liquefied soil or blocks of intact material riding on a liquefied subsurface zone. *Ground oscillation* occurs on gentle slopes when liquefaction occurs at depth and no lateral displacement takes place. Soil units that are not liquefied may pull apart from each other and oscillate on the liquefied zone. The *loss of bearing strength* can occur beneath a structure when the underlying soil loses strength and liquefies. When this occurs, the structure can settle, tip, or even become buoyant and “float” upwards. Liquefaction and associated failures could damage foundations, disrupt utility service, and cause damage to roadways.

Soil liquefaction causes ground failure that can damage roads, pipelines, underground cables, and buildings with shallow foundations. Liquefaction can occur in areas characterized by water-saturated, cohesionless, granular materials at depths less than 40 feet (ABAG, 2003). In addition, liquefaction can occur in unconsolidated or artificial fill sediments located in the Project Area and other reclaimed areas along the margin of San Francisco Bay. The depth to groundwater influences the potential for liquefaction in this area, in that sediments need to be saturated to have a potential for liquefaction (Helley and LaJoie, 1979). Hazard maps produced by the Association of Bay Area Governments (ABAG) depict liquefaction and lateral spreading hazards for the entire Bay Area in the event of a significant seismic event (ABAG, 2003).[1] According to these maps, the project site is in an area expected to have a high potential to experience liquefaction. CGS has designated the project and surrounding area as a Seismic Hazard Zone (CGS, 2001) for liquefaction potential; the mitigation measure listed below would reduce potentially significant impacts to a less than significant level.

> **Mitigation Measure GEO-3*:* A site-specific, design level geotechnical investigation, shall be performed to assess the potential for liquefaction and seismic-related ground failure in susceptible areas along the selected project route. The duct bank and vaults shall be designed to accommodate or mitigate the effects of ground settlement and loss of foundation bearing strength in the event of an earthquake. A geotechnical assessment of the rail crossings at Third and 23rd Streets, Third and Evans Avenue, and Evans Avenue and Quint Street, shall be performed to ensure that the boring alignment and bore casing design appropriately address and minimize the impact of liquefaction. Recommendations and conclusions determined by a registered geotechnical engineer or qualified civil engineer shall be incorporated in the final design as part of the project. PG&E shall submit the design measures selected to mitigate liquefaction to the CPUC for review and approval.**

Impact GEO-4: The proposed project is in an area underlain by artificial fill, which could be susceptible to earthquake-induced settlement. This would be a less than significant impact with implementation of Mitigation Measure GEO-4.

Consolidation of loose soils and poorly-consolidated alluvium can occur as a result of strong seismic shaking, causing uniform or differential settlement of building foundations. Structures supported on deep pile foundations are more resistant to such settlements. However, in the 1985 Mexico Earthquake, buildings supported on piles experienced substantial damage due to differential settlements between pile-supported buildings and non-supported slabs-on-grade.

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid consolidation and settling of subsurface materials (particularly loose, noncompacted, and variable sandy sediments) due to the

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1 Lateral spreading is a ground failure associated with liquefaction and generally results from predominantly horizontal displacement of materials toward relatively unsupported free slope faces.

rearrangement of soil particles during prolonged ground shaking. Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different rates). Areas are susceptible to differential settlement if underlain by compressible sediments, such as poorly engineered artificial fill or Bay Mud. Areas underlain by artificial fill would be susceptible to this type of settlement. Given the geologic setting of the proposed project, this area could be subjected to earthquake-induced settlement. Accordingly, this issue is discussed in further detail in the Checklist Impact Conclusion section of this chapter.

> **Mitigation Measure GEO-4: A site-specific, design level geotechnical investigation shall be performed to assess the extent and consequence of ground instability. The duct bank, vaults, and substation structures shall be designed to accommodate or mitigate the effects of ground settlement and loss of foundation bearing strength in the event of an earthquake. Recommendations and conclusions determined by a registered geotechnical engineer or qualified civil engineer shall be incorporated in the final design as part of the project. PG&E shall submit the design measures selected to mitigate ground instability hazards to the CPUC for review and approval prior to construction.**

Impact GEO-5: The proposed project could be susceptible to ground shaking effects in the event of an earthquake. This would be a less than significant impact with implementation of Mitigation Measure GEO-5.

Landslides

A landslide is the downhill movement of masses of earth under the force of gravity. Earthquakes can trigger landslides in areas that are already landslide prone. Slope gradient is often a clue to stability. Landslides are most common on slopes of more than 15 degrees, and can generally be anticipated along the edges of mesas and on slopes adjacent to drainage courses.

Ground Shaking

Ground shaking includes both horizontal and vertical motions that can last up to several minutes during major earthquakes. Generally, the intensity of ground motion decreases with distance from the zone of fault rupture. However, local soil conditions can amplify and modify the character of ground motion to produce more intense effects at individual sites. Strong ground shaking from a major earthquake could affect San Francisco within the next 30 years. Earthquakes on the active faults in the area, including the San Andreas and Hayward faults are expected to produce significant ground shaking at the project site. Ground shaking may affect areas hundreds of miles distant from the earthquake's epicenter. Historic earthquakes have caused strong ground shaking and damage in the San Francisco Bay Area, the most recent being the magnitude[2] 6.9 Loma Prieta Earthquake in October 1989. The epicenter was approximately 40 miles southeast of the project site, but this earthquake nevertheless caused strong ground shaking for about 20 seconds and resulted in varying degrees of structural damage throughout the Bay Area.

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2 The Richter magnitude (M) scale reflects the maximum amplitude of a particular type of seismic wave.

The 1906 San Francisco Earthquake, with an estimated moment magnitude (Mw)[3] of 7.9, produced strong (VIII) to violent (IX) shaking intensities (ABAG, 2004b). The 1989 Loma Prieta Earthquake, with an Mw of 6.9, produced very strong (VIII) shaking intensities in the project area (ABAG, 2004b).

It is estimated that ground shaking causes over 90 percent of all earthquake-related damage to structures. The common way to describe ground motion during an earthquake is with the motion parameters of acceleration and velocity in addition to the duration of the shaking. A common measure of ground motion is the Peak Ground Acceleration (PGA). The PGA for a given component of motion is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as the percentage of the acceleration due to gravity (g), which is approximately 32.2 feet per second squared. In terms of automobile accelerations, one "g" of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

The lowest values recorded were 0.06 g in the bedrock on Yerba Buena Island from the Loma Prieta Earthquake (CGS, 1990). The presence of non-engineered artificial fill and Bay Mud in the project area could intensify ground shaking effects in the event of an earthquake on one of the aforementioned faults in the vicinity of the project area. The PGA for this project has been previously estimated at 0.61 g with a 10 percent probability of exceeding the estimated 0.61 g in 50 years. This probability exceedance equates to an event with a recurrence interval of 475 years and is consistent with the Design Basis Earthquake inherent in modern building codes. The presence of non-engineered artificial fill and Bay Mud in the project area could intensify ground shaking effects in the event of an earthquake on one of the aforementioned faults in the vicinity of the project area.

> **Mitigation Measure GEO-5*:* Switchyard components, new substation equipment, structures and foundations shall be procured and designed in accordance with PG&E's engineering practices, which include the application of seismic design provisions (e.g., the Institute of Electrical and Electronic Engineers (IEEE) 693 for selected critical equipment, the current edition of the California Building Code (CBC), and various industry standards) intended to mitigate earthquake damage to substation equipment and structures. The design criteria selected to mitigate ground shaking hazards shall be submitted to and approved by PG&E and the CPUC.**

CHECKLIST IMPACT CONCLUSIONS

a.i) The project site is not located in an Alquist-Priolo Earthquake Fault Zone, as defined by CGS. A short pre-Quaternary fault and shear zone was mapped by Schlocker (1974) extending west-northwestward from about 22nd and Illinois Streets to 20th and Missouri Streets (Essex Environmental, 2003). However, this fault is not considered active or

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[3] Moment magnitude is related to the physical size of a fault rupture and movement across a fault. The Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave. Moment magnitude provides a physically meaningful measure of the size of a faulting event (CDMG, 1997b). The concept of "characteristic" earthquake means that we can anticipate, with reasonable certainty, the actual earthquake that can occur on a fault.

potentially active. The nearest active faults are the San Andreas fault, located approximately 7.5 miles to the west of the proposed project route; the Seal Cove-San Gregorio fault, located approximately 10.5 miles west of the proposed project route; the Calaveras fault, located approximately 21 miles east of the proposed project route; and the Hayward fault, located approximately 11 miles east of the proposed project route. Since the site is not located on an active or potentially active fault, the potential for surface fault rupture is low and the impact is considered less than significant.

a.ii) PG&E's Proponent's Environmental Assessment identifies 0.61g as the estimated PGA with a 10 percent probability of exceedance in 50 years (Essex Environmental, 2003). Peak spectral accelerations may be on the order of 1.0 g. These are substantial accelerations which must be considered in the design process for all components of the project. Through proper engineering design and implementation of **Mitigation Measure GEO-5**, the potential impacts on the project due to ground shaking would be less than significant. Additionally, the proposed project itself would not affect the ground shaking hazard for other structures in the area.

a.iii) CGS has included the non-bedrock areas along the proposed project route in the Liquefaction Hazard zone for the City of San Francisco (CGS, 2001). Because of the variable or heterogeneous nature of the artificial fills, generalized liquefaction is estimated to be unlikely; however, localized area of liquefaction may occur in fill across the area. Through proper reinforcement and engineering design and implementation of **Mitigation Measure GEO-3**, the potential impacts on the proposed project due to liquefaction would be less than significant. Additionally, the proposed project itself would not affect the liquefaction potential for other structures in the area.

a.iv) As discussed in the Setting of this section, landslides are most common on slopes of more than 15 degrees. The entire length of the proposed project route is located within existing roadways, a paved parking lot, a vacant lot, and existing switchyards. The area is relatively flat and, therefore, impacts related to landslides would be less than significant.

b) Construction activities such as excavations for the duct bank, vaults, bore pits, and switchyard foundations have the potential to generate water-carried sediment and wind-blown dust. Construction activities involving soil disturbance, excavation, and grading activities could result in increased erosion and sedimentation to surface waters. Through best management practices and implementation of **Mitigation Measure GEO-2**, the impact that the proposed project would have on soil erosion would be less than significant.

c) Portions of the project areas are susceptible to landsliding, lateral spreading, subsidence, and liquefaction. Through proper reinforcement and engineering design and implementation of **Mitigation Measures GEO-3 and GEO-4**, the potential impacts on the proposed project due to ground instability would be less than significant. Additionally, the proposed project itself would not affect the ground stability for other structures in the area.

d) Portions of the natural soils and variable fills may have expansive soils (Essex Environmental, 2003). Through proper reinforcement and engineering design and implementation of **Mitigation Measure GEO-1**, the potential impacts on the proposed project due to expansive soils would be less than significant. Additionally, the proposed project itself would not affect the ground stability for other structures in the area.

e) The proposed project would not include the installation of a septic tank or use of alternative wastewater disposal systems. Accordingly, there would be no impacts involving the use of septic tanks or alternative wastewater disposal systems.

REFERENCES – Geology, Soils, and Seismicity

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