3.6 Geology, Soils, and Seismicity

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
6. GEOLOGY, SOILS, AND SEISMICITY— Would the 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?	☐	☐	☐	☒

3.6.1 Environmental Setting

Located within the northern Coast Ranges geomorphic province[1] of California, the Proposed Project would cross several landscapes with a variety of geologic and soil conditions. The Hollister Tower Segment is located on the northeastern edge of the Gabilan Range, characterized by a series of steep hills, with slopes ranging from approximately 10 to 80 percent, and elevations of about 140 to 1,300 feet above mean sea level (amsl). The Hollister Pole Segment is located primarily within the San Juan Valley, characterized by level or nearly level slopes at an elevation of about 270 feet amsl. The Hollister Pole Segment would also cross the San Benito River, which features a prominent floodplain flanked on each side with steep terrace slopes. Further east, the Hollister Pole Segment crosses the foothills of the Lomerias Muertas Mountains (Flint Hills), which have moderately steep grades and would place some of the Hollister Pole Segment as high as 410 feet amsl.

1 The Coast Ranges extend from southern California to the Oregon border and are comprised of a series of mountain ranges and intervening valleys which trend northwest, subparallel to the San Andreas fault.

Given the physiography of the Proposed Project and that it is traversed by several active faults, geologic hazards could include surface fault rupture, seismic groundshaking, landslides, localized liquefaction and lateral spreading, and soil erosion. In addition, problematic soils, with shrink/swell potential and corrosive properties may be locally present in the project area. The following sections present additional detail on geologic units, soil characteristics and associated hazards.

Local Geology

As discussed above, the Proposed Project crosses several landscape settings. The distribution and characteristics of the geologic units for each area is discussed separately below, and is based on geologic mapping by the California Geologic Survey (CGS, 2002).

Gabilan Range

The Hollister Tower Segment crosses the northeastern tip of the Gabilan Range, where a wide variety of bedrock units are juxtaposed by both active and inactive faults. The southern portion of the Hollister Tower Segment crosses rolling hills and intervening stream valleys composed of Pleistocene alluvial fan deposits overlain by relict dune sands (Aromas Sands). To the north, the Hollister Tower Segment then climbs into Gabilan Range composed of granitic rocks and unnamed volcanic rocks on its southwestern flank, and a series of well consolidated Tertiary-age sedimentary rocks (including the Vaqueros Sandstone, unnamed Red Beds, and the San Juan Bautista Formation) on its northeastern flank. The northern-most portion of the Hollister Tower Segment, before terminating at Anzar Junction, is underlain by the Gabbro of Logan Quarry—a dark, crystalline volcanic rock.

San Juan Valley

Beginning at Anzar Junction, the Hollister Pole Segment is directed east across the San Juan Valley, which is underlain by Holocene (less than 10,000 yeas old) sedimentary deposits of poorly consolidated sand, silt and gravel. The San Benito River floodplain, located along the northern side of the valley, is composed of modern stream gravels, which are actively mined as a source of aggregate (ICF Jones & Stokes, 2009). In places, the Hollister Pole Segment also crosses older Pleistocene stream terrace deposits.

Flint Hills

A portion of the Hollister Pole Segment crosses through the base of the Flint Hills, which has moderately steep grades, is relatively low-relief, and is underlain by unnamed Pliocene continental mudstone.

Soils

Overlying the geologic units described above (aside from rock outcrops and portions of active floodplains) is a mantle of soil that varies in thickness and character. In general, soil characteristics are strongly governed by slope, relief, climate, vegetation and the rock type upon which they form. Soil types are important in describing engineering constrains such as erosion and runoff potential, corrosion risks, and various behaviors that affect structures, such as expansion and settlement.

Table 3.6-1 lists the soil units mapped for all of the construction disturbance areas, and their key physical characteristics. In the table above, it is apparent that soil conditions are highly variable across the different soil units. Soil properties and their potential constraints are further discussed below and in *Section 3.6.4, Environmental Impacts and Mitigation Measures*.

Expansive Soils

Expansive soils contain significant amounts of clay particles that have the ability to give up water (shrink) or take on water (swell). When these soils swell, the change in volume can exert significant pressures on loads that are placed on them, such as buildings or underground utilities, and can result in structural distress and/or damage. Table 3.6-1 provides an estimate of the shrink/swell potential of soils within the project area. While no soils were identified as having the highest shrink/swell category ("very high"), several soils have intervals within their profiles that exhibit high shrink/swell potential.

Soil Corrosivity

The corrosivity of soils is commonly related to several key parameters, including soil resistivity, the presence of chlorides and sulfates, oxygen content, and pH. Typically, the most corrosive soils are those with the lowest pH and highest concentration of chlorides and sulfates. Wet/dry conditions can result in a concentration of chlorides and sulfates as well as movement in the soil, both of which tend to break down the protective corrosion films and coatings on the surfaces of building materials. High-sulfate soils are corrosive to concrete and may prevent complete curing, reducing its strength considerably. Low pH and/or low-resistivity soils can corrode buried or partially buried metal structures. Depending on the degree of corrosivity of the subsurface soils, concrete, reinforcing steel, and bare-metal structures exposed to these soils can deteriorate, eventually leading to structural failures. As shown in Table 3.6-1, both uncoated steel and concrete are susceptible to corrosion in a number of the soils present in the disturbance areas.

Erosion and Runoff

Numerous soil groups within the project area are highly susceptible to runoff and resulting erosion. Soils in hydrologic group D (see Table 3.6-1) have high runoff potential when thoroughly wet, usually because some restricting layer (e.g. bedrock or impermeable soil horizon) impedes the downward movement of water within the soil profile. In addition, if the soil has a high erosion factor, runoff could remove substantial quantities of soil and lead to the formation of rills or gullies in the landscape. The Cotati and Gloria series in the project area have the highest runoff and erosion potential, and thus are more likely to be problematic. While runoff and erosion behavior can be estimated from the mapped soil series, actual susceptibility to erosion would vary site to site and is based on factors other than the soil unit, including slope, vegetation, and human disturbances (such as rangeland uses). The possibility of substantial and accelerated erosion is further discussed in *Section 3.6.4, Environmental Impacts and Mitigation Measures.*

TABLE 3.6-1
SOIL TYPES IDENTIFIED WITHIN THE PROJECT CONSTRUCTION DISTURBANCE AREAS

Soil Unit	Percent of Construction Disturbance Area[a]	Shrink/Swell Potential	Risk of Corrosion[b]		Erosion and Runoff	
			Uncoated Steel	Concrete	Hydrologic Soil Group[c]	Erosion Factor (Kf)[d]
Hills, Mountains and Uplands						
Cotati loam	8.1	High	High	High	D	0.37
Los Gatos clay loam	7.6	Moderate	Moderate	Moderate	C	0.17
Diablo clay	5.7	High	High	Low	D	0.15
Vista coarse sandy loam	4.6	Low	Moderate	Moderate	C	0.37
Soper sand loam	3.9	Moderate	Moderate	Moderate	C	0.28
Arnold loamy sand	3.2	Low	Moderate	Moderate	B	0.15
Pfeiffer-Rock outcrop complex	2.5	Low	Low	Low	B	0.32
Sween rocky clay loam	1.1	High	High	Low	D	0.20
Alluvial Fans, Valleys and Plains						
Sorrento clay loam	32.5	Moderate	High	Low	B	0.32
Sorrento silt loam	8.2	Moderate	Moderate	Low	B	0.37
Rincon silty clay loam	6.3	High	High	Low	C	0.37
Cotati loam	5.5	High	High	High	D	0.37
Arnold loamy sand	4.4	Low	Moderate	Moderate	B	0.15
Salinas clay loam	1.3	Moderate	High	Low	C	0.37
Terrace escarpments	1.3	Not available	Not available	Not available	Not available	Not available
Gloria sandy loam	1.0	High	High	Moderate	D	0.37

[a] Construction disturbance areas include tower and pole installation work areas, landing and laydown areas, new and improved access roads, vegetation clearing, and overland travel routes. Soil Units covering less than 1 percent of the disturbance areas are not included.
[b] "Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete.
[c] Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups (A through D) according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. Soils in Group B have a moderate infiltration rate and a moderate rate of water transmission. Soils in Group C have a slow infiltration and transmission rates and consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. Soils in Group D have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted.
[d] Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

SOURCE: Soil Survey Staff, 2010a, 2010b.

Collapsible Soils

Soil collapse, or hydro-consolidation, occurs when soils undergo a rearrangement of their grains and a loss of cementation, resulting in substantial and rapid settlement under relatively low loads. This phenomenon typically occurs in recently deposited Holocene soils in a dry or semiarid environment, including eolian (wind blown) sands and alluvial fan and mudflow sediments deposited during flash floods. The combination of weight from a building or other structures, and an increase in surface water infiltration (such as from irrigation or a rise in the groundwater table) can initiate settlement and cause structural foundations and walls to crack. Collapsible soils—should they be present in the study area—have a higher potential of occurring in the San Juan Valley which is underlain by relatively young, potentially loose alluvial deposits. Collapsible soils may also be present in the southern portion of the tower section, which in places is underlain by Aromas Sands and Holocene alluvium. The actual presence and extent of collapsible soils would be evaluated as part of the subsurface exploration program that would be required for the proper geotechnical design of the Proposed Project.

Faults and Seismicity

USGS geologic maps and the USGS Quaternary Fault and Fold Database were queried to identify the active and potentially active faults in the project area (see **Table 3.6-2**). Of these faults, the San Andreas and Calaveras faults are considered more likely to generate a large earthquake when compared to other faults in the area. The San Andreas and Calaveras Faults have a 21 and a 7 percent chance, respectively, of generating one or more earthquakes of magnitude 6.7 or higher over the next 30 years (Working Group on California Earthquake Probabilities, 2008). The other faults, including the Vergas Fault and the Sargent Fault Zone, have not experienced displacement in the recent past, but are nonetheless considered potentially active, based on evidence of displacement in the Quaternary Period.

Earthquake Hazards

Fault Rupture

The Proposed Project alignments cross two faults zoned as active by the State of California pursuant to the Alquist-Priolo Act and thus recognized as hazardous with respect to surface fault rupture. These include the San Andreas fault between Tower 6/39 and Pole 13/8, and the Calaveras fault between Poles 21/15 and 22/00. The Hollister Tower Segment also crosses the Zayante-Vergeles fault between Towers 2/14 and 2/15, but this fault has not been zoned as active. Nevertheless, due to identified latest Pleistocene and possible Holocene vertical displacement along the fault (Bryant, 2000), the Zayante-Vergeles fault may also pose a surface fault rupture hazard.

Ground Shaking

The primary tool that seismologists use to evaluate ground-shaking hazard and characterize statewide earthquake risks is a probabilistic seismic hazard assessment (PSHA). The PSHA for the State of California takes into consideration the range of possible earthquake sources and

TABLE 3.6-2
QUATERNARY FAULTS IN THE PROJECT SITE VICINITY

Fault	Location	Most Recent Activity (years)[a]	Fault Classification[b]	Magnitude of Maximum Credible Earthquake
San Andreas, Santa Cruz Mountains Section	Trends northwest between Tower 6/39 and Pole 13/8	< 150	Active	7.0
Calaveras Fault, Southern Section	Trends north between Poles 21/15 and 22/00	< 150	Active	6.2
Vergas Fault	Trends northwest between Towers 2/14 and 2/15	< 130,000	Potentially Active	Not Available
Sargent Fault Zone, Southern Section	About 0.5 miles north of Landing Zone 4	< 15,000	Potentially Active	Not Available

a Defines one of the four time categories in which the most recent prehistoric surface-rupturing or surface-deforming earthquake occurred based on geologically recognizable evidence of faulting, folding, or liquefaction. The categories are (1) latest Quaternary (<15 ka), (2) late Quaternary (<130 ka), (3) late and middle Quaternary (<750 ka), and (4) Quaternary (<1.6 Ma).

b An "active" fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 10,000 years). A "potentially active" fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive.

SOURCES: Hart E.W. and Bryant E.J., 1997; USGS and CGS, 2010; ICF Jones and Stokes, 2009.

estimates their characteristic magnitudes to generate a probability map for ground-shaking. The PSHA maps depict values of peak ground acceleration (PGA) that have a 10 percent probability of being exceeded in 50 years (or a 1 in 475 chance). This probability level allows engineers to design structures for ground motions that have a 90 percent chance of NOT occurring in the next 50-years, making structures safer than if they were simply designed for the most likely events. The peak ground acceleration for the most vulnerable areas of the Proposed Project (those closest to faults over weak materials) would be about 0.71 g[2] (CGS, 2010). This PGA value is typically indicative of a violent earthquake, capable of causing heavy damage; including general damage to foundations; shifting of frame structures off foundation, if not bolted; possible damage to reservoirs; breakage of underground pipes; and appearance of conspicuous cracks in ground. For comparison purposes, the maximum peak acceleration value recorded during the Loma Prieta earthquake of 1989 was in the vicinity of the epicenter, near Santa Cruz, at 0.64g (ABAG, 2010).

Liquefaction and Lateral Spreading

Soil liquefaction can be caused by strong vibratory motion due to earthquakes. Research and historical data indicate that loose granular soils and non-plastic silts that are saturated by relatively shallow groundwater (generally less than 50 feet) are susceptible to liquefaction. Liquefaction causes soil to lose strength and "liquefy," triggering structural distress or failure due to the dynamic settlement of the ground or a loss of strength in the soils underneath structures.

2 PGA is expressed as the percentage of the acceleration due to gravity (g), which is approximately 980 centimeters per second squared. In terms of automobile accelerations, one "g" of acceleration is equivalent to the motion of a car traveling 328 feet from rest in 4.5 seconds.

Lateral spreading of the ground surface during an earthquake usually takes place along weak shear zones that have formed within a liquefiable soil layer. Lateral spreading has generally been observed to take place in the direction of a free-face (e.g. a retaining wall or slope).

In the project area, the liquefaction potential is typically low in upland areas, whereas valley floor areas are at moderate to high risk (Monterey County, 2007). Thus, the Hollister Tower Segment would be expected to have a low potential to experience liquefaction, while portions of the Hollister Pole Segment located near the San Benito River, including the proposed river crossing, would have a moderate to high potential for liquefaction. Observations from the 1989 Loma Prieta Earthquake along the San Benito River and San Juan Creek indicates that liquefaction or ground cracking did not occur during that event (USGS, 1998). The actual presence and extent of liquefiable soils would be evaluated as part of the subsurface exploration program that would be required for the proper geotechnical design of the Proposed Project.

Slope Failure

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, triggered either by static (i.e., gravity) or dynamic (i.e., earthquake) forces. Exposed rock slopes undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience soil slumps, rapid debris flows, and deep-seated rotational slides. Slope stability can depend on a number of complex variables, including the geology, structure, and amount of groundwater, as well as external processes such as climate, topography, slope geometry, and human activity. The factors that contribute to slope movements include those that decrease the resistance in the slope materials and those that increase the stresses on the slope. Landslides can occur on slopes of 15 percent or less, but the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges.

Areas susceptible to slope failure in the project area include portions of the Hollister Tower Segment located on steep slopes, and the banks of the San Benito River. A desktop evaluation of landslide hazards along the proposed tower segment concluded that no towers are located on mapped landslides and only one (Tower 36/227) is located in an area of potentially moderate to high hazard (WLA, 2008). Along the pole segment no poles are located on mapped landslides or within areas of elevated moderate to high hazard (WLA, 2010). The flint hills which the pole segment would traverse is composed of competent mudstone that is not particularly prone to slope failure.

3.6.2 Regulatory Setting

Federal

Occupational Safety and Health Administration (OSHA) Regulations

Excavation and trenching are among the most hazardous construction operations. The Occupational Safety and Health Administration's (OSHA) Excavation and Trenching standard, Title 29 of the Code of Federal Regulation (CFR), Part 1926.650, covers requirements for excavation and trenching operations. OSHA requires that all excavations in which employees could potentially be exposed to cave-ins be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area.

State

Alquist-Priolo Earthquake Fault Zoning Act

Surface rupture is the most easily avoided seismic hazard. The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. In accordance with this act, the State geologist established regulatory zones, called "earthquake fault zones," around the surface traces of active faults and published maps showing these zones. Within these zones, buildings for human occupancy cannot be constructed across the surface trace of active faults. Each earthquake fault zone extends approximately 200 to 500 feet on either side of the mapped fault trace, because many active faults are complex and consist of more than one branch. There is the potential for ground surface rupture along any of the branches. Although the Proposed Project crosses two of the mapped fault zones (San Andreas and Calaveras), this Act does not apply because it does not involve structures for human occupancy.

California Building Code

The California Building Code (CBC) has been codified in the California Code of Regulations (CCR) as Title 24, Part 2. Title 24 is administered by 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 Title 24 or they are not enforceable. The purpose of the CBC is to establish minimum standards to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, and general stability by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all building and structures within its jurisdiction. The 2007 CBC is based on the 2006 International Building Code (IBC) published by the International Code Conference. In addition, the CBC contains necessary California amendments which are based on the American Society of Civil Engineers (ASCE) Minimum Design Standards 7-05. ASCE 7-05 provides requirements for general structural design and includes means for determining earthquake loads as well as other loads (such as wind loads) for inclusion into building codes. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients which are used to determine a Seismic Design Category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site and ranges from SDC A (very small seismic vulnerability) to SDC E/F (very high seismic vulnerability and near a major fault). Design specifications are then determined according to the SDC.

Seismic Hazards Mapping Act

The State Department of Conservation, CGS, provides guidance with regard to seismic hazards. Under the CGS Seismic Hazards Mapping Act, seismic hazard zones are to be identified and mapped to assist local governments for planning and development purposes. The intent of the Act is to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other types of ground failure, and other hazards caused by earthquakes. CGS Special Publication 117 Guidelines for Evaluating and Mitigating Seismic Hazards in California, provides guidance for evaluation and mitigation of earthquake-related hazards for projects within designated zones of required investigations (CGS, 2008). This Act will not apply to the Proposed Project because seismic hazard zones have not yet been established in San Benito County.

Engineering and Construction Codes and Standards

Design and construction of PG&E facilities are governed by a variety of codes and standards. A number of these specifically regulate topics relevant to geology and geotechnical engineering, such as earthwork standards and seismic safety, including the following:

CPUC General Order 95 provides general standards for design and construction of overhead electric transmission and distribution lines.

"IEEE 693" ***Recommended Practices for Seismic Design of Substations*** contains guidelines for earthquake-resistant substation design and construction. The IEEE (Institute of Electrical and Electronics Engineers, Inc.) is an international professional organization and a widely recognized authority in the development of industry standards for electrical engineering and electric power generation and transmission.

The International Building Code (IBC) is voluntarily adopted by jurisdictions and agencies. PG&E adheres to the IBC's earthwork standards where they are not superseded by CPUC regulations.

3.6.3 Applicant Proposed Measures

PG&E proposes the following applicant proposed measure (APM) to minimize impacts related to geology, soils and seismicity. The impact analysis in this MND assumes that this APM would be implemented to reduce the impacts related to geology, soils and seismicity discussed below.

APM GEO-1: Perform Site-Specific Geologic Studies at Active Fault Crossings and Modify Siting/Design as Feasible to Reduce Damage. For all pole or tower replacements proposed within a State-designated Earthquake Fault Zone or within 500 feet on either side of a fault considered likely to be active but not zoned by the State, PG&E will perform site-specific geologic investigations with the purpose of locating any active fault trace(s) and ensuring that project facilities are sited and designed to avoid and reduce damage due to surface fault rupture. Studies may include any appropriate combination of literature research, air photo evaluation, reconnaissance field survey, and/or subsurface investigation (fault trenching), based on the professional judgment of licensed supervising personnel (California Professional Geologist or Certified Engineering Geologist). Where significant potential for damage due to surface fault rupture is identified, facilities siting and design will be modified to the extent feasible to avoid or reduce damage.

3.6.4 Environmental Impacts and Mitigation Measures

This impact analysis considers the potential geology, soils, and seismicity impacts associated with the construction, operation, and maintenance of Proposed Project. The proposed modifications at the Hollister Substation consist solely of electrical system and safety upgrades. All substation work would occur on previously disturbed areas within the existing footprint of the substations, and the associated construction, operation and maintenance activities would have no impact with respect to geology, soils, seismicity, or mineral resources. The following discussion focuses on impacts from construction and operation of the Hollister Pole Segment and Hollister Tower Segment.

ai) 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 (refer to Division of Mines and Geology Special Publication 42): *LESS THAN SIGNIFICANT IMPACT.*

As discussed in the setting, the San Andreas, Calaveras and Zayante-Vergales Faults all cross the transmission line, and have the potential for ground rupture during an earthquake. The possible risks from fault rupture to the Proposed Project would result from changes in the distance between poles and towers (e.g. a reduction of slack and increased tension in the conductors), and possibly pulling or deflection of insulator strings and changes in pole and tower angles. Should fault rupture occur, the effect would be alleviated by pole/tower inspection and repair (such as splicing additional conductor wire into the conductors), and would be unlikely to cause harm or injury to the public. In addition, the existing Hollister Tower Segment and Hollister Pole Segment currently cross these faults in the same location as they would under the Proposed Project (the new river crossing would not intersect an active fault). Therefore, the existing risk due to fault rupture would not be increased by implementation of the Proposed Project.

PG&E proposes to implement several measures to ensure the safety and reliability of the power lines in the event of an earthquake fault rupture. Pursuant to APM GEO-1, for all pole and tower replacements proposed within a State-designated Earthquake Fault Zone or within 500 feet on either side of a fault considered likely to be active but not zoned by the State, PG&E would perform site-specific geologic investigations with the purpose of locating any active fault trace(s) and ensuring that Proposed Project facilities would be sited and designed to avoid and reduce damage due to surface fault rupture. Studies may include any appropriate combination of literature research, air photo evaluation, reconnaissance field survey, and/or subsurface investigation (fault trenching), based on the professional judgment of licensed supervising personnel (California Professional Geologist or Certified Engineering Geologist). Where significant potential for damage due to surface fault rupture is identified, facilities siting and design would be modified to the extent feasible to avoid or reduce damage. Because the Proposed Project would not result in increased risks from fault rupture, and because PG&E has committed to study fault traces and design their structures accordingly, this impact would be *less than significant*.

aii) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking: *LESS THAN SIGNIFICANT IMPACT*.

Due to the proximity of the Proposed Project to several major active faults, the Proposed Project would likely experience strong seismic ground shaking sometime during its operational lifetime. As discussed in the setting, it is possible that the most vulnerable areas of the transmission line could experience violent ground shaking from a major earthquake. However, the Proposed Project would not increase exposure to such risks because the majority of the facilities would be constructed within existing PG&E right-of-way (ROW), and most poles and towers would be placed at approximately the same or similar location as the existing structures. Where a new alignment is proposed at the San Benito River crossing, the new poles would be placed outside of the floodplain. Because floodplain deposits are typically loose and saturated, poles placed outside of the floodplain are likely to be subject to comparatively less intense ground shaking in the event of a major earthquake. In addition, for overhead power lines, wind loading design requirements are typically more stringent than requirements that address strong seismic ground shaking; therefore, overhead power lines can accommodate strong ground shaking without incurring significant damage.

PG&E would adhere to CPUC General Order 95, which provides general standards for design and construction of overhead electric power and distribution lines, as well as earthwork and foundation design requirements of the International Building Code (IBC) where they are not superseded by CPUC regulations. Site characterization, investigation, and project design requirements and standards of the IBC and CPUC would reduce the potential for damage to facilities consistent with current engineering standards of care. Because existing poles would be replaced with new poles built according to modern, up-to-date building codes, and the power line would be relocated out of the San Benito River floodplain, the potential for damage from seismic ground shaking would likely be reduced as a result of the Proposed Project. Therefore, the impact from strong seismic ground shaking would be *less than significant*.

aiii) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction: *LESS THAN SIGNIFICANT IMPACT*.

As discussed in the setting, the Hollister Tower Segment is in an area expected to have a low potential to experience liquefaction, while portions of the Hollister Pole Segment located near the San Benito River, including the proposed river crossing and the temporary shoo-fly connections, would have a moderate to high potential for liquefaction. For the majority of the Proposed Project, exposure to risk of liquefaction would not increase because it would occur within the existing ROW, and the poles and towers would be placed in approximately the same or similar location as the existing structures. Where the Proposed Project would be relocated at the San Benito River crossing, new poles would be relocated outside the floodplain, which would generally reduce the risk of liquefaction compared to existing conditions. For these reasons, the impact from seismic-related ground failure (i.e. liquefaction and lateral spread) would be less than significant. Note that landslides are also considered a seismic related ground failure, which is discussed in item c).

aiv) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides: *LESS THAN SIGNIFICANT IMPACT*.

The potential for seismically-induced landslides is discussed below under criterion c). Certain activities, such as grading and excavations associated with new access roads, construction laydown areas, temporary shoo-fly connections, and tower and pole footings, if performed in unstable sloped terrain, could increase the susceptibility of the terrain to slope failures. As discussed under item c), impacts would be less than significant.

b) Result in substantial soil erosion or the loss of topsoil: *LESS THAN SIGNIFICANT IMPACT*.

Loss of Topsoil

Most of the proposed construction activities would take place within PG&E's existing ROWs, which has experienced repeated disturbance associated with maintenance of the existing power lines and is unlikely to preserve an intact topsoil layer. Even if topsoil is present, the existing ROWs are dedicated to utilities use and do not represent an important topsoil resource; further disturbance by Proposed Project activities would not result in significant loss of topsoil. For the proposed river crossing and staging and laydown areas not within an existing ROW, construction of the Proposed Project would potentially result in a minor loss of topsoil; however, such a loss would be comparatively small, or occur in areas that have been previously disturbed by extensive grazing activities. In addition, the general construction permit required under NPDES would require that the topsoil be preserved in areas requiring grading in order to ensure proper implementation of post-construction best management practices (BMPs) (site restoration). For these reasons, the impact of potential loss of topsoil would be less than significant.

Soil Erosion

The preliminary stages of construction, especially initial pole/tower site grading, stripping, and soil stockpiles would leave loose soil exposed to the erosive forces of rainfall and high winds. As discussed in the setting, runoff and erosion could be especially problematic in areas underlain by the Cotati and Gloria soil series. More generally, however, soil erosion would be more of a concern along segments of the Hollister power line where the terrain is hilly and where new and improved access roads and staging areas are proposed. Intense rain or wind events in such areas could result in substantial soil erosion into adjacent waterways, and possibly propagation of small rills or gullies. In cases such as this (i.e., constructed-related impacts), increased runoff or entrainment of sediment in runoff is just as much a concern as soil erosion. It is both processes (surface runoff and disturbed soils) that must be managed, and the principle concern for the Proposed Project for this issue relates more to water quality (see Section 3.8, *Hydrology and Water Quality*) impacts than loss of topsoil resources or impacts from the formation of rills, channels or gullies. In the event that rills or gullies form, the features would not significantly undermine any of the tower or pole footings, and any degradation of access roads would likely be minimized from design and installation of culverts and other proposed drainage improvements. Soil erosion and associated rilling or gullying that could pose a threat to the proposed facilities would be detected and repaired through the routine inspection and maintenance procedures discussed in the Project Description.

Nevertheless, during construction and operation of the Proposed Project, erosion control measures and design features would be implemented that utilize BMPs to avoid or minimize soil erosion and off-site sediment transport. Because soil surface disturbance for the Proposed Project would be greater than one acre, specific erosion control measures would be identified as part of the NPDES permit and Storm Water Pollution Prevention Plan (SWPPP) required for construction. Examples of typical construction BMPs include scheduling or limiting activities to certain times of the year; installing sediment barriers such as silt fence and fiber rolls along the perimeter of the construction area; maintaining equipment and vehicles used for construction; tracking controls, such as stabilizing entrances to the construction site, and developing and implementing a spill prevention and cleanup plan. The SWPPP (and associated BMPs) would be prepared and implemented prior to commencing construction, and BMP effectiveness would be ensured through the sampling, monitoring, reporting, and record keeping requirements contained in the construction general permit.

In addition, the SWPPP requires implementation of post-construction BMPs that would restore the work sites to their original condition (such as reseeding of disturbed areas); thus, preventing or minimizing long-term erosion problems. As discussed in more detail in the Hydrology and Water Quality discussion (Section 3.8), it may be necessary to require additional and/or more specific measures in the SWPPP (i.e., measures that are not explicitly required as part of the General Construction Permit or the SWPPP) in order to adequately address local conditions that may present a relatively higher erosion risk. In either case, substantial or accelerated soil erosion during and following construction of the Proposed Project would be less than significant.

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: *LESS THAN SIGNIFICANT IMPACT*.

Portions of the Proposed Project that would be located in hilly areas, including most of the Hollister Tower Segment and some of the construction lay-down areas, could be subject to landslide hazards, including seismically induced landslides. In the long run, the Proposed Project would be unlikely to experience an increase in exposure to landslide hazards because it would occur within PG&E's ROW and most poles and towers would be placed in the same or similar location as the existing structures. The only poles to be constructed outside of the existing ROW would be at the San Benito River crossing, which is largely flat and not landslide-prone.

Grading and excavations associated with new access roads, construction laydown areas, and tower and pole footings, if improperly performed, could create unstable conditions, or worsen existing landslide risks. Cuts into hillsides could remove material that is needed to support the upland material, and road or staging area fills could slough, slump, or ravel if they result in over-steepened slopes. Landslide evaluations performed for the Proposed Project generally concluded the transmission alignment would cross areas of low to moderate landslide hazard, except for one

(Tower 36/227), which is located in an area of potentially moderate to high hazard[3] (WLA, 2008; WLA, 2010). In addition, no towers or poles would be located within existing landslides (WLA, 2008; WLA, 2010). Adherence to sound grading practices (e.g. bracing or underpinning of excavated faces), as stipulated in the CPUC General Order 95, the IBC, and OSHA regulations followed by all California construction projects, would generally ensure that construction activities would not create new areas of instability.

In summary, while one tower is located in a moderate to high landslide area, and there is a slight chance of minor slope failures on other portions of the Proposed Project, the impact is *less* than significant for three reasons. First, the Proposed Project would replace an existing line that is currently subject to the same hazards. Second, workers, vehicles, and equipment used during the Proposed Project-related grading and excavation would be protected through commonly-applied health and safety requirements and grading practices, as stipulated in the CPUC General Order 95, the IBC, and OSHA regulations. Third, the proposed alignment is primarily in an uninhabited area that is not generally visited by the public. Should a landslide occur in the long-run (most likely earthquake-induced), people and habitable structures would not be put at risk. PG&E would inspect and repair any damage incurred by the transmission line.

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: *LESS THAN SIGNIFICANT IMPACT*.

Portions of the Proposed Project are situated on soils with moderate to high expansion potential. If improperly designed or installed, expansive soils could cause damage to foundations over a long period of time, usually the result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils. The soil conditions present in the study area are not particularly unique in comparison to other areas nor do they represent a significant impediment to the Proposed Project. Facility design and construction would comply with CPUC design standards and would employ standard engineering and building practices common to construction projects throughout California. Depending on the nature of the facilities and the characteristics of the substrate at the work sites, such standards and recommendations could require a variety of mitigation approaches, including specialized foundation design; over-excavation and placement of clean, nonexpansive engineered fill prior to construction; and/or other measures to reduce concerns related to expansive soils, consistent with the prevailing engineering standard of care. Consequently, impacts related to expansive soils would be *less than significant*.

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[3] The landslide hazard classes used by WLA include very low to low (landslides are very unlikely), low to moderate (minor slope failures possible but unlikely), moderate (isolated slope failures), moderate to high (distributed slope failures), and known (failure of mapped landslide).

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: *NO IMPACT*.

The Proposed Project would not include any components that would include construction of any septic tank or other wastewater disposal system into soils. Accordingly, there would be *no impact* to soils in the project area from wastewater disposal.

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