4.6 Geology, Soils, and Seismicity

This section describes potential hazards associated with geology, soils and seismicity related to construction and operation of the Proposed Project. The impacts and mitigation measures, where applicable, are also discussed.

The Proposed Project components that do not involve rupture of a known earthquake fault; strong seismic ground shaking; seismic-related ground failure; lateral spreading, subsidence; liquefaction, landslides, soil erosion or the loss of topsoil; or located on a geologic unit or soil that is unstable; were not assessed. These components include installation of upgraded relay systems and equipment at the Newhall, Chatsworth, and San Fernando Substations and construction support activities.

4.6.1 Existing Geologic Setting

The Proposed Project is located near the southern edge of the Ventura Basin of the Transverse Ranges geomorphic province of California, and lies within both the Santa Clara River Valley and the San Fernando Valley on the southern side of the Santa Susana Mountains. The Proposed Project lies within the jurisdiction of the Los Angeles County. The San Fernando Valley is a triangular-shaped alluvial plain 20 miles long in an east-west direction which is an area of compression between the San Gabriel Mountains on the northeast and the Santa Monica Mountains on the south. The valley narrows from 10 miles wide at its western end to 3 miles wide at its eastern end.

The Santa Susana Mountains are bounded to the south by the San Fernando Valley across the Santa Susana Fault, and on the north by Santa Clara River and Newhall across the Oak Ridge and related faults (Globus, 2006). The Ventura Basin is filled with a sequence of sedimentary rocks that are middle Miocene to Holocene in age (BAS, Sunshine Canyon Report, 2008).

The lithology beneath the Proposed Project consists of upper Cretaceous sediments, Tertiary and Quaternary marine sedimentary and alluvial/stream channel sediments, which are thousands of feet thick. Below the thick accumulations of sediments are crystalline Basement Complexes which are Mid Cretaceous and older in age (Norris and Webb, 1990).

The mountainous areas within the Proposed Project include the Oat Mountains and the Santa Susana Mountains. While the floodplain of the Santa Clara River is fairly flat, most of the topography within the planning area is rugged and is characterized by steepsided canyon lands. Elevations range from about 1,270 feet above mean sea level (MSL) near the Newhall substation along the Santa Clara River to about 3,000 feet above MSL just west of Aliso Canyon within the Santa Susana Mountains in the western area of the Proposed Project.

The Transverse Ranges geomorphic province of California is composed of a series of east-west trending mountain ranges interspersed with alluvium-filled basins. This province is characterized by an east/west-trending sequence of ridges and valleys formed by a combination of folding and faulting during a period of compression and uplift. The western Transverse Ranges extend from about Ventura County west to Point Arguello and are composed of sedimentary, igneous, and metamorphic rocks ranging in geologic age from Jurassic (144 million to 208 million years ago) to Holocene (recent). North-south tectonic compression has resulted in regional east-west trending faults and folds within rocks of the western Transverse Ranges (Norris and Webb, 1990).

The trough of the Ventura Basin was first formed in the Pliocene (4 million to 5 million years ago). The Basin was subsiding faster than it was filling with sediment and as a result, the sediment and fossils found in the older Ventura Basin formations are typical of deep marine conditions. Within the basin are several prominent anticlinal hills, including the Santa Susana Mountains which enclose the west and northwest San Fernando Valley. Other ridges are Sulfur Mountains and the South Mountain-Oak Ridge Complex, which joins the Santa Susana Mountains to the east (Norris, and Webb, 1990).

The northern portion of the Proposed Project is primarily underlain by marine and nonmarine sedimentary rocks divided among the Towsley, Pico, and Saugus Formations. The entire length of the existing 66 kV sub-transmission system from Newhall Substation to the proposed SCE Natural Substation crosses similar geologic units such as the Modelo/Monterey, Pico, Towsley, and Saugus Formations.

The Pico Formation (Pliocene) is mainly located within along the central portion of the Proposed Project around the Gavin Canyon to just south of Rice Canyon. The Pico Formation comprises marine clayey siltstone and sandy siltstone. The soft, olive gray color unit, contains interbeds of very fine-grained sandstone. Siltstone locally contains abundant foraminifera and well-cemented shells of invertebrates.

Towsley Formation (early Pliocene and late Miocene) is mainly located the along the alignment of the existing 66 kV sub-transmission system which transects the I-5 Freeway to the south and within the Sunshine Canyon Landfill. This is a marine unit, thick-bedded to poorly sorted, and very fine-grained to granular sized. Slopes comprising the Towsley Formation are subject to bedding plane failure, landsliding, where the bedding dips out of slope and rock falls, rock slides, and rotational failures.

The Modelo Formation is of Miocene age (5 million to 25 million years) and consists of marine deposits of gray, white, and brown, shale, siltstone, and sandstone located primarily within the Aliso Canyon Oil Field which is located at the top of a hill where two canyon washes (Aliso and Limekiln Canyons) meet and drain to the southwest into the San Fernando Valley (USGS Topographic Map, Oat Mountain Quadrangle, dated 1952; photorevised, 1969).

Geologic Units

Geologic units present at the Proposed Project are presented in Table 4.6-1 and are based on a review of four State Geologic Maps: Geology of the Southeast Quarter of the Oat Mountain [7.5'] Map Sheet Quadrangle (Saul, 1979), the Southwestern Quarter of the Oat Mountain [7.5'] Map Sheet Quadrangle (Evans and Miller, 1978), the Geologic Map of the Oat Mountain and Canoga Park Quadrangles (Dibblee, 1992), and the Newhall Quadrangle (Dibblee, 1996). A map showing the Proposed Project and local geology is provided on Figure 4.6-1.

The Proposed Project and surrounding areas is characterized by artificial fill, alluvium, landslide and slope wash deposits; a small portion mapped as a possible surficial slide. Artificial fill consists of uncontrolled deposits of construction debris, particularly adjacent to river and creek banks, and engineered fill placed during land improvement projects.

The alluvium consisting primarily of non-marine deposits of undifferentiated, unconsolidated, massive to weakly stratified sand, silt, clay, gravel, and boulders including stream channel deposits, colluvium and slope wash, alluvial fan deposits, valley fill and floodplain deposits are of Quaternary age (11,000 million to 1.8 million years old) and are located within the northern segment of the existing 66 kV sub-transmission system along I-5 from the Newhall substation to about Rice Canyon.

A small area along the southern perimeter of the Proposed Project is mapped as a possible surficial slide composed of slope wash with a small amount of weathered rock material. The Topanga Formation mapped in the Proposed Project is described as semi-friable, light gray to tan, massive to vaguely bedded and sparsely fossiliferous in places (Dibblee, 1992).

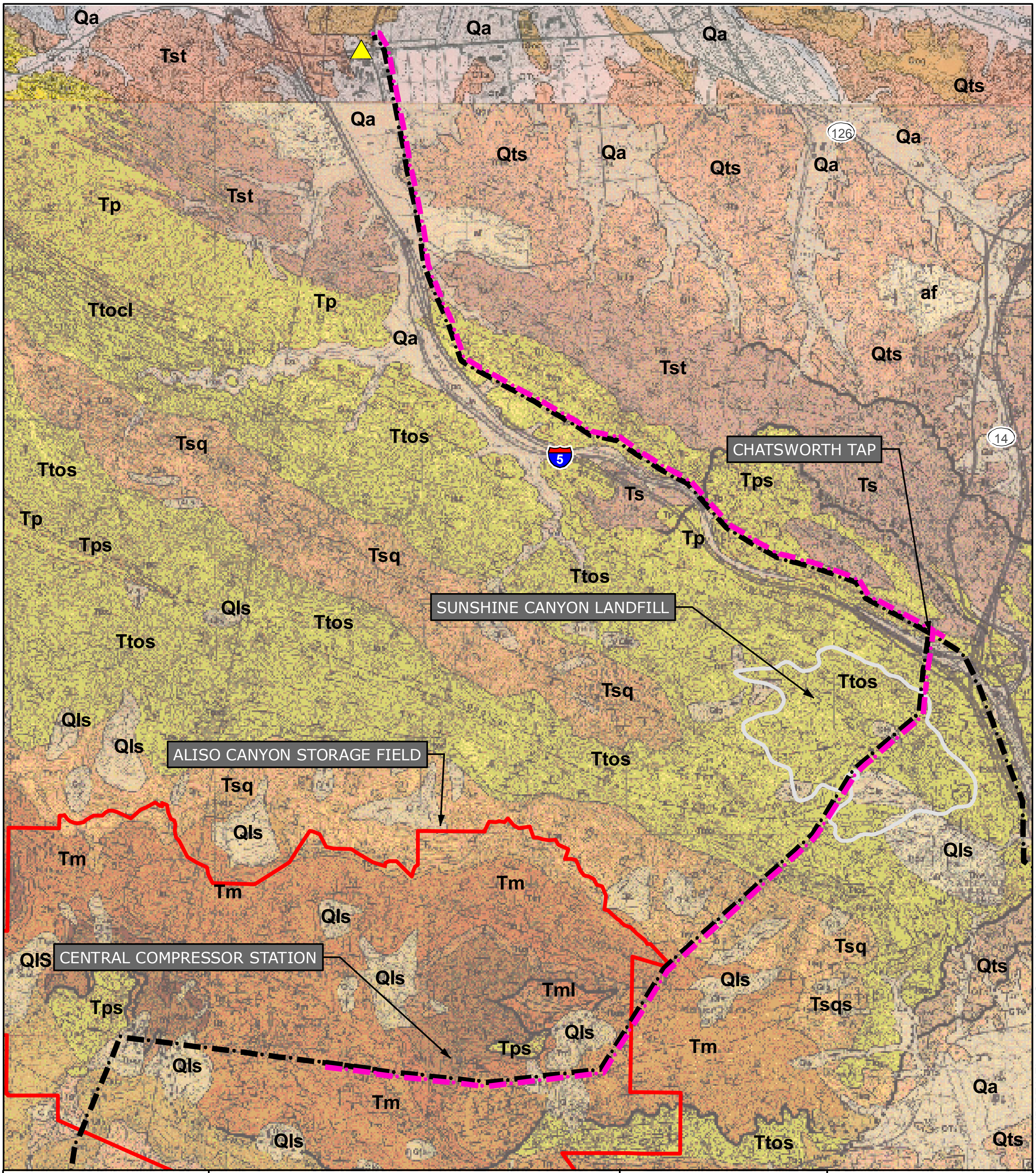
The Saugus Formation (early Pleistocene to late Pliocene) is mainly located within the northern portion of the Proposed Project near the Newhall substation and east of the I-5 Freeway and is described as nonmarine, weakly consolidated light gray pebble conglomerate and sandstone composed of pebbles and small cobbles, mostly of granitic rocks and few of gneiss, metavolcanic rocks, quartzite, anorthosite, gabbro, and tertiary volcanic rocks (Dibblee, 1992).

The Pico Formation (Pliocene) is mainly located along the central portion of the Proposed Project around the Gavin Canyon to just south of Rice Canyon. The Pico Formation comprises marine clayey siltstone and sandy siltstone. The soft, olive gray color unit, contains interbeds of very fine-grained sandstone. Siltstone locally contains abundant foraminifera and well-cemented shells of invertebrates.

Towsley Formation (early Pliocene and late Miocene) is mainly located along the alignment of the existing 66 kV sub-transmission system which transects the I-5 Freeway to the south and within the Sunshine Canyon Landfill. This is a marine unit, thick-bedded to poorly sorted, and very fine-grained to granular sized. Slopes comprising the Towsley Formation are subject to bedding plane failure, landsliding, where the bedding dips out of slope and rock falls, rock slides, and rotational failures.

The Modelo and Topanga Formations are of Miocene age (5 million to 25 million years) and consists of marine deposits of gray, white, and brown, shale, siltstone, and sandstone located primarily within the Aliso Canyon Oil Field.

Geologic units mapped in the vicinity of the Proposed Project are presented in Table 4.6-1 and are based on a review of the above referenced State Geologic Maps series.



Map Location

Legend For Geology Types Please See Page 2

- Proposed SCE 66 kV Modification
- Existing SCE 66 kV Alignment
- Sunshine Canyon Landfill
- Aliso Canyon Storage Field
- Existing SCE Substation

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Aliso Canyon PEA

Figure 4.6-1
Proposed Project and Nearby Local Geology

Source:Dibblee, T.W., Jr., 1992.Geologic Map of the Oat Mountain and Canoga Park (north Half), Newhall Quadrangles, Los Angeles County, California

Southern California Gas Company A Sempra Energy utility

AECOM

Project: 06205-134
Date: September 2009

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Table 4.6-1 Geologic Units Present in the Vicinity of the Proposed Project

Geologic Formation Name	Geologic Symbol	Description of Lithology
Artificial Fill	(af)	Artificial fill will likely be encountered, with the most probable locations being abutments and urban areas. Artificial fill may range from uncontrolled deposits of construction debris, particularly adjacent to river and creek banks, to engineered fill placed during land improvement projects.
Quaternary Terrace Deposits	Qt	These deposits are remnants of an old erosion surface (stream laid gravels). These older terrace deposits are generally stable except where they are underlain by weak or undercut bedded material.
Landslide deposits (Holocene and late Pleistocene?)	Qls	Rock detritus from bedrock and surficial materials, broken in varying degrees from relatively coherent large blocks to disaggregated small fragments, deposited by landslide processes including slides, slumps, falls, topples and flows; generally unconsolidated; some dissected landslides may be as old as late Pleistocene. A few large landslides toe below present sea level or stream level.
Older alluvium	Qoa	Older alluvial deposits consist of non-marine deposits of undifferentiated, dissected and/or uplifted, unconsolidated to poorly consolidated, non-stratified to slightly stratified sand, silt, clay, and gravel including terrace deposits, older alluvial fan deposits, and valley fill and floodplain deposits. The older alluvium is of Quaternary age (<1.8 million years old). Slopes comprising the older alluvium may be subject to bank failure and slumping.
Saugus	Ts	The Saugus Formation is made up of three units: the Upper Member, Middle Member and Sunshine Ranch Member. The Pliocene to Pleistocene aged (11,000 million to 5 million years old) Saugus formation consists of non-marine deltaic deposits of poorly to well consolidated, cross bedded, pebbly, coarse sandstone and conglomerate. The Saugus Formation grades downward into estuarine deposits comprising fine to medium grained clayey sandstone and siltstone. Slopes within the Saugus Formation are subject to gradual raveling and small slumps can occur.
Pico	Tp	The Pico Formation is of Pliocene age (1.8 million to 5 million years) and consists of marine deposits of blue-gray, tan, and brown, interbedded siltstone, sandstone, shale, mudstone, and conglomerate. The fine-grained units are lamellar to thick-bedded, fossiliferous, and commonly expansive. The coarse grained units are generally poorly sorted, thin-bedded to massive, and poorly to moderately indurated. Slopes within the Pico formation are subject to widespread large- and small-scale bedrock and surficial landslides.
Towsley	Pt	The Towsley Formation is of Late Miocene to Early Pliocene age (2 million to 10 million years) and consists of marine deposits of tan, white, and reddish brown, siltstone and sandstone. The Towsley Formation is thick-bedded to poorly sorted, and very fine-grained to granular sized. The topographic expression of the sandstone units can

Geologic Formation Name	Geologic Symbol	Description of Lithology
		support steep cliffs up to several hundred feet thick. Slopes comprising the Towsley Formation are subject to bedding plane failure where the bedding dips out of slope and rock falls, rock slides, and rotational failure were the where the topographic relief is great.
Modelo	Tm	The Modelo Formation is of Miocene age (5 million to 25 million years) and consists of marine deposits of gray, white, and brown, shale, siltstone, and sandstone. The Modelo Formation is thin-bedded to finely laminated, siliceous, diatomaceous, cherty, and clayey with localized carbonized organic material, vitreous, expansive, and fossiliferous. Slopes comprising the Modelo Formation are subject to large- and small-scale landslides where bedding dips out of slope and rotational failure where the rock is fractured and moist to saturated. The Modelo formation is considered the equivalent of the Monterey formation in the eastern portion of the Ventura basin.
Topanga	Mt	Marine sandstone and conglomerate. Semi-friable conglomerate, sandstone and siltstone, light gray to tan, massive to vaguely bedded and sparsely fossiliferous in places. The siltstone is interbedded with minor thin lenses of conglomerate sandstones. This unit flakes and spalls into small fragments in cuts and is landslide prone.

Sources: California Geological Survey (CGS), Preliminary Geologic Map of the Los Angeles 30´ x 60´, Quadrangle, Southern California Open-File Report 2005-1019), Compiled by Robert F. Yerkes and Russell H. Campbell, 2005, and Southeast and Southwest Quarters of the Oat Mountain [7.5'] Map Sheet Nos. 30/33 Quadrangles, Saul, 1979, and Geologic Map of the Oat Mountain and Canoga Park Quadrangles, Dibblee, 1992

4.6.1.1 Soils

Several soil types are present within the Proposed Project area. Soils information presented herein was obtained from the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly the Soil Conservation Service), and Soil Survey Geographic (SSURGO) database.

The soils are within the Castaic-Balcom, Gaviota and Milsholm Soil association. These soils are derived from deposits of the sediment and alluvial materials, primarily from the erosion of intrusive granitic rocks, metamorphic schist, slates and sedimentary rocks (sandstone and shale) originating from the nearby Mountains.

The soils underlying the Proposed Project are generally well drained, with some excessively drained, consisting of loamy sands, silty clay loams, clayey loams, coarse sandy loams, and rocky sandy loams on low river terraces and alluvial deposits. Soils in the Proposed Project have a low to moderate shrink/swell potential, and are prone to medium to very high erosion.

Based on the corrosivity testing of the soil samples collected around the Compressor Station by Globus Engineering, the risk of corrosion to steel is very high for ferrous metals under saturated conditions and moderately corrosive to corrosive under existing field moisture conditions. The silty clay and sandy loam soils underlying the Proposed Project are classified as "saline alkali" and have a relatively alkaline pH (7.64 to 8.12). The risk of caving in shallow excavations is generally low, and the erosion hazard is medium to very high. The sandy loams are less cohesive. Although the risk of corrosion to steel is also generally high in these soils, the risk of corrosion to concrete is low. The shrink/swell potential is low to moderate for coarser texture soils.

Figure 4.6-2 shows the soils in the vicinity of the Proposed Project. Table 4.6-2 describes the soil types and their characteristics.

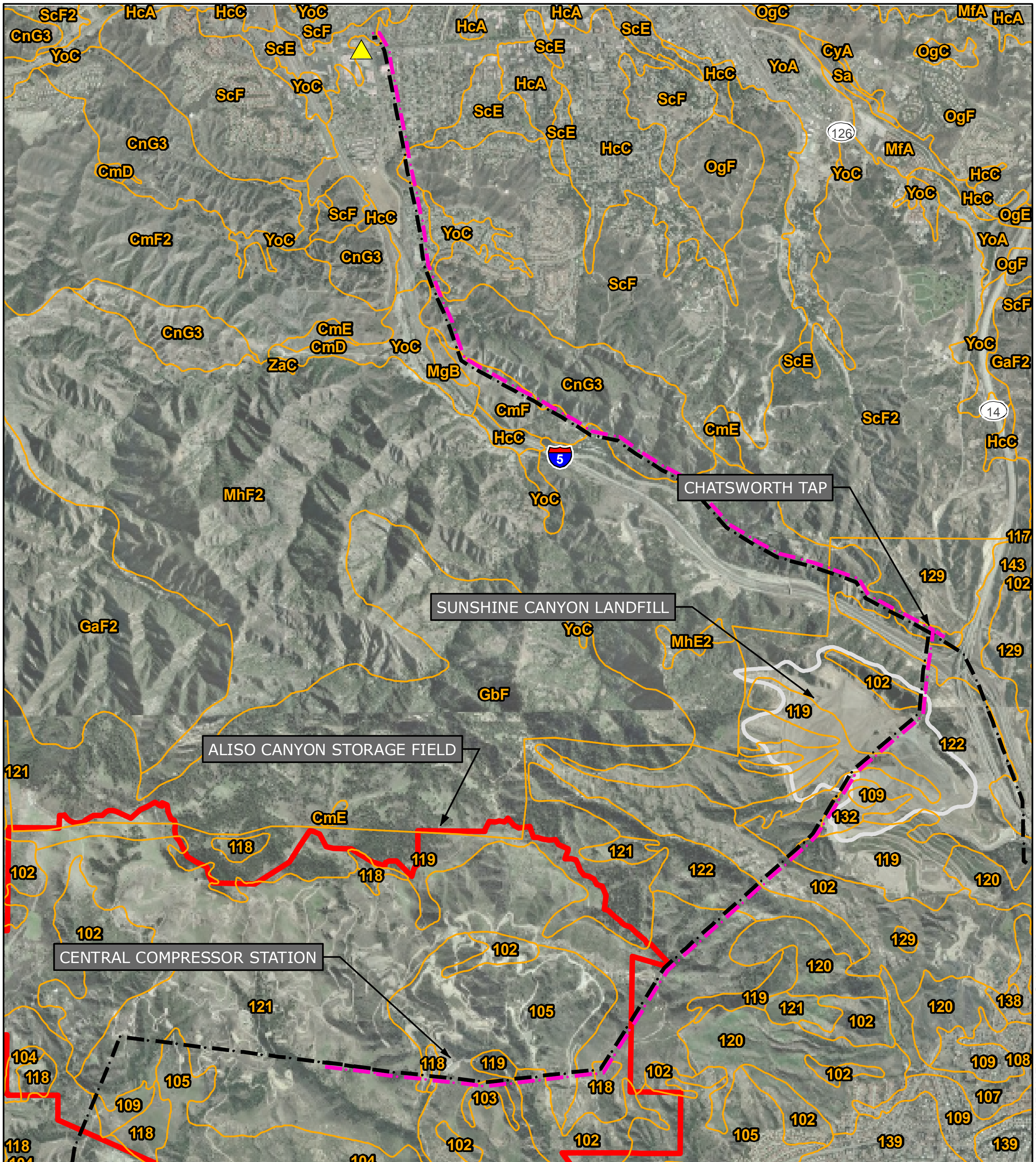
Table 4.6-2 Soil Types and Characteristics in the Vicinity of Proposed Project

Map Unit Symbol	Soil Type Name and Description	Shrink/Swell Potential	Drainage Class	Erosion Class	Subsoil Permeability	Runoff
102	Badland	Low	--	Low	Very Low	
103	Balcom silty clay loam, 9 to 15 percent slopes	Moderate	Well drained	Medium	Moderately High	Very high
105	Balcom silty clay loam, 30 to 50 percent slopes	Moderate	Well drained	Very High	Moderately High	High
107	Capistrano-Urban land complex, 0 to 2 percent slopes	Low	--	Low	High	N/A
108	Capistrano-Urban land complex, 2 to 9 percent slopes	Low	--	Low	High	Very low
109	Chualar-Urban land complex, 2 to 9 percent slopes	Low	Well drained	Low	Moderately High	N/A
117	Gaviota sandy loam, 30 to 50 percent slopes	Low	Well drained	Very High	High	N/A
118	Gazos silty clay loam, 15 to 30 percent slopes	Moderate	Well drained	Very High	Moderately High	Medium
119	Gazos silty clay loam, 30 to 50 percent slopes	Moderate	Well drained	Very High	Moderately High	N/A
120	Gazos-Balcom complex, 30 to 50 percent slopes	Moderate	Well drained	Very High	Moderately High	N/A
121	Lopez shaly clay loam, 30 to 50 percent slopes	Low	Excessively drained	High	Moderately High	Very high
122	Millsholm loam, 30 to 50 percent slopes	Low	Well drained	Very High	Moderately High	N/A
128	Saugus loam, 15 to 30 percent slopes	Low	Well drained	High	Moderately High	N/A
129	Saugus loam, 30 to 50 percent slopes	Low	Well drained	Very High	Moderately High	N/A
132	Soper gravelly sandy loam, 15 to 30 percent slopes	Low	Well drained	Very High	Moderately High	High
138	Xerorthents, 0 to 30 percent slopes	Low	Well drained	Low	Very Low	Very high
139	Xerorthents-Urban land-Balcom complex, 5 to 15 percent slopes	Low	Well drained	Low	Very Low	N/A
143	Xerorthents-Urban land-Saugus complex, 15 to 30 percent slopes	Low	Well drained	Low	Very Low	N/A
CmD	Castaic-Balcom silty clay loams, 9 to 15 percent slopes	Moderate	Well drained	Medium	Moderately High	N/A

Map Unit Symbol	Soil Type Name and Description	Shrink/Swell Potential	Drainage Class	Erosion Class	Subsoil Permeability	Runoff
CmE	Castaic-Balcom silty clay loams, 15 to 30 percent slopes	Moderate	Well drained	Very High	Moderately High	N/A
CmF	Castaic-Balcom silty clay loams, 30 to 50 percent slopes	Moderate	Well drained	Very High	Moderately High	N/A
CmF2	Castaic-Balcom silty clay loams, 30 to 50 percent slopes, eroded	Moderate	Well drained	Very High	Moderately High	N/A
CnG3	Castaic and Saugus soils, 30 to 65 percent slopes, severely eroded	Moderate	Well drained	Very High	Moderately High	Very high
CyA	Cortina sandy loam, 0 to 2 percent slopes	Low	Excessively drained	Low	High	N/A
GaF2	Gaviota rocky sandy loam, 30 to 50 percent slopes, eroded	Low	Well drained	Very High	High	N/A
GbF	Gazos clay loam, 30 to 50 percent slopes	Moderate	Well drained	Very High	Moderately High	Very high
HcA	Hanford sandy loam, 0 to 2 percent slopes	Low	Well drained	Low	High	N/A
HcC	Hanford sandy loam, 2 to 9 percent slopes	Low	Well drained	Low	High	Very low
MfA	Metz loamy sand, 0 to 2 percent slopes	Low	Excessively drained	Low	High	N/A
MgB	Metz loam, 2 to 5 percent slopes	Low	Excessively drained	Low	Moderately High	N/A
MhE2	Millsholm rocky loam, 15 to 30 percent slopes, eroded	Low	Well drained	High	Moderately High	Low
MhF2	Millsholm rocky loam, 30 to 50 percent slopes, eroded	Low	Well drained	Very High	Moderately High	Very high
OgC	Ojai loam, 2 to 9 percent slopes	Low	Well drained	Low	Moderately High	Very high
OgE	Ojai loam, 15 to 30 percent slopes	Low	Well drained	High	Moderately High	Medium
OgF	Ojai loam, 30 to 50 percent slopes	Low	Well drained	Very High	Moderately High	N/A
Sa	Sandy alluvial land	Low	Excessively drained	Low	High	High
ScE	Saugus loam, 15 to 30 percent slopes	Low	Well drained	High	Moderately High	Very low
ScF	Saugus loam, 30 to 50 percent slopes	Low	Well drained	Very High	Moderately High	High

Map Unit Symbol	Soil Type Name and Description	Shrink/Swell Potential	Drainage Class	Erosion Class	Subsoil Permeability	Runoff
ScF2	Saugus loam, 30 to 50 percent slopes, eroded	Low	Well drained	Very High	Moderately High	N/A
YoA	Yolo loam, 0 to 2 percent slopes	Low	Well drained	Low	Moderately High	High
YoC	Yolo loam, 2 to 9 percent slopes	Low	Well drained	Low	Moderately High	N/A
ZaC	Zamora loam, 2 to 9 percent slopes	Low	Well drained	Low	Moderately High	N/A

Notes: Erosion classification based on Bureau of Land Management (BLM) Standard (NRCS rating by County may be different): 0-3 Low; 3-5 Medium; 5-7 High; >7 Very High. Source: USDA, 2009 (http://www.nrcs.usda.gov/) and USDA,1969. Report and General Soil Map. Los Angeles County, California



Map Location

Legend

For Soils Legend See Page 2

- Proposed SCE 66 kV Modification
- Existing SCE 66 kV Alignment
- Sunshine Canyon Landfill
- Existing SCE Substation
- Aliso Canyon Storage Field
- Soil Map Unit

1 inch = 3,500 feet

0 3,500 7,000 Feet

Aliso Canyon PEA

Figure 4.6-2
Soil Types in the Vicinity of the Proposed Project

Source: NRCS Web Soil Survey 2009

Project: 06205-134
Date: September 2009

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4.6.1.2 Faulting and Seismicity

Southern California is a geologically complex and diverse area, dominated by the compressional forces created as the North American and Pacific tectonic plates slide past one another along a transform fault known as the San Andreas. Regional tectonic compressional forces shorten and thicken the earth's crust, creating and uplifting the local transverse mountain ranges, including the Santa Susana, Santa Monica, and San Gabriel. A variety of fractures within the crust are created to accommodate the compressional strain, allowing one rock mass to move relative to another rock mass (Norris and Webb, 1990).

Within southern California, several fault types are expressed, including lateral or strike slip faults, vertical (referred to as normal and reverse or thrust faults) and oblique faults accommodating both lateral and vertical offset. Earthquakes are the result of sudden movements along faults, generating ground motion (sometimes violent) as the accumulated stress within the rocks is released as waves of seismic energy.

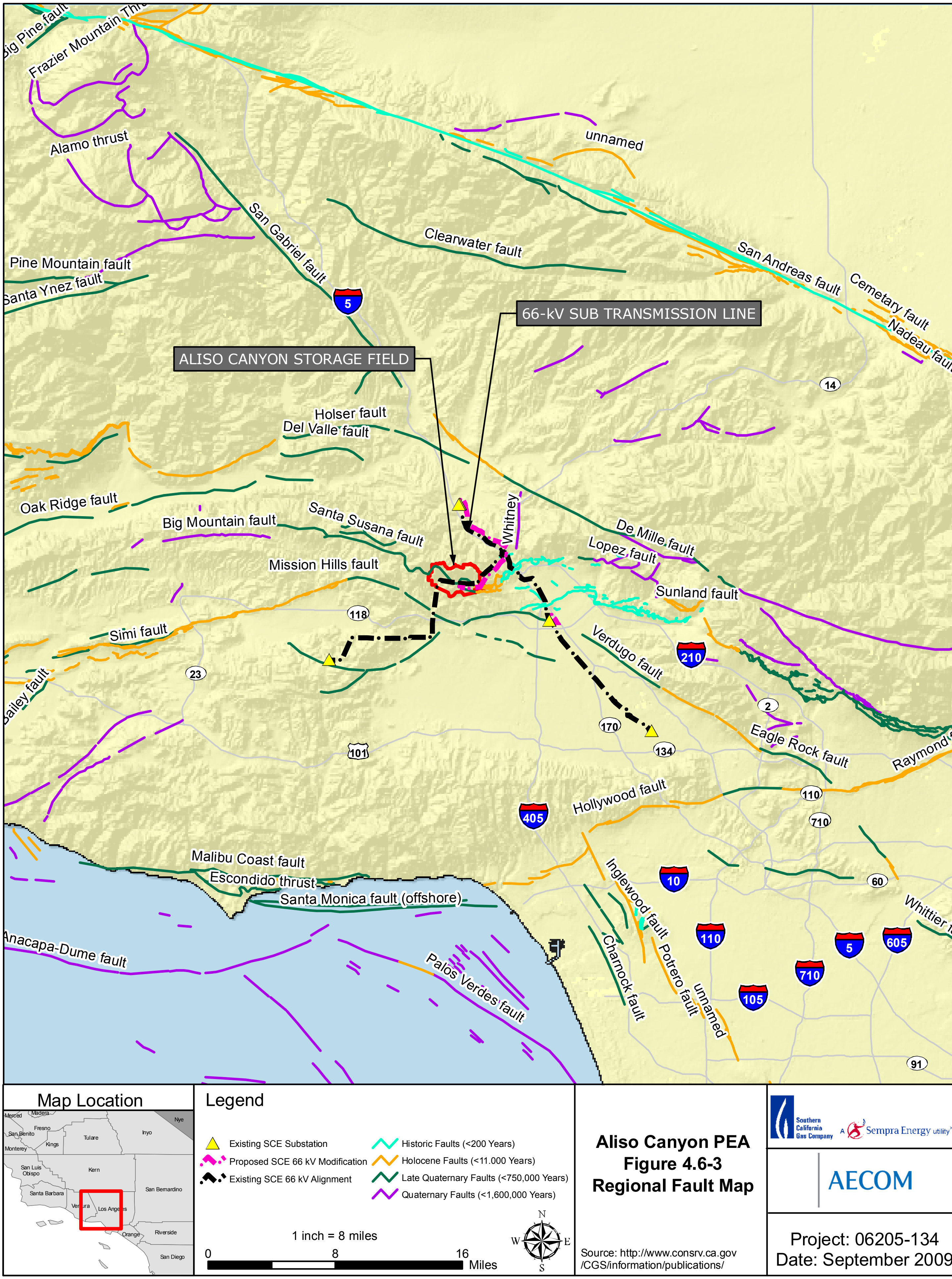
The Proposed Project is located within a seismically active area of southern California, a region that has experienced numerous earthquakes in the past and most recently, near the epicenter of the January 1994 Northridge Earthquake. The January 1994 Northridge Earthquake caused the Storage Field to shut down for three days; however, the reservoir remained in tact and the integrity of the field was never compromised. There were no major damages, only minor damage to some of the injection/withdrawal wells and piping. There is the potential for the Proposed Project area to experience strong ground shaking from local and regional active faults. Within the Santa Susana Mountains, faulting is very common; however, the majority has not been evaluated for activity.

The California Geological Survey (CGS), previously known as the California Division of Mines and Geology (DMG), developed criteria to classify fault activity for the Alquist-Priolo (AP) Earthquake Fault Zoning Program (Hart, 1999). By definition, an active fault is one that is "sufficiently active and well defined," with evidence of surface displacement within Holocene time (about the last 11,000 years). These terms are defined in Special Publication 42 (Hart, 1999) and reproduced below.

> "Sufficiently active. A fault is deemed sufficiently active if there is evidence of Holocene surface displacement along one or more of its segments or branches. Holocene surface displacement may be directly observable or inferred; it need not be present everywhere along a fault to qualify that fault for zoning."
>
> "Well-defined. A fault is considered well-defined if its trace is clearly detectable by a trained geologist as a physical feature at or just below the ground surface. The fault may be identified by direct observation or by indirect methods (e.g., geomorphic evidence). The critical consideration is that the fault, or some part of it, can be located in the field with sufficient precision and confidence to indicate that the required Proposed Project-specific investigations would meet with some success."

A potentially active fault displaces Quaternary age deposits (last 1.6 million years). Although to a lesser degree, potentially active faults also represent possible surface rupture hazards. In contrast to active or potentially active faults, faults considered inactive have not moved in the last 1.6 million years.

A computer-aided search of the known sufficiently active faults was conducted within a 25-mile radius using the compressor station as the starting point (target site) in order to capture all of the project components. The search was conducted using the EQFAULT computer program, Version 3.0 (Blake, 2000). Using the EQFAULT typically provides the approximate distance from the Proposed Project to known active faults, the estimated maximum earthquake potential for a given fault, and the estimated peak acceleration. These faults are listed in Table 4.6-3. Active and Potentially Active Faults in the region are shown on Figure 4.6-3.



Aliso Canyon PEA
Figure 4.6-3
Regional Fault Map

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Table 4.6-3 Summary of Faults Located Within 20 Miles of the Proposed Project

Fault Name	Distance From Proposed Project in miles (kilometers)	Estimated Maximum Earthquake Magnitude (M_w)	Last Rupture
San Fernando*	2.7 (4.3)	6.7	Late Quaternary, except for a short segment which ruptured slightly in1971
Northridge Hills (E. Oak Ridge)	3.4 (5.4)	6.9	Holocene, in part; mainly Late Quaternary Slip
Mission Hills	4 (6.4)	6.2	Late Quaternary, possibly Holocene
Big Mountain	8 (12.8)	--	Late Quaternary
Devonshire	1.7 (2.8)	7.0	Holocene
Holser	3.6 (5.8)	6.5	Late Quaternary
San Gabriel	4.7 (7.5)	7	Late Quaternary
Sierra Madre	5 (8.1)	6.7	1971
Oak Ridge (Onshore)	10.1 (16.3)	6.9	Holocene, in part; mainly Late Quaternary
Whitney	1.0 (1.6)	--	Late Quaternary
Verdugo	10.3 (16.5)	6.7	Holocene; Late Quaternary along northern segment
San Cayetano	14 (22.6)	6.8	Less than 5,000 years ago
Simi-Santa Rosa	15 (24.1)	6.7	Holocene
Sierra Madre	15.2 (24.5)	7	Holocene
Hollywood	19.5 (31.4)	6.4	Holocene
Santa Monica	20.3 (32.6)	6.6	Late Quaternary
Malibu Coast	21.7 (35)	6.7	Holocene, in part; otherwise Late Quaternary
San Andreas - 1857 Rupture	22.5 (36.2)	7.8	1857
San Andreas- Mojave	22.5 (36.2)	7.1	1857
Anacapa-Dume	22.7 (36.6)	7.3	Not available
San Andreas - Carrizo	23.7 (38.1)	7.2	Not available
Raymond	24.5 (39.5)	6.5	Holocene
Newport-Inglewood (Long Beach)	24.9 (40)	6.9	1933
Santa Ynez (East)	25.2 (40.6)	7	Late Quaternary; except for a short Holocene segment near the intersection with the Baseline fault

*Note: The distance from the Proposed Project (defined in this radius search as the compressor station) to the Santa Susana Fault zone is ~ 0.5-mile; however, the southernmost portion of the existing 66 kV sub-transmission system lies just southeast of this fault zone.

Source: Computer program EQFAULT and CGS, Digital Database of Quaternary and Younger Faults from the Fault Activity Map of California, Version 2.0, 2000.

Faults generally produce damage in two ways: ground shaking and surface rupture. Seismically induced ground shaking covers a wide area and is greatly influenced by the distance of the Proposed Project to the seismic source, soil conditions, and depth to groundwater. Surface rupture is limited to very near the fault. Other hazards associated with seismically induced ground shaking include earthquake-triggered landslides and tsunamis.

The California Division of Mines and Geology (1996) classifies faults into two categories in their modeling of California's seismic risk. These categories are:

- Type A faults - these faults have slip rates greater than 5 millimeters per year and magnitude (M) > 7.0 and well constrained paleoseismic data. The San Andreas and Elsinore faults are examples of a Type A fault.

- Type B faults - all other faults not classified as Type A faults. Type B faults lack paleoseismic data necessary to constrain the recurrence interval of large events. The San Gabriel, Oak Ridge, Holser, and Santa Susana faults are Type B faults.

Seismic events on any of these active or potentially active faults could cause strong ground shaking, surface fault rupture, or liquefaction in susceptible areas. Active and Potentially Active faults in the region are shown on Figure 4.6-3.

The San Gabriel is a principal active fault in California and is mapped by the CGS, and zoned, under the Alquist-Priolo Earthquake Fault Zoning Act (DMG, Special Publication [SP] 42), as a Alquist-Priolo Fault Hazard Zone. This fault has not experienced historic surface rupture (i.e., within the last 200 years).

A number of earthquakes of moderate to major magnitude have occurred in the southern California area within the last 75 years (CGS, SP116, 1995). A partial list of these earthquakes and magnitude which occurred between 1933 through 1999, is included in the following table:

Table 4.6-4 List of Historic Earthquakes in Southern California

Earthquake	Date of Earthquake	Magnitude (M)	Distance to Epicenter (mi)
Long Beach	March 10, 1933	6.4	55
Tehachapi (Kern)	July 21, 1952	7.5	42
San Fernando	February 9, 1971	6.7	3
Whittier Narrows	October 1, 1987	5.9	30
Sierra Madre	June 28, 1991	5.8	32
Landers	June 28, 1992	7.3	150
Big Bear	June 28, 1992	6.4	95
Northridge	January 17, 1994	6.7	4
Hector Mine	October 16, 1999	7.1	120

Note: M = magnitude; M_w = estimated maximum earthquake magnitude.

The Proposed Project could be subjected to strong ground shaking in the event of an earthquake. However, this geological hazard is common in southern California and the effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices.

The AP Earthquake Fault Zoning Act was enacted by the State of California in 1972 to mitigate the hazard of surface faulting to structures planned for human occupancy and other critical structures. This law was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive fault ruptures that damaged numerous residential dwellings, commercial buildings, and other structures. The State has established regulatory zones (known as Earthquake Fault Zones and often referred to as "AP zones") around the surface traces of active faults and Earthquake Fault Zone maps to be used by government agencies in planning/reviewing new construction. In addition to residential projects, structures planned for human occupancy that are associated with industrial and commercial projects are of concern.

A review of the AP Earthquake Fault Zone Maps (CGS, Interim Revision, 2007), indicates that the Proposed Project does not lie within an AP Earthquake Fault Zone. Although not designated as AP Earthquake Faults, numerous nearby faults have been mapped in the area (Figure 4.6-4). The closest identified fault is the Santa Susana fault, located adjacent to, and east of, the Aliso Canyon area, southeast of the water tank and the existing 66 kV sub-transmission alignment. There is no evidence that this fault has offset Holocene age alluvial deposits (County of Los Angeles, Seismic Safety Element, 1990). Ziony and Jones (1989) indicate that the fault is potentially active (i.e., no displacement of Holocene age alluvium). Additionally, Jennings (1994) indicates that the fault is potentially active.

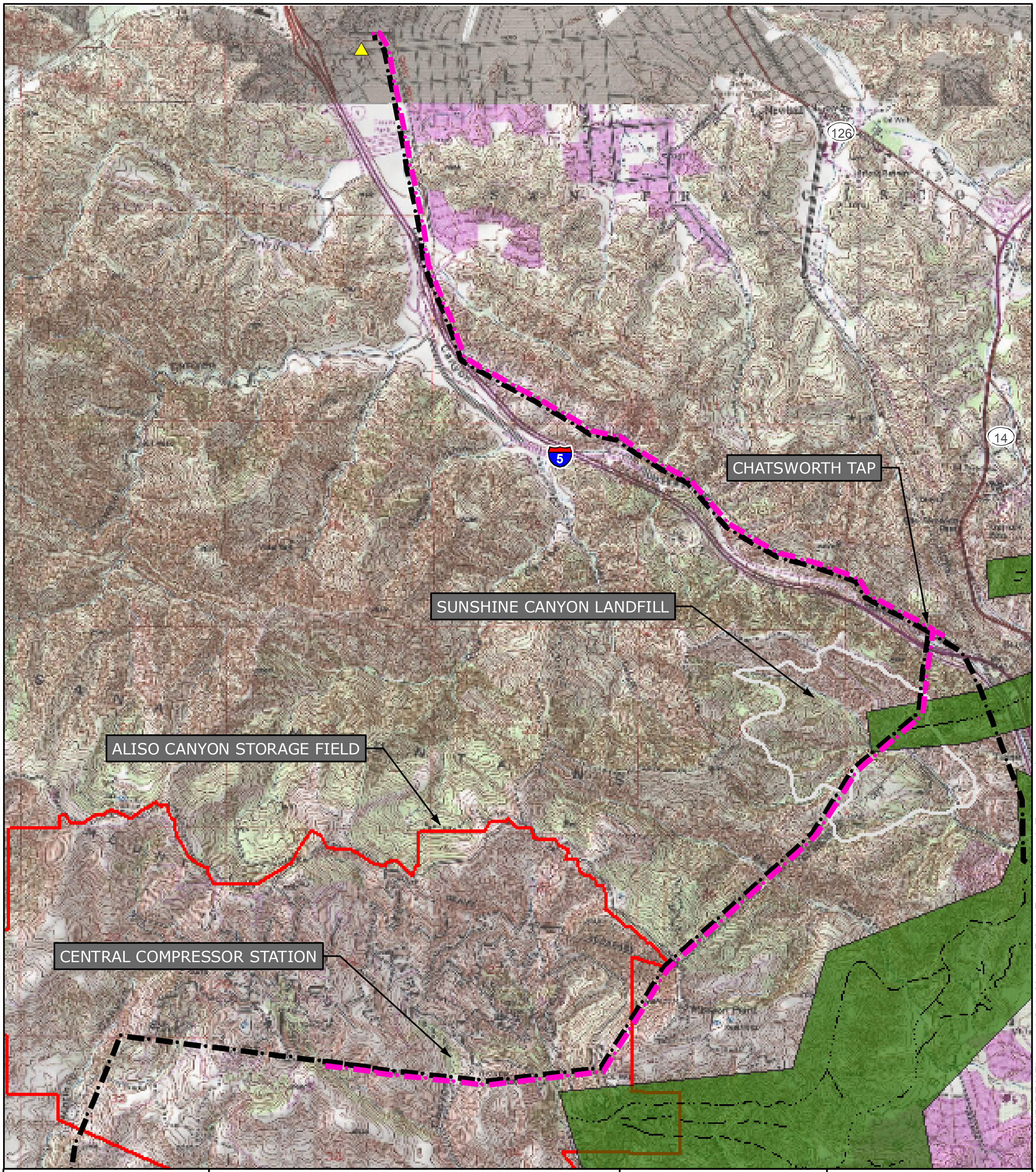
The Santa Susana fault has the potential to produce a maximum credible earthquake magnitude of 6.7. Other seismically active faults in the area include the San Gabriel Fault (approximately 2.5 miles north of Newhall), Northridge Fault (~ 2 miles south of the Plant Station), and the Sierra Madre San Fernando segment (~ 0.5-mile east of Plant Station). These faults have the potential to generate maximum credible earthquakes (MCE) of M_w 7.0, M_w 7.0 and M_w 6.7, respectively (Norris and Webb, 1990). The aforementioned faults are all classified as Type B faults.

The notorious San Andreas Fault system is more than 800 miles long and extends to depths of at least 10 miles beneath the Earth's crust. It lies ~ 20 miles northeast of the Newhall substation, and is a Type A fault. Several active and potentially active faults and fault zones are present in the vicinity of the Proposed Project, and are discussed below:

Active Faults

San Andreas Fault

The San Andreas Fault is the dominant active fault in California and is classified as an active right lateral strike-slip fault and capable of producing a 8-plus M regional earthquake. The San Andreas Fault Zone is located 20 miles northeast of the Newhall substation. This fault zone, California's most prominent fault, trends generally northwest for almost the entire length of the State. The southern segment, closest to the Proposed Project, is approximately 280 miles long and extends from the Mexican Border to the Transverse Ranges west of Tejon Pass. It is the primary surface boundary between the Pacific and the North American plate. This fault is capable of producing a moment M 8 to M 8.5 earthquake. There have been numerous historic earthquakes along the San Andreas Fault. The 1857 Fort Tejon earthquake was the last major earthquake along the San Andreas Fault Zone in southern California.



Map Location

Legend

- Proposed SCE 66 kV Modification
- Existing SCE 66 kV Alignment
- Inferred Fault Traces
- Concealed Fault Traces
- Accurately Located Fault Traces
- Approximately Located Fault Traces
- Alquist Priolo Fault Zone Boundary Polygons
- Existing SCE Substation

N W E S

1 inch = 3,500 feet

0 3,500 7,000 Feet

Aliso Canyon PEA

Figure 4.6-4
Alquist-Priolo Fault Hazard Zone Map

Sources: CA Geological Survey, CA Division of Mines and Geology, 1976 Special Studies Zone Fault Zone Map, Oat Mountain Quadrangle

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San Fernando Fault Zone

The San Fernando Fault is located 3 miles east of the Proposed Project. The San Fernando Fault is an active fault of an ~ 12 miles (19 kilometers [km]) segment of the Sierra Madre-Santa Susana fault system and was the source of the 1971 San Fernando (Sylmar) earthquake. An earthquake of M 6.7 originated along this fault zone on February 9, 1971. According to DMG, 1996, the San Fernando Fault Zone has an estimated average slip rate of 2 millimeters per year (mm/yr).

The San Fernando Fault Zone comprises one of a number of left lateral/reverse frontal faults bounding the southern margin of the Santa Susana Mountains and the portion of the San Gabriel Mountains west of Big Tujunga Canyon. Surface rupture occurred along the Tujunga, Sylmar, and Mission Wells segments of the San Fernando Fault Zone during this 1971 earthquake.

Oak Ridge Fault

The active Oak Ridge Fault is located in the Ventura Basin of which the segments extend for ~ 100 km from Santa Barbara to Piru. This fault is located about 2.5 miles north of the Newhall substation. The fault generally dips 65 degrees to 80 degrees south and is a steep south-dipping reverse fault that forms the boundary between Oak Ridge to the south and the Santa Clara River to the north (Ziony and Jones, 1989). According to DMG, 1996, the Oak Ridge Fault Zone has an estimated average slip rate of 4 mm/yr.

Activity along the Oak Ridge Fault is known to have occurred during the Pliocene time (5.3 million to 7.6 million years ago) and into the Pleistocene. The maximum credible earthquake is a moment M of 6.9 for both the eastern and western parts of this fault. The M 6.7 Northridge earthquake (in 1994) is thought to have occurred along the eastern end of the Oak Ridge fault (Yeates et al., 1995).

San Cayetano Fault

The San Cayetano Fault is a north-dipping reverse fault that runs along the north side of the Santa Clara River valley. The San Cayetano Fault is ~ 30 miles in length, running along the base of the Topa Topa Mountains from Piru Canyon to the Upper Ojai Valley, where it merges with the Lion Mountain and Sisar faults. Subsurface mapping by oil companies suggest as much as 20,000 feet of dip-slip displacement has occurred (Norris and Webb, 1990). The San Cayetano Fault is considered capable of generating an earthquake of Mw 7.3 and is zoned as active (Holocene) near the city of Fillmore, California, and along portions to the west.

San Gabriel Fault

The San Gabriel Fault, one of the principal structural elements of the Transverse Ranges, is a near vertical, right lateral, strike-slip displacement fault. This fault is a long break that extends from near Frasier Mountain, to near the Tejon Pass, near San Bernardino. The San Gabriel Fault is ~ 90 miles (145 km) in length, and trends obliquely across the mountains on a strike of about N65°W from the San Gabriel Mountains to Frazier Park and has been mapped as a part of the San Andreas fault system (Norris and Webb, 1990). This fault is an active fault that crosses the City of Santa Clarita ~ 5 miles north-northwest of the Proposed Project. According to the Special Publication 42, Interim Revision 2007, Fault Rupture

Hazard Zones in California, the Saugus-Newhall segment of the San Gabriel Fault Zone is included within an Alquist-Priolo Earthquake Fault Zone.

The San Gabriel Fault has been modeled as being capable of generating an earthquake of Mw 7.0 and is zoned as active between the city of Saugus and Castaic to the north of the Proposed Project (CGS, 2007). Dibblee (1992) has mapped the closest segment of the San Gabriel Fault (an actively zoned portion of the fault) less than 2.5 miles northeast of the Newhall substation.

Blind Thrust Fault Zone

Northridge Blind Thrust

The Northridge Blind Thrust, as defined by Petersen et al. (1994), is an inferred deep thrust fault that is considered the eastern extension of the active Oak Ridge fault and extends for ~ 27 km. From seismological and geodetic evidence, the Northridge Blind Thrust dips ~ 30 degrees to 40 degrees to the south, and trends roughly east-west. The zone of aftershocks defines a fault plane that is ~ 25 km to 30 km in length, extending to a depth of ~ 20 km beneath the city of Northridge. The Northridge Blind Thrust is located beneath the majority of the San Fernando Valley and is believed to be the causative fault of the January 17, 1994, Northridge earthquake. The Northridge Blind Thrust is not exposed at the surface and does not present a potential surface fault rupture hazard. However, this thrust fault is an active feature that can generate future earthquakes. Petersen et al. (1994) estimates an average slip rate of 1.5 mm/yr and a maximum M of 6.9 for the Northridge Blind Thrust.

Potentially Active Faults

Northridge Hills Fault

The central portion of the San Fernando Valley is transected by the Northridge Hills Fault, a north dipping reverse fault that may connect the Verdugo and Eagle Rock faults, segments of which have Holocene offsets (USGS, Ziony and Jones, 1988). The Northridge Hills Fault is a high-angle fault and its location is based primarily on the numerous petroleum test wells that have been drilled in the Northridge Hills located 4 miles southwest of the Proposed Project. The Northridge Hills constitute a series of discontinuous low lying hills that extend from near the town of Chatsworth east-southeast to the San Diego Freeway marks the crest of a south-vergent fault-propagation fold above the blind, north-dipping, 15-km-long Northridge Hills thrust (Tsutsumi and Yeats, 1999).

Logs of these wells indicate that the Modelo Formation has been displaced between 490 feet to 1,000 feet along the dip of the fault. The apparent movement along the fault has been dip-slip with the north block moving down. The apparent surface trace of the fault can be found in the Cretaceous Chico Formation north of Chatsworth (Weber, et al., 1980).

Geomorphic evidence, such as scarps in the Pleistocene age alluvial deposits, has been identified on aerial photographs. The fault is considered potentially active by Jennings (1994). However, a recent publication suggests that deformation of young sediments in the area could be related to movement along the Northridge Hills Fault (Baldwin et al., 2000).

Santa Susana Fault Zone

The Santa Susana Fault Zone (Type B fault) comprises a complex group of predominantly northwest trending, north-dipping reverse faults. The fault zone is ~ 23 miles long and runs from the eastern end of the Oak Ridge fault near Fillmore to the Sierra Madre and San Fernando faults to the east. This fault is a reverse fault that extends from the northern edge of Simi Valley through the northern end of the San Fernando Valley (City of Santa Clarita General Plan Safety Element, 1991).

The dip of the Santa Susana Fault is steep at depth and flattens to nearly horizontal (no dip) near the ground surface, resulting in a highly sinuous surface trace of the fault. The most recent movement on the fault has been estimated as Late Quaternary, except for a short segment in the San Fernando Valley which ruptured in the 1971 San Fernando earthquake and experienced surface displacements along its trace following the 1971 earthquake. Saul (1975) suggests that the Santa Susana Fault has been inactive since middle Pleistocene time. Surface displacements were mapped along its trace following the 1971 M_w 6.4 San Fernando earthquake. However, there is no evidence that this fault has offset Holocene age alluvial deposits partly because no movement was recorded on the fault plane where it is penetrated by numerous oil wells in the Plant Station (County of Los Angeles Seismic Safety Element, 1990). Ziony and Jones (1989) indicate that the fault is potentially active (i.e., no displacement of Holocene age alluvium). Additionally, Jennings (1994) indicates the fault is potentially active.

The Santa Susana Fault is considered capable of generating an earthquake of M M_w of 6.5 to M_w 7.3. According to DMG, 1996, the Santa Susana Fault Zone has an estimated average slip rate of 3 mm/yr. Both the 1971 and 1994 earthquakes are thought to have transferred strain on to the Santa Susana Fault (Globus, 2006). Yeats reports that oil well casings in the Aliso Oil Field were not sheared off during the 1971 earthquake. This fault is considered to be the most significant seismic source in the northern San Fernando Valley. It is mapped as an AP Earthquake Fault Zone as it crosses the northern portion of Aliso Canyon located ~ 0.5-mile east-southeast of the Proposed Project as shown on Figure 4.6-4.

Devonshire Fault

The Devonshire Fault is located ~ 1.7 miles southwest of the Proposed Project site, south of the Horse flat syncline geological structure, and cuts Limekiln Canyon 1-mile north of the 118 Freeway. This steep fault has the potential to produce a maximum credible earthquake M_w of 7.0. This is a high angle thrust fault dipping south. The upper sediments are mapped as slopewash. Since the Devonshire Fault thrusts over older alluvium, the Devonshire Fault is thought to be pre-Holocene, which makes the fault older than 10,000 years. Currently, the CGS classifies this fault as inactive but may be presumed to be potentially active.

Holser Fault

The Holser Fault, lying to the east of the San Cayetano fault, is an east-west trending reverse fault ~ 12 miles in length with an estimated vertical separation of about 2,600 feet (Jennings, 1994). The Holser fault trends along the northern border of the Santa Clara River Valley and has not been determined to run through the city of Santa Clarita. The Holser Fault is known to offset Pleistocene-aged/sediments of the Saugus formation but is buried beneath Quaternary-aged terrace deposits at its eastern end near the San Gabriel fault.

There is no evidence that this fault has offset Holocene age alluvial deposits (County of Los Angeles Seismic Safety Element, 1990). Ziony and Jones (1989) indicate that the fault is potentially active (no displacement of Holocene age alluvium). Additionally, Jennings (1994) indicates the fault is potentially active.

The Holser Fault is probably related to the San Cayetano fault but has a different sense of movement (i.e., south-side up movement on the Holser Fault versus north side up on the San Cayetano fault). The Holser fault has not been zoned as active by the CGS AP. The inferred trace of the Holser Fault is located ~ 2.5 miles north of the Newhall substation. It is modeled as being capable of generating a maximum moment of M 6.5 (City of Santa Clarita, General Plan, Safety Element, 2007).

Seismicity

The development of seismic input parameters for structural design requires knowledge of the faults surrounding the site, the magnitude of earthquakes that each fault can generate, and the attenuation or magnification of ground acceleration that may occur at a given site if an earthquake occurs along a particular fault. Research of historical earthquake events that have occurred in the general study area as well as a deterministic and probability evaluation of seismic parameters for potential on-site ground motion consideration can be readily performed with computer data bases and associated software, such as computer programs EQSEARCH, EQFAULT, and FRISK89 (Blake, 2000). Two terms used to describe earthquakes are MCE and maximum probable earthquake (MPE). The MCE refers to the maximum earthquake that appears capable of occurring under the presently known tectonic framework. The MPE refers to the maximum earthquake that is likely to occur during a 100-year interval and is often used in design of earthquake resistant structures. For example, the MCE that may impact the Proposed Project due to the Holser Fault is M 6.75 while the MPE is M 6.25. The computed largest credible peak acceleration that may impact the Proposed Project is 0.82 amount of ground shaking (g), while the computed largest probable peak acceleration is 0.7488g. The computed largest credible repeatable high ground acceleration that may impact the Proposed Project is 0.54g, while the computed largest probable repeatable high ground acceleration is 0.49g.

It has been indicated that the Proposed Project is within a zone of concentrated ground breakage during the 1994 Northridge earthquake (CGS, 1995).

Seismic Risk Zones have been developed based on the known distribution of historic earthquake events, evidence of past earthquakes, proximity to earthquake areas and active faults, and frequency of earthquakes in a given area. These zones are generally classified using either the CGS (formerly California Division of Mines and Geology) Maximum Expected Earthquake Intensity Map or the Uniform Building Code (UBC) Seismic Risk Map of the United States.

Geologic Hazards

Areas most susceptible to intense ground shaking are those located closest to the earthquake generating fault, as well as areas underlain by thick, loosely unconsolidated and water saturated sediments. Ground movement during an earthquake can vary depending on the overall magnitude, distance from the fault, focus of the earthquake energy, and type of geologic materials underlying the Proposed Project (CGS, 1995).

Magnitude is the measure of energy released in an earthquake, while intensity measures the ground shaking effects at a particular location. Ground shaking intensity varies substantially depending on underlying substrate at a particular location. Areas atop bedrock typically experience less severe ground shaking than those underlain by loose, unconsolidated materials. The entire Proposed Project would likely be subject to strong ground shaking in the event of a major earthquake in the Proposed Project region (CGS, 1995).

Landslide

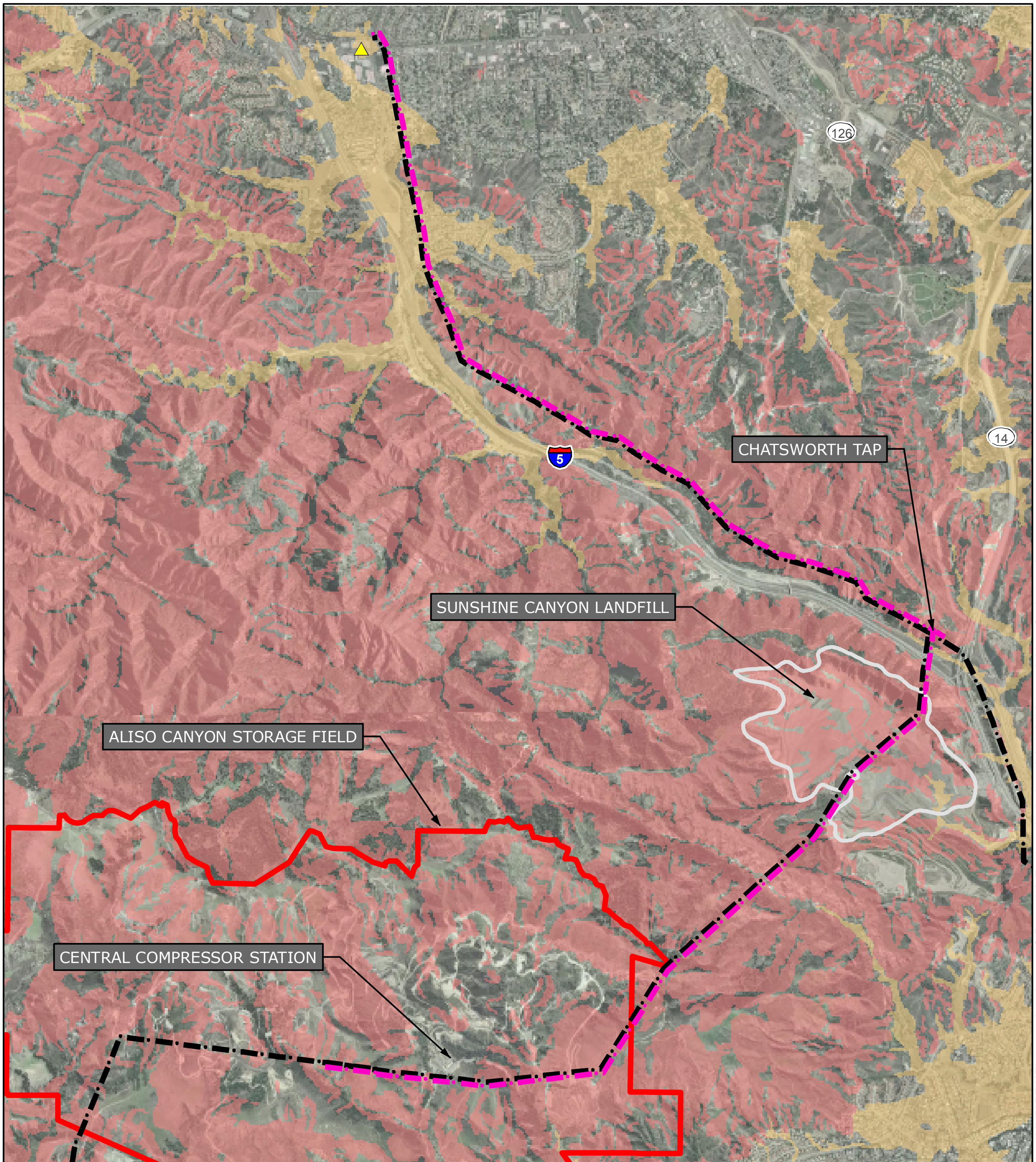
Landslides are masses of rock, soil, and debris displaced down-slope by sliding, flowing, or falling. Areas of landsliding are, in general, confined to the areas of weak or clay bedrock and adverse geologic structure (such as bedding, joints or fracture planes dipping in downslope directions). Slides can result from certain geologic features, slope steepness, excessive rainfall, earthmoving disturbance, and seismic activity. Excavation and development activities often increase the incidence of landslides. Shaking during an earthquake may cause materials on a slope to lose cohesion and collapse. Potential earthquake-induced landslide areas are shown on Figure 4.6-5.

According to the State of California, Seismic Hazard Zone, Oat Mountain Quadrangle Seismic Hazard Zones, Earthquake-induced Landslides (DMG, 1998), the Proposed Project does not lie within an Earthquake-induced Landslide Zone. However, the surrounding area along the existing 66 kV sub-transmission alignment crosses several of these landslide features. The 1994 Northridge earthquake triggered more than 11,000 landslides over an area of 10,000 square kilometers (km^2). Most of the landslides were concentrated in a 1,000 km^2 area that includes the Santa Susana Mountains and the mountains north of Santa Clara River Valley. Most of the triggered landslides were at shallow depths of ~ 1-m to 5 m.

According to the DMG report #87-8 LA for the North Half Oat Mountain Quadrangle (Treiman, J., 1987), landslide susceptibility and debris flow map #10, landslides typically occur on steep or unstable slopes. Portions of the Proposed Project traverse hills and slopes that may be susceptible to landslides both seismically and aseismically induced. These landslides occur in areas with steep and unstable slopes. The unstable and steep slopes in the area could experience rapid earth movement in the form of a landslide with or without a seismic trigger.

The following segments of the proposed SCE 66 kV sub-transmission modification may be susceptible to landslides based on slope and soil types (USDA, 2008):

- Newhall substation to I-5 crossing
- I-5 crossing to proposed SCE Natural Substation
- Proposed SCE Natural Substation to proposed Central Compressor Station
- South of proposed Central Compressor Station



Map Location

Legend

- Proposed SCE 66 kV Modification
- Existing SCE 66 kV Alignment
- Aliso Canyon Storage Field
- Potential Liquefaction Area
- Potential Landslides Area
- Existing SCE Substation

1 inch = 3,500 feet

0 3,500 7,000 Feet

N W E S

Aliso Canyon PEA
Figure 4.6-5
Areas of Potential Earthquake-Induced Landslides and Liquefaction

Source:.State of California, DMG, Seismic Hazard Zone, Oat Mountain Quadrangle Seismic Hazard Zones, February 1,1998)

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Liquefaction

Liquefaction is a seismic phenomenon in which loose, saturated, fine-grained granular soil behaves similarly to a fluid when subjected to high-intensity ground shaking. Liquefaction occurs when the following exists: (1) shallow groundwater; (2) low-density, fine, clean sandy soil; and (3) high-intensity ground motion.

Liquefaction involves a sudden loss in strength of a saturated, cohesionless soil (predominantly sand) caused by cyclic loading such as an earthquake. This phenomenon results in elevated pore-water pressures that temporarily transform the soil into a fluid mass resulting in vertical settlement and could include lateral deformations. Typically, liquefaction occurs in areas where groundwater is less than 50 feet from the surface and where the soil consists predominantly of poorly consolidated sands. Seismic ground motions can also induce settlement without liquefaction occurring, including within dry sands above the water table.

The potential for liquefaction to occur depends on both the susceptibility of a soil to liquefy and the opportunity for ground motions (shaking) to exceed a specified threshold level. Depending upon specific soil conditions, such as density, uniformity of grain size, confining pressure and saturation of the soil materials, a certain intensity of groundshaking is required to trigger liquefaction. Ground shaking intensity depends on the magnitude, distance and direction from the Proposed Project, depth, and type of earthquake, the soil and bedrock conditions beneath the Proposed Project, and the topography of the Proposed Project and vicinity.

According to the State of California, Seismic Hazard Zone, Oat Mountain Quadrangle Liquefaction Zone (DMG, 1998), the Proposed Project does not lie within a Liquefaction Zone (areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required). Potential earthquake-induced liquefaction areas are shown on Figure 4.6-5.

Land Subsidence

Land subsidence is normally the result of fluid withdrawal such as groundwater and/or oil extraction or other mining activities have created subsurface voids, resulting in the sinking of the ground surface. When fluid is withdrawn, the effective pressure in the drained sediments increases. Compressible sediments are then compacted due to overlying pressures no longer being compensated by hydrostatic pressure from below. Subsidence and associated fissuring have occurred in a variety of places due to fluctuating (rising and falling) groundwater tables. There are several basins within the Transverse Ranges, including the San Fernando Basin and Ventura Basin, noted for petroleum production.

The Proposed Project is located within an area of known subsidence associated with fluid withdrawal (ground water or petroleum), peat oxidation, or hydrocompaction. Subsidence in the Proposed Project area would be primarily associated with the withdrawal of petroleum fluids (oil and gas) from the sedimentary strata located within the Aliso Canyon Oil Field. Alluvial valley regions, such as the San Fernando Valley located just south of the Proposed Project are particularly susceptible to subsidence (Source: County of Los Angeles General Plan, 1990).

Even though both groundwater and petroleum have been removed from the ground, there is no evidence that significant subsidence has occurred, or may occur in the future, in the project vicinity. The likelihood of seismically induced settlement is, therefore, considered to be remote.

Expansive Soils

Expansive soils contain significant amounts of a specific type of high-plasticity clay (smectite) that expands when it becomes wet and shrinks upon drying, resulting in volume changes in the soil column. Expansive soils are generally fine grained soils with an appreciable amount of smectitic clay. A quantitative assessment of the expansion potential of the soils was not performed for this study. General expansive characteristics of soil that may be encountered along the alignment of the existing 66 kV sub-transmission system were obtained from the USDA soil survey estimated soil properties tables. Based on soil descriptions, the soils in the Proposed Project have a low to moderate shrink/swell potential, and therefore, there is no significant potential for presence of expansive soils within the near surface.

4.6.1.3 Applicable Laws, Regulations and Standards

Federal Plans, Policies, Regulations, and Laws

The 1997 Uniform Building Code (UBC) specifies acceptable design criteria for structures with respect to seismic design and load bearing capacity. Seismic Risk Zones have been developed based on the known distribution of historic earthquake events and frequency of earthquakes in a given area. These zones are generally classified on a scale from I (least hazard) to IV (most hazard). These values are used to determine the strengths of various components of a building required to resist earthquake damage. Based on the UBC Seismic Zone Maps of the United States, and because of the number of active faults in southern California, the Proposed Project is located in the highest seismic risk zone defined by the UBC standard, as UBC Zone IV. The State has adopted these provisions in the California Building Code (CBC).

State/County Plans, Policies, Regulations, and Laws

The Proposed Project is subject to the applicable sections of the CBC. The county of Los Angeles is responsible for implementing the CBC for certain structures associated with the Proposed Project. Regardless of whether or not the Proposed Project is located within an AP seismic zone, certain Proposed Project structures must be designed in accordance with the requirements of the CBC and UBC Zone IV because the Proposed Project is located in a seismically active area. The CBC and UBC are considered to be the standard safeguards against major structural failures and loss of life. The goals of the codes are to provide structures that will: 1) resist minor earthquakes without damage; 2) resist moderate earthquakes without structural damage but with some non-structural damage; and 3) resist major earthquakes without collapse but with some structural and non-structural damage. The CBC and UBC requirements operate on the principle that providing appropriate foundations, among other aspects, helps to protect buildings from failure during earthquakes. In addition, the County of Los Angeles General Plan, Seismic Safety Element (Draft 2008), includes standards and plans to reduce the loss of life, injuries, damage to property, and economic and social dislocations resulting from natural and urban related hazards.

For the SCE components of the Proposed Project, SCE will comply with certain industry standards and CPCU General Orders. Similarly, the Proposed Project subtransmission line modifications would be designed consistent with CPUC G.O. 95, while the substation would be designed consistent with the Institute of Electrical and Electronics Engineers,(IEEE) Standard 693, Recommended Practices for Seismic Design of Substations.

4.6.2 Significance Criteria

The significance criteria for assessing the impacts of geology, soils and seismicity come from the CEQA Environmental Checklist. According to the CEQA Checklist, a project causes a potentially significant impact if it would:

- 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 AP 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 No. 42.
  - Strong seismic ground shaking?
  - Seismic-related ground failure, including liquefaction?
  - Landslides?
- Result in substantial soil erosion or the loss of topsoil?
- 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?
- Be located on expansive soil, as defined in Table 18-1-B of the UBC (1994), creating substantial risks to life or property?
- 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?

4.6.3 Applicant Proposed Measures

The following APMs will be implemented as part of the Proposed Project design:

APM-GS-01: Construction phase procedures and the engineering design and operational procedures for the proposed Central Compressor Station will incorporate measures for fire prevention and detection in order to lower the risk of initiating wildland fires.

APM-GS-02: Construction procedures will be conducted as discussed in the recommendations section of the Preliminary Geotechnical Investigation Report prepared by Globus, 2006, in order to mitigate impacts related to unstable geologic conditions. In addition, a site-specific geotechnical investigation is proposed which will provide information on the potential geological hazards.

APM-GS-03: SoCalGas will build all structures and facilities in compliance with the requirements of the State of California and according to UBC standards for Seismic Risk Zone IV.

4.6.4 Environmental Impacts

The potential impact to geology, soils, and seismicity from construction and operation of the Proposed Project was evaluated using the stated CEQA significance criteria and is presented in this section. For the purpose of presenting potential geology, soils, and seismicity resource impacts, CEQA criteria were evaluated and are discussed separately for construction and operations.

This impact analysis is based on the assumption that all structures and facilities will be constructed according to UBC standards for Seismic Risk Zone IV to minimize the potential for injury caused by structural failure from primary and secondary hazards during an earthquake.

Construction Impacts

Would the Proposed Project expose people or structures to potential substantial adverse effects, including the risk of loss, or 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); strong seismic ground shaking?

The Proposed Project is not located within a currently established AP Earthquake Fault Zone for surface fault rupture hazards. However, the closest AP Earthquake Fault Zone is the Santa Susana fault located less than 1-mile to the east-southeast of the Proposed Project, east of the Aliso Canyon area, and southeast of the water tank; and it intersects the proposed PPL, ~ 0.33-mile south of I-5 (200 feet southwest of Mile 7-Pole#4452277). Movement on the Santa Susana fault zone could cause extensive damage via ground rupture and strong seismic ground shaking. Ground rupture associated with the 1971 San Fernando earthquake occurred less than 1-mile southeast of the Proposed Project (Globus, 2006). According to the AP fault zoning map, the zone terminates just east of the Proposed Project. However, a note on the map indicates that the fault zone extends to the west, but is not yet evaluated for zoning purposes. It may be re-evaluated/revised in the future when warranted by new fault data. Displacement on nearby faults, such as the Oak Ridge fault (1994) and San Fernando fault (1971), could also cause extensive ground shaking if a major earthquake would occur.

In addition, the Weldon Canyon fault intersects the alignment of the existing 66 kV sub-transmission system near The Old Road, at the I-5. According to CGS, this fault is inactive.

The Proposed Project components which could be affected by strong seismic ground shaking are:

- Segment from Newhall substation to I-5 crossing of the proposed SCE 66 kV sub-transmission modification
- Segment from the I-5 crossing to the proposed SCE Natural Substation, of the proposed SCE 66 kV sub-transmission modification
- Proposed Central Compressor Station
- Proposed SCE Natural Substation Site
- Proposed Trailer Relocation Site
- Proposed SCE 66 kV sub-transmission modification at the San Fernando Substation tap

SCE will implement appropriate seismic engineering considerations for the substation facilities in accordance with the IEEE 693, Recommended Practices for Seismic Design of Substations. Further, SCE will design and construct sub-transmission line modifications consistent with CPUC G.O. 95 to withstand seismic loading. The Proponent, at a minimum, will build all structures in compliance with the requirements of the State of California and the UBC; these standards were developed to minimize exposure of people, structures, or property to geologic hazards. Any additional recommendations made in supplemental geologic studies currently underway will be incorporated into building design to maximize structural integrity of buildings during an earthquake. Future proposed critical structures identified as straddling the Santa Susana fault will be relocated, if possible, or strengthened to withstand the effects of ground shaking resulting from a MPE.

Based on the above, the Proposed Project's impacts are less than significant.

Would the Proposed Project result in substantial seismic-related ground failure, including liquefaction?

According to the State of California, Seismic Hazard Zone, Oat Mountain Quadrangle Seismic Hazard Zones, Liquefaction (DMG,1998), the Proposed Project does not lie within a seismic related Liquefaction Zone.

Studies indicate that saturated, loose and medium dense, near-surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential. According to the State of California, Seismic Hazard Zone, Oat Mountain Quadrangle Liquefaction Zone (DMG, 1998), the Proposed Project does not lie within a seismic related Liquefaction Zone. However, localized areas where shallow groundwater (~10 feet bgs) were observed in the excavated trenches identified in the Globus Geotechnical Investigation Report (Globus, 2006).

According to the CGS Seismic Hazard Zone map, San Fernando Quadrangle, the San Fernando substation is not located within a liquefaction zone. Therefore, the installation the intrusive work to include the removal of existing four towers followed by the installation of four engineered TSPs will not encounter liquefaction zones.

SCE will implement appropriate seismic engineering considerations for the substation facilities in accordance with the IEEE 693, Recommended Practices for Seismic Design of Substations. Further, SCE will design and construct sub-transmission line modifications consistent with CPUC G.O. 95 to withstand seismic loading. SoCalGas, at a minimum, will build all structures in compliance with the requirements of the State of California and the UBC; these standards were developed to minimize exposure of people, structures, or property to geologic hazards. Recommendations, of the Geotechnical Investigation Report prepared for the Proposed Project by Globus (2006), shall be implemented during Proposed Project construction. Any additional recommendations made in supplemental geologic studies currently underway will be incorporated into building design to maximize structural integrity of buildings during an earthquake.

Based on the above, the Proposed Project's impacts are less than significant.

Would the Proposed Project result in substantial landslides?

The Proposed Project does not lie within a potential earthquake-induced landslide. The earthquake-induced landslide hazard feature mapped by the CGS indicates that landslides may occur around the Proposed Project in nearby areas where hills and unstable slopes may be susceptible to landslides both seismically and aseismically induced. The unstable slopes in the area could experience rapid earth movement in the form of a landslide, debris flow or rock glides. According to CGS, there are numerous earthquake-induced landslide features mapped along the alignment of the existing 66 kV sub-transmission system and several Proposed Project components that are associated with the geologic units of the Pico formation which are subject to widespread large- and small-scale bedrock and surficial landslides, and with the Monterey (Modelo) Formation which are subject to large- and small-scale landslides.

The relatively irregular topography surrounding the Proposed Project includes both stability problems and the potential for lurching, which is earth movement at right angles to a cliff or very steep slope during ground shaking. Based on slope and soil types, the following Proposed Project components may be susceptible to landslides and are as follows:

- Segment from Newhall Substation to the I-5 crossing, of the proposed SCE 66 kV sub-transmission modification
- Proposed SCE 66 kV sub-transmission modification, segment from I-5 crossing to proposed SCE Natural Substation
- South of proposed Central Compressor Station

A site-specific geotechnical investigation would provide information on the landslide hazard, and provide recommendations for either stabilization of the landslide, and/or reinforcement requirements for the sub-transmission structures.

Based on the above, the Proposed Project's impacts are less than significant.

Would the Proposed Project result in substantial soil erosion or the loss of topsoil?

During construction of new facilities at the Proposed Project, earth moving operations could increase the potential for short-term soil erosion and loss of topsoil. The storage and movement of soil greatly affects the amount of erosion that occurs. If soil is improperly stored or transported, wind and water can erode the soil. The Proposed Project has been mapped as having potential for slight to severe erosion. The results of the geotechnical investigation conducted by Globus (2006) prior to construction of the Proposed Project would identify the need for any permanent erosion control measures that would be specified in the SWPPP and grading permit obtained from the county of Los Angeles. Impacts are, therefore, expected to be less than significant.

During construction, erosion control measures would be implemented, utilizing BMPs, to avoid or minimize soil erosion and off-site deposition. Because soil surface disturbance for the Proposed Project is estimated to be greater than 1-acre, specific erosion control measures would be identified as part of the Storm Water General Permit issued by the State Water Resources Board and a SWPPP required for construction of the Proposed Project. The SWPPP must be administered throughout Proposed Project construction.

Soil erosion and loss of topsoil would be minimized by the implementation of BMPs that would be provided in the SWPPP prepared for the Proposed Project. Refer to Parsons SWPPP/Monitoring Program (Parsons, 2001), included in Appendix B.3.

In addition, it is assumed that a grading permit will be obtained from the county of Los Angeles that would include surface improvements that would minimize soil erosion and the loss of topsoil at the Proposed

Project. The Proposed Project preparation, design and construction in compliance with the SWPPP and the grading permit would make impacts due to soil erosion and loss of topsoil less than significant. Construction of proposed facilities would cause minor changes to topography. Proper design and precautions taken during construction and operation of facilities will prevent any potential impacts.

No exceptional difficulties due to soil conditions are anticipated during planned excavations at the site. Shoring would need to be used for vertical excavations at the site. It is anticipated that the earth materials at the Proposed Project can be excavated with conventional earth-moving equipment. Since the soil will be excavated at depths greater than 5 feet, a Cal-OSHA Excavation/Trench Permit will need to be obtained from the California, Department of Industrial Relations, Division of Occupational Safety & Health.

Based on the above, the Proposed Project's impacts are less than significant.

Would the Proposed Project be 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?

SoCalGas is proposing to increase the injection (flow) rate from 300 MMcfd to 450 MMcfd to maximize their gas storage capacity during periods of higher demands and use during the summer months. According to engineering analysis obtained from SoCalGas storage engineer, the increase of gas injection rates will not affect the subsurface geological formation since the gas storage volume will remain the same (84 BCF), and the geologic units will not become unstable.

The existing artificial materials beneath the proposed Central Compressor Station portion of the Proposed Project are underlain by non-engineered fills of generally poor quality that will not meet current UBC requirements. The majority of the fill materials encountered in the soil borings appear to be imported from off-site locations (Globus, 2006). Typically, these fine-grained fill materials have undesirable properties for grading and foundation support (Globus, 2006). The Proposed Project development will require significant mass grading, remove, rework, over-excavate and bind the soil to improve the quality of the fills.

Even though both groundwater and petroleum have been removed from the ground, there is no evidence that significant subsidence has occurred, or may occur in the future, in the Proposed Project vicinity. The likelihood of seismically induced settlement is, therefore, considered to be remote. Therefore, the potential for subsidence is low and impacts would be less than significant.

Studies indicate that saturated, loose and medium dense, near-surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential. The Proposed Project is not located within a mapped liquefaction hazard zone. Groundwater was encountered in 5 of the 9 soil borings at depths of ~ 9 feet to 37 feet bgs and appears to be related to inadequate drainage or deficiencies related to filling of the pre-existing canyons and drainages (Globus, 2006). Due to relatively high fine contents and intermediate clayey soil layers, potential for liquefaction is considered low and impacts would be less than significant.

Liquefaction may also cause lateral spreading. For lateral spreading to occur, the liquefiable zone must be continuous, unconstrained laterally, and free to move along gently sloping ground toward an unconfined area. However, if lateral containment is present for those zones, then no significant risk of lateral spreading will exist. Since the liquefaction potential at the Proposed Project is low, earthquake-induced lateral spreading is not considered to be a seismic hazard at the Proposed Project and impacts would be less than significant.

The following measure was recommended in the Preliminary Geotechnical Investigation Report (included in Appendix B.3), prepared by Globus (2006), for the Proposed Project to mitigate impacts related to unstable geologic conditions to a less than significant level:

- Geotechnical recommendations for foundation scheme contained on page 13 and in the proposed Phase Two Geotechnical investigation discussed on page 23 of the report.

While project development would not result in the hazards addressed above, the Preliminary Geotechnical Investigation Report (Globus, 2006) recommendations prepared for the Proposed Project shall be implemented as mitigation.

Based on the above, the Proposed Project's impacts are less than significant.

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

Based on soil descriptions, the soils in the Proposed Project have a low to moderate shrink/swell potential as shown in Table 4.6-2. According to Globus (2006),, clayey materials at the location of the proposed Central Compressor Station can be moisture sensitive (both collapsible and expansive). The soils observed in the borings and test pits sampled near the Compressor Station generally consisted of artificial fill with deeper, moisture sensitive, clayey soils which were at a lesser compaction level. These materials may be encountered during the proposed Phase Two Geotechnical investigation (refer to Chapter 3.0 Project Description, for more information).

The San Fernando substation is located near the intersection of San Fernando Mission Boulevard and Sepulveda Boulevard, in the city of San Fernando, specifically on the northwest corner of the I-5 Freeway and Sepulveda Boulevard ~ 0.75-mile east of the 405 Freeway.

The intrusive work at this substation will include the removal of existing two towers and installation of four new TSP poles. The structure foundation process would start with the auguring of the boreholes for each pole using various diameter augers to match diameter requirements of the foundation sizes. TSPs typically require an excavated hole of up to 10 feet in diameter and 20 feet to 60 feet bgs. The soils to be encountered at the San Fernando substation during the TSP installation would consist of alluvial gravels, sand, silts and clays. These materials may possess expansive properties.

The proposed Phase II geotechnical investigation (Globus, 2006) would offer the Proposed Project-specific project design and construction recommendations, such as over-excavation of soil, conducting proper compaction tests, expansive testing, and removal of these incompatible soils at the construction site to minimize any effects due to the presence of expansive soils. With construction of the Proposed Project in accordance with the CBC and the implementation of the recommendations of the initial geotechnical investigation conducted by Globus, the impacts from expansive soils within the near surface would be less than significant.

Would the Proposed Project 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?

No impacts are expected. The Proposed Project would not construct septic tanks, and use of existing septic tanks during construction is not anticipated, as workers would use portable toilets. Waste would be pumped out by qualified contractors and disposed of in accordance with all applicable regulations and codes.

Based on the above, the Proposed Project's impacts are less than significant.

Operation Impacts

Would the Proposed Project 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?

The Proposed Project is not located within an established AP Earthquake Fault Zone or designated Fault-Rupture Hazard Zone for surface fault rupture hazards. Operation of the Proposed Project would not expose people or structures to potential substantial adverse effects, including the risk of loss, or injury, or death involving rupture of a known earthquake fault.

Based on the available geologic maps reviewed, the closest identified fault (Santa Susana fault) to the Plant Station is located adjacent to, and east of the Aliso Canyon area, southeast of the water tank and the proposed PPL. There is no evidence that this fault has offset Holocene age alluvial deposits (County of Los Angeles Seismic Safety Element, 1990). Ziony and Jones (1989) indicate that the fault is potentially active (no displacement of Holocene age alluvium). Additionally, Jennings (1994) indicates the fault is potentially active.

Due to its proximity to an active fault zone, the Proposed Project would experience moderate to high levels of earthquake-induced ground shaking. Even though the Proposed Project is located in an area susceptible to earthquake forces, the structures would not be utilized for human occupancy and would be designed consistent with the IEEE 693, Recommended Practices for Seismic Design of Substations. Similarly, the proposed PPL and SCE's sub-transmission line modifications would be designed and constructed consistent with CPUC GO 95 to withstand seismic loading.

Based on the above, the Proposed Project's impacts are less than significant.

Would the Proposed Project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving Strong seismic ground shaking?

The entire Proposed Project would likely be subject to strong seismic ground shaking in the event of a major earthquake originating along one of the faults listed as active or potentially active in the Proposed Project region. The operation of the Proposed Project would expose people or structures to potential substantial adverse effects, including the risk of loss, or injury, or death involving strong seismic ground shaking.

Components of the Proposed Project which could be affected by strong seismic ground shaking are:

- Proposed SCE Natural Substation Site
- Proposed Central Compressor Station site and proposed office trailer relocation.

Movement on the Santa Susana Fault zone could cause extensive damage via ground rupture and strong seismic ground shaking. Also, displacement on nearby faults, such as the Northridge fault (1994) and San Fernando fault (1971), could also cause extensive ground shaking if a major earthquake would occur. However, this geological hazard is common in southern California and the effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices. Impacts are, therefore, expected to be less than significant.

SCE will implement appropriate seismic engineering considerations for the substation facilities in accordance with the IEEE 693, Recommended Practices for Seismic Design of Substations. Further, SCE will design and construct subtransmission line modifications consistent with CPUC G.O. 95 to withstand seismic loading. SoCalGas, at a minimum, will build all structures in compliance with the requirements of the State of California and the UBC; these standards were developed to minimize exposure of people, structures, or property to geologic hazards. Any additional recommendations made in supplemental geologic studies currently underway will be incorporated into building design to maximize structural integrity of buildings during an earthquake. Future proposed critical structures identified as straddling the Santa Susana fault will be relocated, if possible, or strengthened to withstand the effects of ground shaking resulting from a MPE.

Would the Proposed Project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving Seismic-related ground failure, including liquefaction?

Liquefaction is a seismic phenomenon in which loose, saturated, fine-grained granular soils behave similarly to a fluid when subjected to high-intensity ground shaking. Liquefaction occurs when the following exists: (1) shallow groundwater; (2) low-density, fine, clean sandy soils; and (3) high-intensity ground motion. Studies indicate that saturated, loose and medium dense, near-surface cohesionless soils exhibit the highest liquefaction potential, while dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential. According to the State of California, Seismic Hazard Zone, Oat Mountain Quadrangle Liquefaction Zone (DMG, 1998), the Proposed Project does not lie within a seismic related Liquefaction Zone.

Based on the above, the Proposed Project's impacts are less than significant.

Would the Proposed Project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving Landslides?

The topography of the Proposed Project and the immediate built environment is irregular and has an abundance of distinctive landforms. As indicated above, there are significant ground slopes, and there were several known landslides in the vicinity of the Proposed Project. The Proposed Project, however, is not located in the path of any known or potential landslides and therefore, the impact will be less than significant.

Based on the above, the Proposed Project's impacts are less than significant.

Would the Proposed Project result in substantial soil erosion or the loss of topsoil?

During the Proposed Project, wind and water driven erosion of soils due to grading activities might be of concern if soil is stockpiled or exposed during construction. However, this impact is considered short-term in nature since the potential for significance will end after construction is finished due to covering the area of the Proposed Project with pavement and landscaping.

Further, as part of the Proposed Project, the applicant would be required to adhere to conditions under the facility SWPPP. In addition, SoCalGas will develop a construction SWPPP and update the existing SWPPP including the applicable Proposed Project components., The SWPPP includes project information; monitoring and reporting procedures; and BMPs, such as dewatering procedures, storm water runoff quality control measures (boundary protection), spill reporting, and concrete waste management, as applicable to the project, to ensure that potential water quality impacts from water erosion would be reduced to less than significant. The SWPPP would be based on final engineering design and would include all Proposed Project components. Site preparation, design and construction in compliance with the SWPPP and the county of Los Angeles grading permit would make impacts due to soil erosion and loss of topsoil less than significant.

Based on the above, the Proposed Project's impacts are less than significant.

Would the Proposed Project be 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.

Prior to operation of facilities, a Phase II geotechnical investigation would have been conducted to provide site-specific details of unstable geologic units. The Proposed Project would incorporate the geotechnical information into the proper design and precautions in order to ensure the safe and reliable operation of the Proposed Project.

Based on the above, the project's impacts are less than significant.

Would the Proposed Project 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?

Because the substations would not be equipped with an on-site wastewater disposal system, there would be no impact to soils as a result of using a septic tank drainfield. The Proposed Project would connect to and use the City's existing sewage conveyance system. Therefore, based on the above, the Proposed Project's impacts are less than significant.

4.6.5 Mitigation Measures

The Proposed Project was determined to have **a less than significant impact without mitigation** due to construction and operation; therefore no mitigation is required or proposed.

4.6.6 References

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