4.5 Geology, Soils, and Mineral Resources

This section describes the environmental and regulatory setting and discusses impacts associated with the construction and operation of the Mesa 500-kV Substation Project (proposed project) proposed by Southern California Edison Company (SCE, or the applicant) with respect to geology, soils, and mineral resources.

4.5.1 Environmental Setting

As detailed in Chapter 2, "Project Description," in addition to the components within the Main Project Area, North Area, and South Area, and at proposed Staging Yard locations, construction and operation of the proposed Mesa Substation would require additional minor modifications within several existing satellite substations in other locations in Southern California. Work at three of these satellite substations—Vincent, Pardee, and Walnut—would require ground disturbance and installation of underground components. Therefore, impacts associated with work at these three substations are discussed in this section. No ground disturbing activities would occur as a result of work at any of the other satellite substations listed in Table 2-5. Work would occur within the existing perimeter fence line; it would have no impacts associated with geology, soils, or minerals. Therefore, this analysis includes no further discussion of impacts associated with work at these other substations.

4.5.1.1 Geology

Topography

The project area is located in the northern portion of the geomorphic province of California known as the Peninsular Ranges. The Peninsular Ranges consist of steeply sloped, east-west trending mountain ranges and valleys bounded on the north by the Santa Ynez fault, on the east by the San Gabriel Mountains, on the south by the Transverse Ranges frontal fault zone, and on the west by the Pacific Ocean. The Transverse Ranges intersect the California coastline at an oblique angle and continue offshore to include the San Miguel, Santa Rosa, and Santa Cruz islands. Topography in the Main Project Area, including the proposed Mesa Substation site and associated transmission, subtransmission, distribution, and telecommunication line areas, and at the Vincent Substation, ranges from nearly flat to moderately sloping hills. The topography in the North and South Areas; the Pardee and Walnut Substations; and all seven staging yards is nearly flat. Elevations in the project area range from approximately 130 feet above mean sea level at the distribution street light source line conversion from aboveground to underground project component in Bell Gardens to 700 feet above mean sea level at the Goodrich Substation component in Pasadena (CGS 2012, USGS 2015a).

Geologic Setting

In the proposed Mesa Substation site area, the surficial geology consists of Holocene and Pleistocene age alluvium in alluvial fan deposits ranging in age from less than 11,700 years before present (BP) to approximately 1.5 million years BP. The bedrock geology in the proposed Mesa Substation site area consists of sandstone and conglomerate of the Pliocene Fernando Formation, ranging in age from 2.6 million to 5.3 million years BP as detailed in Table 4.5-1. Large portions of Telecommunications Routes 1, 2, and 3 do not involve ground disturbance; thus, geology identified in the table is only described for areas where ground disturbing activities are proposed. Due to the extensive ground disturbance planned in the proposed substation site area and the area of the transmission, subtransmission, and distribution components that are immediately adjacent, this entire area is generally considered to involve ground disturbing activities. Figure 4.5-1 shows surficial and bedrock geology in the Main, North, and South Project Areas as well as the three satellite substations where ground disturbing work is planned.

Table 4.5-1 Geology in the Proposed Project Area

Project Components	Formation Name (age)	Description
Proposed Main Project Area		
Mesa 500-kv Substation	Young Alluvial Fan Deposits, undivided (Holocene to late Pleistocene); Old Alluvial Fan Deposits Unit 2 (late Pleistocene)	Alluvium
	Fernando Formation (Pliocene)	Sandstone and Conglomerate
500-kV Transmission Lines	Old Alluvial Fan Deposits Unit 2 (late Pleistocene); Old Alluvial Fan Deposits Unit 1 (middle Pleistocene)	Alluvium
	Fernando Formation (Pliocene)	Sandstone and Conglomerate
220-kV Transmission Lines	Young Alluvial Fan Deposits, undivided (Holocene to late Pleistocene)	Alluvium
	Fernando Formation (Pliocene); Fernando Formation Upper Member (Pliocene)	Sandstone and Conglomerate; Silty Sandstone
66-kV Subtransmission Lines	Young Alluvial Fan Deposits, undivided (Holocene to late Pleistocene); Old Alluvial Fan Deposits Unit 2 (late Pleistocene)	Alluvium
	Fernando Formation (Pliocene)	Sandstone and Conglomerate
16-kV Distribution Lines	Young Alluvial Fan Deposits, undivided (Holocene to late Pleistocene)	Alluvium
	Fernando Formation (Pliocene)	Sandstone and Conglomerate
Telecommunications Route 1	Young Alluvial Fan Deposits, undivided (Holocene to late Pleistocene); Old Alluvial Fan Deposits Unit 2 (late Pleistocene), Old Alluvial Fan Deposits Unit 3 (late Pleistocene)	Alluvium
	Fernando Formation (Pliocene)	Sandstone and Conglomerate
Telecommunications Route 2	Old Alluvial Fan Deposits Unit 1 (middle Pleistocene); Old Alluvial Fan Deposits Unit 2 (late Pleistocene); Old Alluvial Fan Deposits Unit 3 (late Pleistocene)	Alluvium
	Fernando Formation (Pliocene)	Sandstone and Conglomerate
Telecommunications Route 3	Alluvium and Marine Deposits (Quaternary – Holocene and Pleistocene); Old Alluvial Fan Deposits Unit 2 (late Pleistocene); Old Alluvial Fan Deposits Unit 3 (late Pleistocene)	Alluvium and Marine Sediments

Table 4.5-1 Geology in the Proposed Project Area

Project Components	Formation Name (age)	Description
North Area		
Temporary 220-kV Transmission Structure (Line loop-in) and conduit installation at Goodrich Substation	Young Alluvial Fan Deposits Unit 3 (Quaternary)	Alluvium
South Area		
220-kV Transmission Structure (Replacement Tower on Goodrich–Laguna Bell 220-kV Transmission Line)	Old Alluvial Fan Deposits Unit 4 (Quaternary)	Alluvium
Street Light Source Line Conversion in Loveland Street	Young Alluvial Fan and Valley Deposits, Sand	Alluvium
Minor Modifications at Existing Substations		
Vincent Substation	Permian to Tertiary; mostly Mesozoic intrusive rocks	Granodiorite and Quartz Monzonite
Walnut Substation	Pliocene to Holocene terrace deposits	Alluvium
Pardee Substation	Pliocene to Holocene terrace deposits, Miocene to Pleistocene sedimentary rocks	Alluvium, Sandstone, and Conglomerate

Sources: CGS 2007a, USGS 2005

Soils

The Natural Resources Conservation Service (NRCS) maintains an online database of soil survey data for most U.S. counties. Soil surveys describe the types of soils that exist in an area, their locations on the landscape, and their suitability for various uses. Soils of a similar type are grouped into soil map units, and each soil map unit differs in some respect from all others in a survey area (NRCS 2011). The major soil map unit types within the proposed project area are presented in Table 4.5-2. Soils in the project area are generally loamy, well drained, and have high runoff rates. Soil series in the Main, North, and South Project Areas are shown on Figure 4.5-2.

Table 4.5-2 Soil Map Units within the Proposed Project Area

Soil Name	Project Component	Description/ Soil Texture (USDA)	Shrink-Swell Potential(1)	Erosion Hazard(2)	Wind Erodibility Group(3)	Hydric Rating
Altamont Clay Loam	Proposed Mesa Substation site area; 500-kV ROW; 220-kV ROW; Telecommunications Routes 1, 2 and 3; Staging Yards 1 and 3.	Clay loam on gently sloping to very steep uplands	High	Slight-Moderate	Not Available	Not Available
Chino Silt Loam	Walnut Substation and Staging Yard 7	Moderately well drained fine sandy loams	Moderate	Moderate-Severe	Not Available	Not Available

Table 4.5-2 Soil Map Units within the Proposed Project Area

Soil Name	Project Component	Description/ Soil Texture (USDA)	Shrink-Swell Potential[1]	Erosion Hazard[2]	Wind Erodibility Group[3]	Hydric Rating
Hanford Fine Sandy Loam	Telecommunications Route 3; Staging Yards 6 and 7	Fine sandy loam, 0 to 15 percent slopes on flood plains, alluvial fans, and stream bottoms	Low	Moderate-Severe	3	Yes
Ramona Loam	Proposed Mesa Substation site area; 500-kV ROW; 220-kV ROW; 66-kV ROW; 16-kV ROW; Telecommunications Route 1, 2 and 3; 220-kV Transmission Structure (Replacement Tower on Goodrich–Laguna Bell 220-kV Transmission Line); Street Light Source Line Conversion; and Staging Yards 2 and 5.	Loam, nearly level to moderately steep slopes on alluvial fans and terraces.	Moderate	Severe	Not Available	No
Tujunga Fine Sandy Loam	Telecommunications Route 1, North Area (Goodrich Substation), Vincent Substation, and Staging Yard 4.	Fine sandy loam, 0 to 9 percent slopes on alluvial fans and terraces.	Low	Severe	2	No
Yolo Loam	Proposed Mesa Substation site area; 220-kV ROW; Telecommunications Routes 1 and 2; Walnut and Pardee Substations.	Loam, on nearly level to moderately sloping alluvial fans	Moderate	Moderate	Not Available	No

Sources: NRCS 1997, 1999, 2000, 2003, 2009, 2015; CLADPW 2004a, 2004b.

Notes:

(1) Linear extensibility of less than 3 percent = low shrink-swell potential; 3 to 6 percent = moderate potential; 6 to 9 percent = high potential; greater than 9 percent = very high potential.

(2) Erosion hazard interpreted by NRCS for unsurfaced roads and trails.

(3) Soils are assigned to wind erodibility groups based on their susceptibility to wind erosion. Soils assigned to Group 1 are the most susceptible; soils assigned to Group 8 are the least susceptible (NRCS 2015).

Key:

kV kilovolt
NRCS Natural Resources Conservation Service
USDA United States Department of Agriculture

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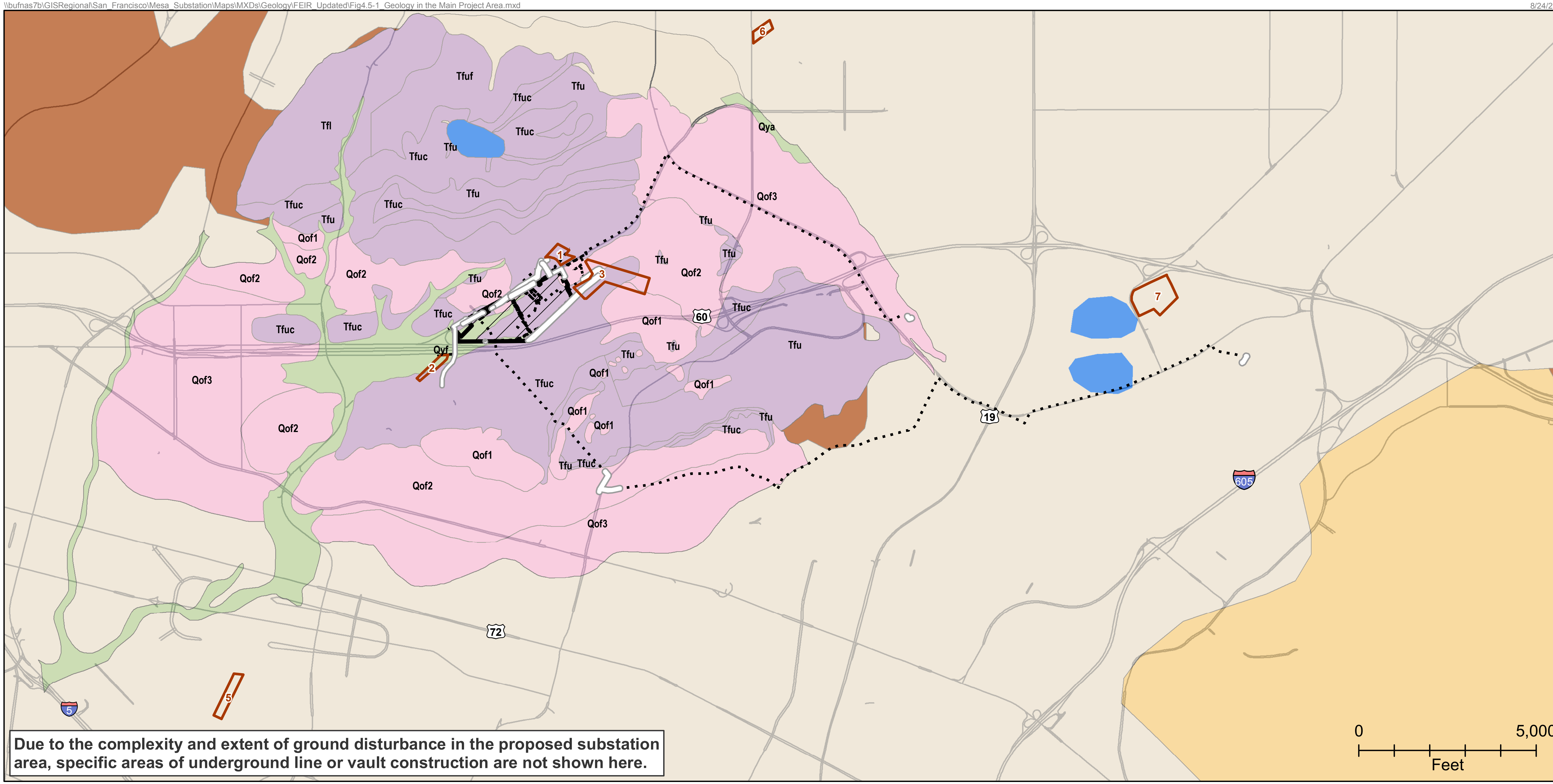

Telecommunications route
Manholes, vaults, and underground construction
Staging yard
Proposed mesa substation area
Major road

U.S. geological survey
Q: pliocene to holocene
P: Pliocene marine rocks
M: miocene marine rocks

California geological survey
Qy: young alluvium
Qoa: old alluvium
Tf: fernando formation
Water

Sources: CGS 2007, SCE 2016, USGS 2005
Basemap: ESRI Media Kit, 2010

Figure 4.5-1
Geology in the Main Project Area
Mesa Substation
Los Angeles County, CA

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\\bufnas7b\GISRegional\San_Francisco\Mesa_Substation\Maps\MXDs\Geology\FEIR_Updated\Fig4.5-2_Soils in the Main Project Area.mxd

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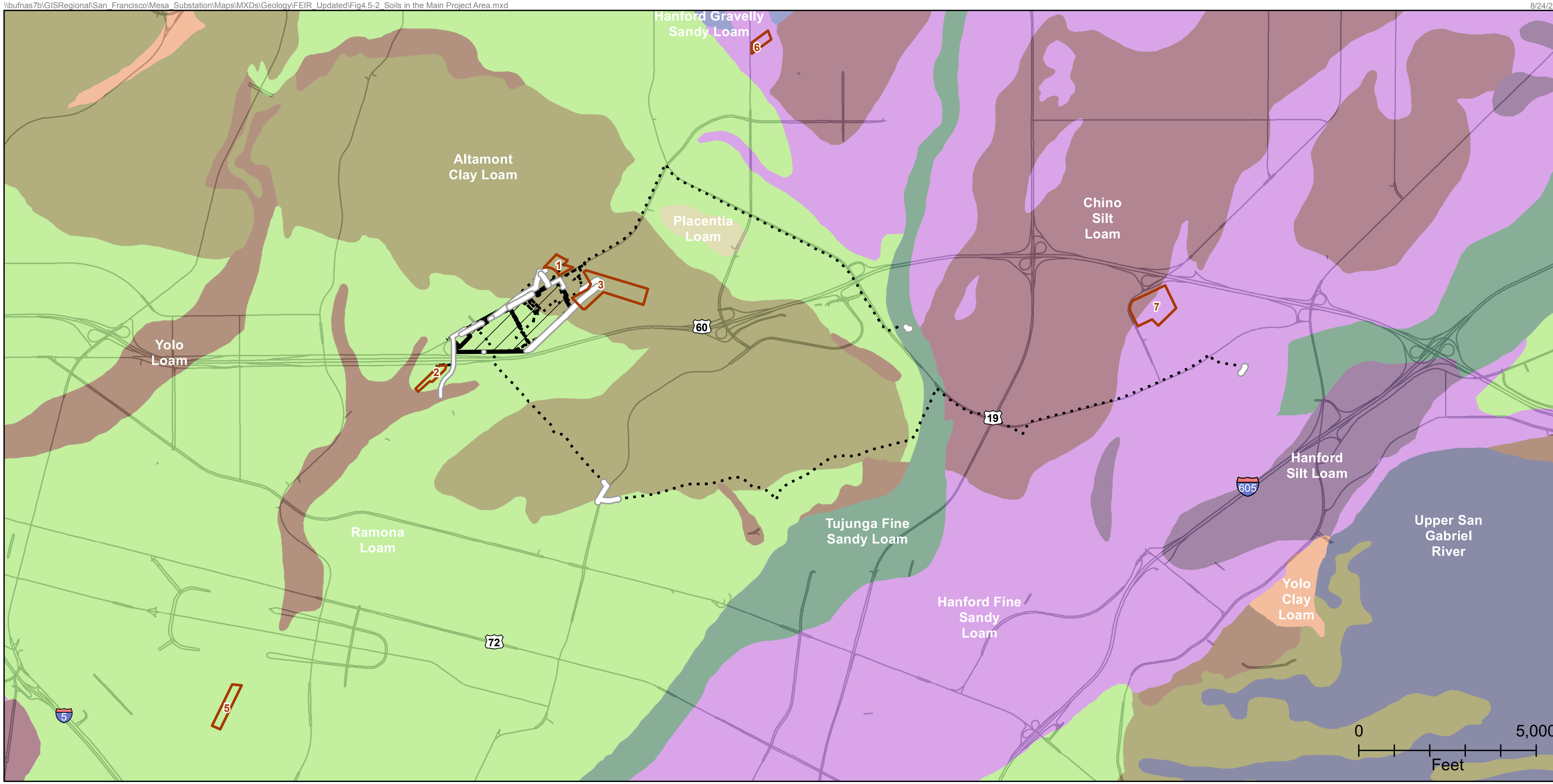

Telecommunications route
Manholes, vaults, and underground construction
Staging yard
Proposed mesa substation area
Major road

Altamont clay loam
Chino silt loam
Hanford fine sandy loam
Hanford gravelly sandy loam
Hanford silt loam
Placentia loam
Ramona loam
Tujunga fine sandy loam
Upper san gabriel river
Yolo clay loam
Yolo Loam

Sources: Los Angeles County DPW 2004, SCE 2016
Basemap: ESRI Media Kit, 2010

Figure 4.5-2
Soils in the Main Project Area
Mesa Substation
Los Angeles County, CA

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4.5.1.2 Geologic Hazards

Faulting and Seismicity

The Alquist–Priolo Earthquake Fault Zoning Act (Public Resources Code Division 7, Chapter 2.5) requires the delineation of earthquake faults for the purpose of protecting public safety. Faults included in the Alquist–Priolo Earthquake Fault Zoning Program are classified by activity as follows:

- Faults classified as "active" are those that have been determined to be "sufficiently active and well defined," with evidence of movement within Holocene time (CGS 2007b).
- Faults classified as "potentially active" have shown geologic evidence of movement during Quaternary time (CGS 2007b).
- Faults considered "inactive" have not moved in the last 1.6 million years (CGS 2007b).

Active and potentially active faults are present in the vicinity of the project area, as shown on Figure 4.5-3. Alquist-Priolo Earthquake Fault Zones (A-P fault zones) are designated areas within 500 feet of a known active fault trace. Staging Yard 6 would be located within the East Montebello A-P fault zone and the northwestern end of the fault. No other project components would intersect a known active or potentially active fault. The southeast end of Telecommunications Route 1 is located approximately 950 feet southwest of the southeast end of the East Montebello fault zone. The Raymond fault is also an A-P fault zone mapped at approximately 1.3 miles south southeast of the Goodrich Substation project component in the North Area. No other A-P fault zones or active faults cross the proposed project components; however, a number of faults are located within approximately 5 miles of the proposed project, as shown in Table 4.5-3.

Table 4.5-3 Active and Potentially Active Faults in the Immediate Vicinity of the Proposed Project

Fault Name	Approximate Location	Maximum Moment Magnitude Earthquake(1)
Elsinore Fault Zone (Whittier Section)	4 miles southeast of the proposed Mesa Substation site area and 2 miles south of Telecommunications Route 3.	6.8
East Montebello Fault	950 feet north northeast of the east end of Telecommunications Route 1 and crossing Staging Yard 6.	Not available
Montebello Fault	Approximately 2.5 miles below the surface of a portion of Telecommunications Route 3.	Not available
Newport-Inglewood-Rose Canyon Fault Zone (North Los Angeles Basin Section)	7.9 miles southwest of the distribution street light source line conversion on Loveland Street project component in the South Area.	7.1
Raymond Fault	1.3 miles south southeast of the Goodrich Substation in the North Area.	6.5
Puente Hills Blind Thrust Fault	Projection of fault plane 6–8 miles below Mesa Substation and Telecom Segments 1-3; 9 miles below Goodrich Substation; 2.5 miles below the lattice steel tower replacement on Goodrich-Laguna Bell 220 kV line; and 2 miles below the	7.1

Table 4.5-3 Active and Potentially Active Faults in the Immediate Vicinity of the Proposed Project

Fault Name	Approximate Location	Maximum Moment Magnitude Earthquake(1)
	streetlight source line conversion to underground along Loveland Street.	
San Andreas Fault (Mojave Section)	4 miles northeast of Vincent Substation.	7.4
San Cayetano Fault	4,000 feet southwest of Pardee Substation.	7.2
San Gabriel Fault	2,000 feet northeast of Pardee Substation.	7.2
San Jose Fault	4.8 miles northeast of Walnut Substation.	6.4
Sierra Madre Fault Zone	1.5 miles north northeast of Goodrich Substation in the north area.	7.2
Upper Elysian Park Blind Thrust Fault	2,000 feet north of Mesa Substation and approximately ¾ mile or less below ground	6.4
Whittier Fault	2.7 miles south southwest of Walnut Substation.	6.8

Sources: Cao et al. 2003; USGS 2006; CGS 2003a, 2003b; Shaw et al. 2002
Note:
(1) Maximum moment magnitude (Cao et al. 2003). The moment magnitude is a measure of the size of an earthquake in terms of energy released.
Key:
N/A not applicable

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 to the seismic source, soil conditions, and groundwater depth. Surface rupture is limited to the areas closest to the faults. Other potential hazards associated with seismically induced ground shaking include earthquake-triggered landslides and tsunamis.

A number of historical earthquakes have occurred within approximately 5 miles of the Main Project Area with moment magnitudes up to 5.9, as shown on Figure 4.5-3. Seismic hazards in a region are estimated by statistical analysis of earthquake occurrence to determine the level of potential ground motion. A common parameter used for estimating ground motion at a particular location is the peak ground acceleration (PGA). PGA is a measure of earthquake intensity; it indicates how hard the earth shakes at a given geographic location during the course of an earthquake (USGS 2015c). PGA values are typically expressed as a percentage of acceleration due to gravity: the higher the PGA value, the more intense the ground shaking.[1] PGA values were calculated by the California Geological Survey (CGS) based on historical earthquake occurrence, known damage from historic earthquakes, slip rates of major faults, and geologic materials. The PGA values calculated by the CGS in the vicinity of the various project components range from 0.4 to 0.7 times the force of gravity (g) (CGS 1999). The PGA values calculated by the CGS have a 10 percent probability of being exceeded in a 50-year period. PGA values vary throughout the project area and would be assessed as part of a site-specific geotechnical analysis. The assessed PGA values would be used to ensure that the project is designed in compliance with applicable building codes.

1 The acceleration due to gravity is relatively constant at the earth's surface: 980 centimeters per second per second (cm/sec/sec). An acceleration of 16 feet per second is 16*12*2.54 = 487 cm/sec/sec. Therefore, an acceleration of 16 feet per second = 487/980 = 0.50 g.

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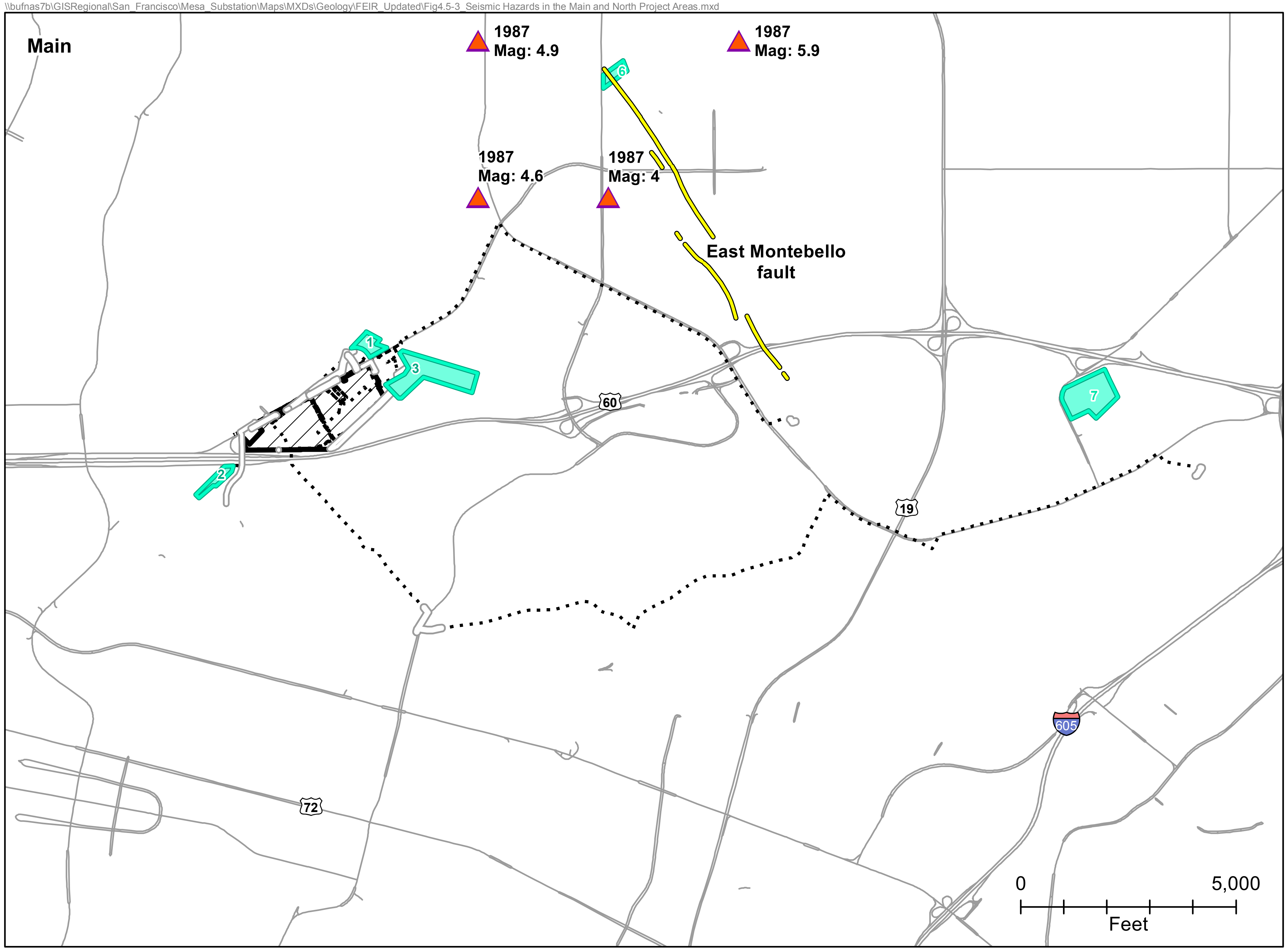

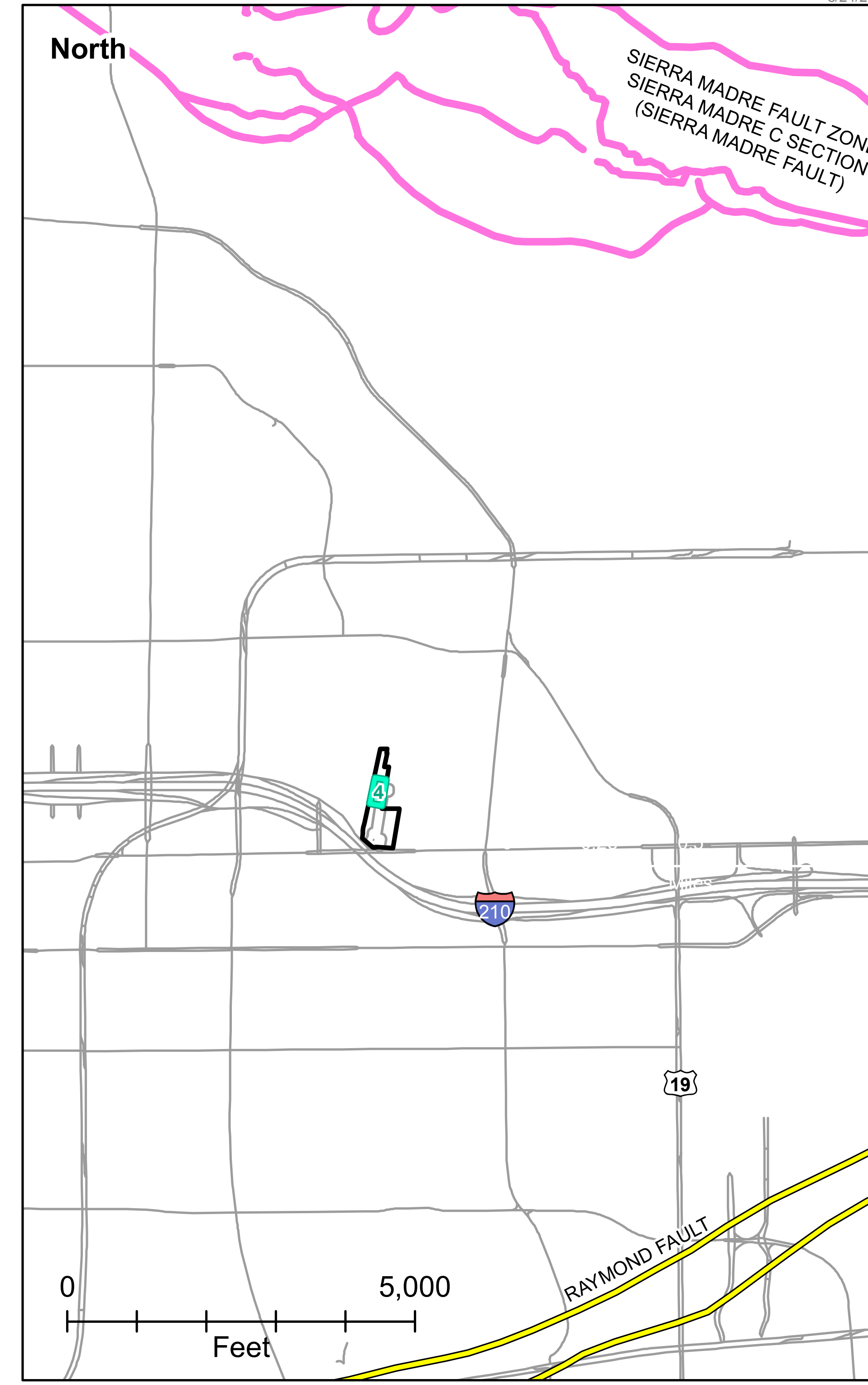

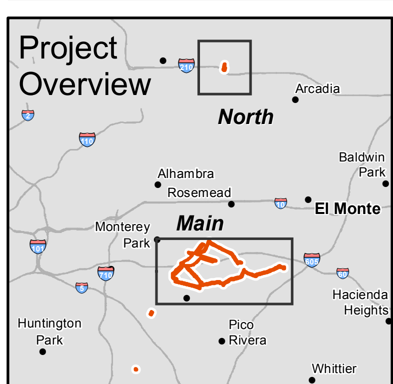

Telecommunications route

Manholes, vaults, and underground construction

Staging yard

Proposed mesa substation area

Major road

United States Geological Survey Earthquakes over Moment Magnitude 4

Approximate Fault Locations

Alquist-Priolo Fault Zone

Other Fault

Sources: SCE 2016, USGS 2006, 2015b
Basemap: ESRI Media Kit, 2010

Figure 4.5-3
Active Faults, Earthquakes, and Alquist- Priolo Fault Zones in the Main and North Project Areas
Mesa Substation
Los Angeles County, CA

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Erosion

Water and wind are the processes responsible for most soil erosion in the project area. Increased erosion could occur in the project area where surface disturbing activities are planned to occur. The NRCS assigns soils to Wind Erodibility Groups (WEGs) and determines an Erosion Hazard rating. The susceptibility of the soils in the project area to wind erosion ranges from WEG 1 (most highly erodible) to WEG 8 (not susceptible). The Hanford fine sandy loam has a WEG rating of 3 and an erosion hazard rank of moderate to severe. The Tujunga fine sandy loam has a WEG rating of 2 and an erosion hazard rating of severe. WEG ratings were not available for the other soil types in the project area; however, they are assigned erosion hazard ratings of slight-moderate (Altamont clay loam), moderate (Yolo loam), moderate-severe (Chino silt loam), and severe (Ramona loam). Information regarding soil characteristics in the proposed project area is presented above in Table 4.5-2.

Landslides

Earthquake-induced landslides are present in the vicinity of the project area; however, none are mapped within the project area (CGS 2015). Areas of earthquake-induced landslides were mapped by the CGS where previous occurrence of landslide movement, or local topographic, geological, geotechnical, and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required. The Main Project Area is mapped as having low landslide susceptibility (USGS 2001). The City of Industry General Plan (City of Industry 2014) indicates that all sites in the area will be subject to seismic and geologic hazards, including earthquake-induced landslides; however, the nearly flat topography at the Walnut Substation indicates that the risk for landslides is low. The nearly flat topography at the Vincent and Pardee Substations, as well as at work areas in the North and South Areas, indicates that the risk for landslides at these locations is low as well. Areas of earthquake-induced landslides and areas of mapped landslide susceptibility are shown on Figure 4.5-4.

Liquefaction

Liquefaction occurs when saturated sandy soil loses strength and cohesion due to ground shaking during an earthquake. Areas of significant liquefaction potential were mapped by the CGS 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. The only project components involving ground disturbance that would be located in an area of significant liquefaction potential are the fiber optic cable that would be installed in new underground conduit at the southeastern terminus of Telecommunications Route 3 within the Whittier Narrows Natural Area, and underground conduit proposed at the existing Walnut and Pardee Substations (City of Industry; City of Santa Clarita 2011; CGS 1998~~USGS 2001~~). All other project components are located outside areas of significant liquefaction potential (~~USGS 2001~~CGS 1998). Areas of significant liquefaction potential are shown on Figure 4.5-4.

Subsidence

Ground subsidence is not discussed as a hazard in the General Plans of Los Angeles County and the City of Monterey Park (County of Los Angeles 2015; City of Monterey Park 2001). The City of Commerce General Plan indicates that the City is not likely to be exposed to secondary seismic hazards that include ground settlement (City of Commerce 2008). The City of Montebello General Plan considers subsidence to be a limited hazard (City of Montebello 1975). The City of Pasadena General Plan indicates that sites near the base of the San Rafael Hills at the valley margin are vulnerable to differential settlement during an earthquake (City of Pasadena 2002). However, underground construction associated with the 220-kV line loop-in and installation of underground conduit at the Goodrich Substation would be located on the valley floor over 5 miles east southeast of the San Rafael Hills. The nearest similar geologic conditions are located at the valley margin adjacent to the San Gabriel Mountains, approximately 1.75 miles northeast of the Goodrich Substation. The City of Bell Gardens considers the risk of seismically induced ground subsidence to be insignificant (City of Bell Gardens 1995). Some of the project components would cross the jurisdictions of other cities; however, the potential for seismically induced subsidence was only evaluated for cities where ground disturbance is planned because no impact is present beyond pre-construction baseline conditions where no ground disturbance is planned. The City of Industry General Plan indicates that all sites in the area will be subject to seismic and geologic hazards, including subsidence (City of Industry 2014). The City of Santa Clarita General Plan indicates that no large-scale problems with ground subsidence have been reported there (City of Santa Clarita 2011).

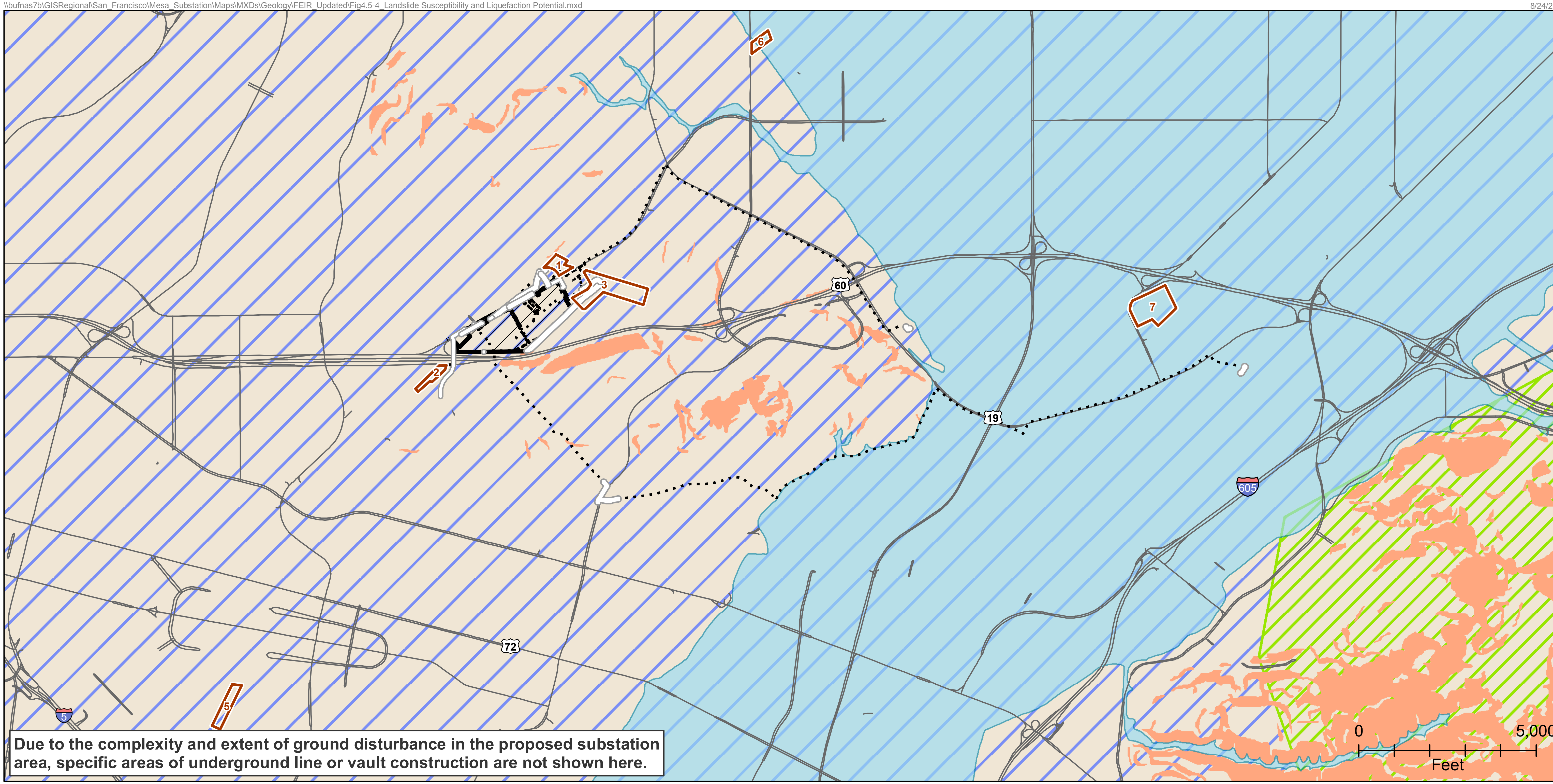
Expansive and Collapsible Soils

Some soils contain certain clay minerals that may cause them to swell when moist and shrink as the soil dries. These soils are known as "expansive soils." Expansive soils have the potential to disturb building foundations, walls, and roads and are found occasionally throughout the project area. The Altamont Clay Loam has a high shrink-swell potential, while the Chino Loam, Ramona Loam, and Yolo Loam have moderate shrink-swell potential. All other soils below the various project components have a low shrink-swell potential, as detailed in Table 4.5-3. In areas where soils have moderate to high shrink-swell potential, project components may require special design features to prevent damage.

4.5.1.3 Mineral Resources

According to the United States Geological Survey (USGS), a mineral resource is defined as a concentration of naturally occurring solid, liquid, or gaseous material in or on the earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible (USGS 1980). Mineral resources include oil, natural gas, and metallic and non-metallic deposits.

The proposed project area is located in a region of active oil exploration and production. A small part of the eastern area of the Mesa Substation site is located within the administrative boundaries of the Montebello oil field. This area contains transmission infrastructure. Four plugged oil wells and one idle oil well (all outside of the administrative boundaries of the Montebello oil field) are located in the proposed Mesa Substation site area and adjacent 220-kV ROW southeast of the proposed Mesa Substation (DOGGR 2003). Although the idle well located within the proposed Mesa Substation site area was identified in historic documentation of the site, no oil well was identified in this location during pedestrian surveys of the site. Telecommunications Route 2 and most of Telecommunications Route 3 are located within the administrative boundaries of the Montebello oil field. The eastern end of Telecommunications Route 3 is located within the administrative boundary of the abandoned Lapworth oil field. Some active and some plugged oil and gas wells are located in close proximity to portions of all three telecommunications routes. The transmission tower replacement on the Goodrich–Laguna Bell transmission line is located within the Los Angeles East oil field. No oil and gas wells are present on the project components in the north and south project areas; however, there are wells in close proximity to the Goodrich–Laguna Bell transmission tower replacement project component (CA DOC 2014). Figure 4.5-5 shows the locations of oil and gas



- Telecommunications route
- Manholes, vaults, and underground construction
- Staging yard
- Proposed mesa substation area
- Major road

Areas of Susceptibility

- Liquefaction potential
- Low landslide susceptibility
- Moderate landslide susceptibility
- Landslide potential

Sources: CGS 2015, SCE 2016, USGS 2001
Basemap: ESRI Media Kit, 2010

Figure 4.5-4
Landslide Susceptibility and Liquefaction Potential in the Project Area
Mesa Substation
Los Angeles County, CA

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\\bufnas7b\GISRegional\San_Francisco\Mesa_Substation\Maps\MXDs\Geology\FEIR_Updated\Fig4.5-5_Oil Fields and Oil and Gas Wells in the Project Area.mxd

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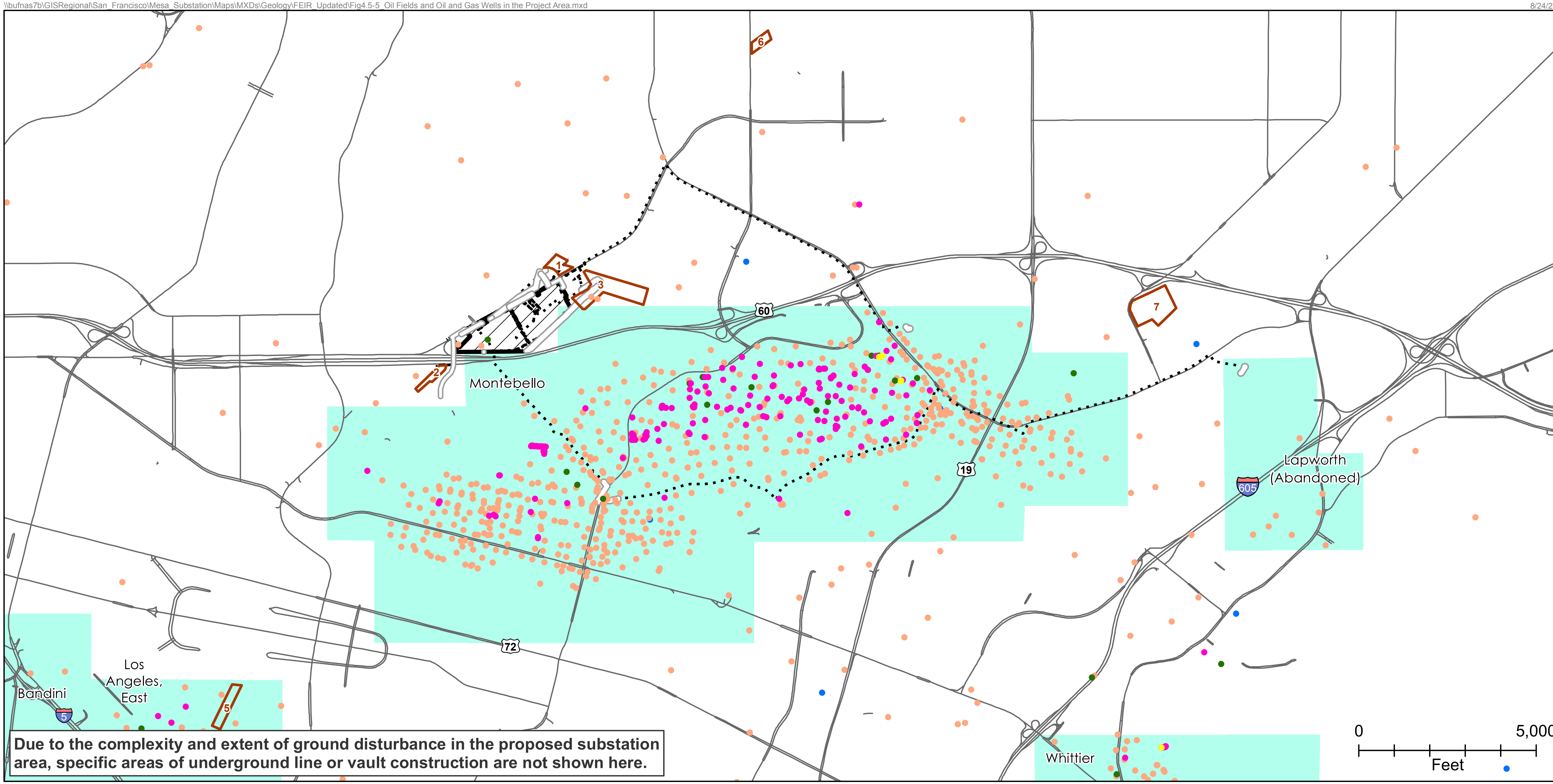

Telecommunications route

Manholes, vaults, and underground construction

Staging yard

Proposed mesa substation area

Major road

DOGGR Well Status
- New
- Active
- Idle
- Plugged
- Buried

Oil and Gas Field Administrative Boundaries

Sources: CA DOC 2014, SCE 2016
Basemap: ESRI Media Kit, 2010

Figure 4.5-5
Oil Fields and Oil and Gas Wells in the Project Area
Mesa Substation
Los Angeles County, CA

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wells and the administrative boundaries of oil and gas fields in the vicinity of the various project components.

In addition to oil and gas, aggregate resources are currently mined near, but not in, the proposed project area (USGS 2012). No active mines are known to exist within the project area. The McCaslin Materials Company Pit is the only mineral resource producer, past producer, or prospect within the project area. The McCaslin Materials Pit is a former producer mapped within the proposed Main Project Area. The nearest active mineral resource mine to the proposed project is the Irwindale Pit Sand and Gravel Mine, located approximately 1.2 miles southeast of the terminus of Telecommunications Route 3 in the Whittier Narrows Natural Area.

Proposed work within the North Area at Goodrich Substation would occur within the areas identified by the California Geological Survey as Mineral Resource Zone 2 (MRZ-2) where significant portland cement concrete-grade aggregate resources are present (CGS 2010a, CGS 2010b). The Pardee Substation is also located in an area designated as MRZ-2 according to the City of Santa Clarita General Plan (City of Santa Clarita 2011). Sandstone, conglomerate, and sand/gravel that are potentially useful in construction are identified throughout the Montebello hills adjacent to Telecommunications Route 3 (City of Montebello 1975). Mineral deposits, mines, and mineral resource zones are shown on Figure 4.5-6.

4.5.2 Regulatory Setting

This subsection summarizes federal, state, and local laws, regulations, and standards that govern geology, soils, and mineral resources in the proposed project area.

4.5.2.1 Federal

~~1997 Uniform Building Code~~

~~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 (lowest hazard) to IV (highest 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 would be located in the highest seismic risk zone defined by the UBC standard: UBC Zone IV. The state has adopted these provisions in the California Building Code (CBC).~~

Clean Water Act of 1972, as amended in 2002

The Clean Water Act (33 United States Code §1251 et seq.) requires states to set standards to protect water quality, including the regulation of storm water and wastewater discharge during construction and operation of a facility. This includes the creation of the National Pollutant Discharge Elimination System (NPDES), a system that requires states to establish discharge standards specific to water bodies and that regulates storm water discharge from construction sites through the implementation of a Storm Water Pollution Prevention Plan (SWPPP). Erosion and sedimentation control measures are fundamental components of SWPPPs. In California, the NPDES permit program is implemented and administered by Regional Water Quality Control Boards under the authority of the California State Water Resources Control Board. Refer to Section 4.9, "Hydrology and Water Quality," for further information.

As authorized by Section 402 of the Clean Water Act, the California State Water Resources Control Board administers the NPDES General Permit for Discharges of Storm Water Associated with Construction Activity (General Construction Activity NPDES Storm Water Permit, 2009-0009-DWQ, ~~and~~ 2010-0014-DWQ, and 2012-0006-DWQ) that covers a variety of construction activities that could result in wastewater discharges. Under this General Permit, the state issues a construction permit for projects that disturb ~~more than~~ 1 acre or more of land. To obtain the permit, applicants must notify the State Water Resources Control Board of the construction activity by providing a Notice of Intent, develop a SWPPP, and implement water quality monitoring activities as required. The purpose of a SWPPP is to ensure the design, implementation, management, and maintenance of best management practices aimed at reducing the amount of sediment and other pollutants in storm water discharges associated with land disturbance activities.

Earthquake Hazards Reduction Act

The National Earthquake Hazards Reduction Program (NEHRP) was established by the United States Congress when it passed the Earthquake Hazards Reduction Act of 1977, Public Law (PL) 95–124. At the time of its creation, Congress's stated purpose for NEHRP was "to reduce the risks of life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program." Congress recognized that earthquake-related losses could be reduced through improved design and construction methods and practices, land use controls and redevelopment, prediction techniques and early-warning systems, coordinated emergency preparedness plans, and public education and involvement programs. Since NEHRP's creation, it has become the federal government's coordinated long-term nationwide program to reduce risks to life and property in the United States that result from earthquakes. Four basic NEHRP goals are:

- Develop effective practices and policies for earthquake loss reduction and accelerate their implementation.
- Improve techniques for reducing earthquake vulnerabilities of facilities and systems.
- Improve earthquake hazards identification and risk assessment methods, and their use.
- Improve the understanding of earthquakes and their effects.

Congress has recognized that several key federal agencies can contribute to earthquake mitigation efforts. Today, there are four primary NEHRP agencies:

- Federal Emergency Management Agency of the Department of Homeland Security.
- National Institute of Standards and Technology (NIST) of the Department of Commerce (NIST is the lead NEHRP agency).
- National Science Foundation.
- United States Geological Survey (USGS) of the Department of the Interior.

Congress completed a review of NEHRP, resulting in the NEHRP Reauthorization Act of 2004, PL 108–360. PL 108–360 directed that NEHRP activities be designed to develop effective measures for earthquake hazard reduction; promote the adoption of earthquake hazards reduction measures by government agencies, standards and codes organizations, and others involved in planning and building infrastructure; improve the understanding of earthquakes and their effects through interdisciplinary research; and develop, operate, and maintain both the Advanced National Seismic

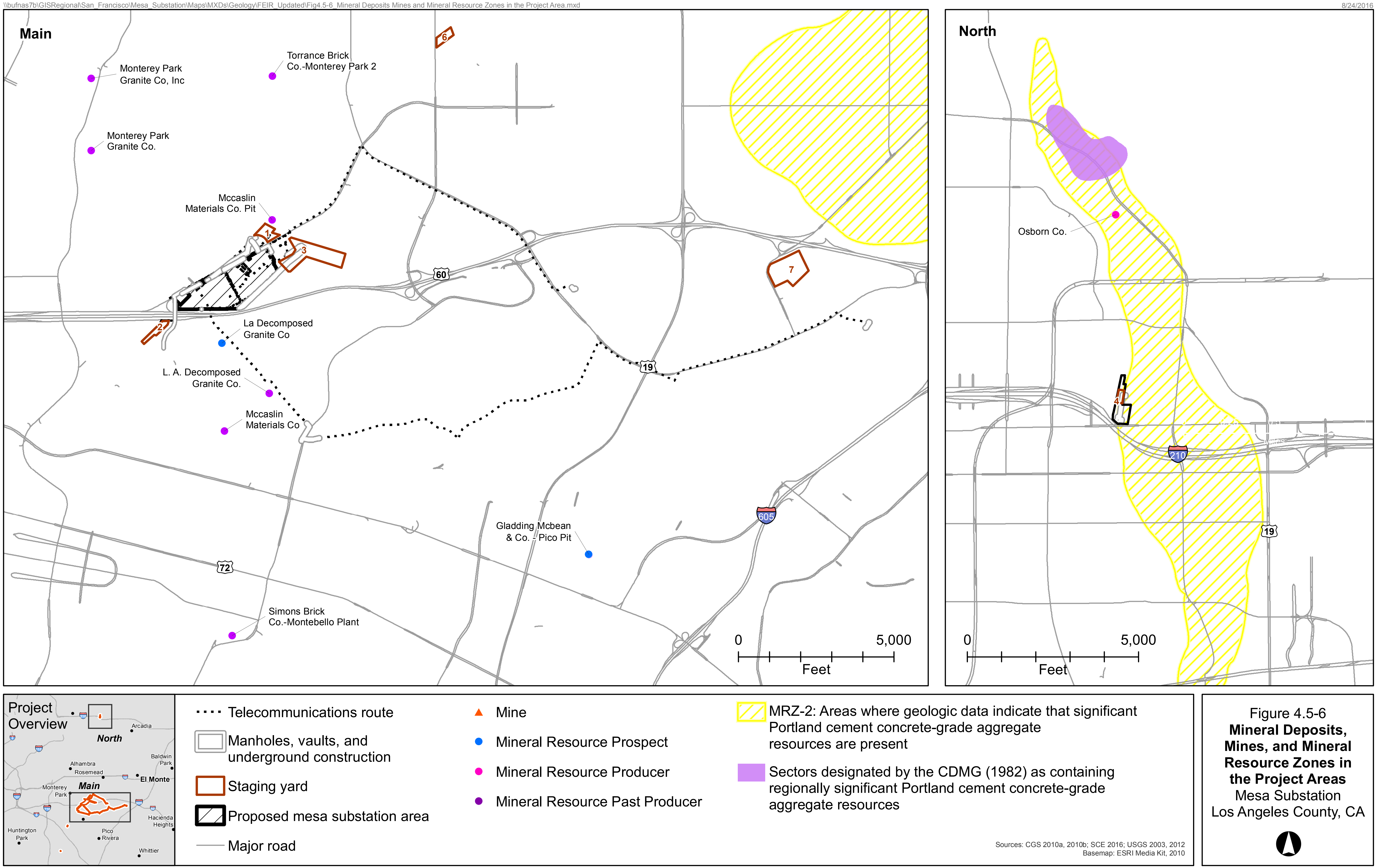

Figure 4.5-6
Mineral Deposits, Mines, and Mineral Resource Zones in the Project Areas
Mesa Substation
Los Angeles County, CA

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System and the George E. Brown, Jr. Network for Earthquake Engineering Simulation. In a major new initiative, PL 108–360 also directed that NEHRP support development and application of performance-based seismic design.

4.5.2.2 State

Alquist-Priolo Earthquake Fault Zoning Act

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act of 1972 is to regulate development near active faults to minimize the hazards associated with a surface fault rupture. This act requires disclosure to potential real estate buyers and a 50-foot setback for new occupied buildings. While the act does not specifically regulate overhead power lines, it helps define areas where fault rupture is most likely to occur. The act defines an active fault as one that exhibits evidence of surface rupture within the last 11,000 years (i.e., Holocene activity). The state has identified active faults within California and has delineated "earthquake fault zones" along active faults.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 provides a statewide seismic hazard mapping and technical advisory program to assist cities and counties in fulfilling their responsibilities for protecting public health and safety from the effects of strong ground shaking, liquefaction, landslides, or other ground failure and seismic hazards caused by earthquakes. Mapping and other information generated pursuant to the Seismic Hazards Mapping Act is to be made available to local governments for planning and development purposes. The state requires that: (1) local governments incorporate site-specific geotechnical hazard investigations and associated hazard mitigation as part of the local construction permit approval process; and (2) the agent for a property seller, or the seller if acting without an agent, must disclose to any prospective buyer if the property is located within a Seismic Hazard Zone. The State Geologist is responsible for compiling seismic hazard zone maps.

California Building Code

The 2013 CBC was adopted by the California Building Standards Commission and became effective January 1, 2014. The California Building Standards Commission adopted a newer version of the CBC in January 2016, which will become effective January 1, 2017. The CBC is contained in Title 24 of the California Code of Regulations, California Building Standards Code and is a compilation of three types of building standards from three different origins:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes.
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions.
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes that have been adopted to address particular California concerns.

The code includes grading and other geotechnical issues, building specifications, and non-building structures. The proposed project would include these types of improvements, and therefore, the building code would be applicable.

California Public Utilities Commission General Orders 95, 128, and 165

California Public Utilities Commission (CPUC) General Order (G.O.) 95 Rules for Overhead Line Construction provides general standards for the design and construction of overhead electric transmission lines. CPUC G.O. 128 (Rules for Construction of Underground Electric Supply and Communication Systems) provides general standards for the construction of underground electric and communication systems. Additionally, CPUC G.O. 165 (Inspection Requirements for Electric Distribution and Transmission Facilities) establishes requirements for electric distribution and transmission facilities (excluding those facilities contained in a substation) regarding inspections in order to ensure safe and high-quality electrical service. The proposed project would be designed and constructed in accordance with standards outlined in CPUC G.O. 95, CPUC G.O. 128, and CPUC G.O. 165.

4.5.2.3 Regional and Local

Los Angeles County General Plan and Municipal Code

The following Los Angeles County General Plan Safety Element goal and policy regarding geology and soils are applicable to the proposed project (County of Los Angeles 2015a):

- ***Goal S 1:*** *An effective regulatory system that prevents or minimizes personal injury, loss of life and property damage due to seismic and geotechnical hazards.*
- ***Policy S 1.1:*** *Discourage development in Seismic Hazard and Alquist-Priolo Earthquake Fault Zones.*

A review of the Los Angeles County municipal code did not identify any municipal code sections relevant to minerals, geology, and soils and the proposed project.

City of Monterey Park General Plan and Municipal Code

The following City of Monterey Park General Plan Safety and Community Service Element goals and policies regarding geology, soils, and mineral resources are applicable to the proposed project (City of Monterey Park 2001):

- ***Goal 1.0:*** *Minimize the potential damage to structures and loss of life that could result from earthquakes.*
- ***Policy 1.1:*** *Continue to implement Uniform Building Code seismic safety standards for construction of new buildings, and update the City's codes as needed in response to new information and standards developed at the State level.*
- ***Goal 3.0:*** *Protect public and private properties from geologic hazards associated with steep slopes and unstable hillsides.*
- ***Policy 3.2****: Require that hillside developments incorporate measures that mitigate slope failure potential and provide for long-term slope maintenance.*

Grading in the City of Monterey Park requires a permit from the City, per Monterey Park Municipal Code Chapter 16.21.

City of Montebello General Plan and Municipal Code

The following City of Montebello General Plan Seismic Safety Element goal and policies regarding geology are applicable to the proposed project (City of Montebello 1975):

- ***Goal 2.0:*** *Reduce the loss of life, damage to property, and the economic and social dislocations resulting from future earthquakes.*
- ***Policy 4:*** *Incorporate a seismic hazard review procedure in the evaluation of new developments.*
- ***Policy 5:*** *Continue to require engineering geologic investigations in hillside areas.*

A review of the City of Montebello municipal code did not identify any municipal code sections relevant to minerals, geology, and soils and the proposed project.

City of Rosemead General Plan and Municipal Code

The following City of Rosemead General Plan goal and action regarding geology and soils are applicable to the proposed project (City of Rosemead 2010):

- ***Goal 1:*** *The City of Rosemead will act in cooperation with federal, State, and County agencies responsible for the enforcement of planning statutes, environmental laws, and building codes to minimize, to the extent practical, risks to people and property damage, risks related economic and social disruption, and other impacts resulting from 1) geologic and soil hazards, 2) seismic hazards including primary and secondary effects of seismic shaking, fault rupture, and other earthquake-induced ground deformation in Rosemead, and 3) dam failure-induced flood and inundation hazards, while reducing the disaster recovery time due to hazard incidents in Rosemead….*
- ***Action 1.10:*** *Require proper geotechnical and engineering geological investigations and reports that address and evaluate necessary analyses of (for example) soil foundation conditions (i.e. expansivity, collapse, seismic settlement), slope stability, surface and subsurface water, and provide necessary design recommendations for grading and site stability, such as excavation, fill placement, and stabilization or remediation measures.*

A review of the City of Rosemead municipal code did not identify any municipal code sections relevant to minerals, geology, and soils and the proposed project.

City of South El Monte General Plan

The following City of South El Monte General Plan Public Safety Element goal and policies regarding geology and soils are applicable to the proposed project (City of South El Monte 2000):

- ***Goal 1:*** *Reduce the risk of danger related to natural hazards.*
- ***Policy 1.2****: Require liquefaction studies to be prepared for new development proposed to be located in areas of the City with high susceptibility to liquefaction hazards.*
- ***Implementation Plan Policy PS-1:*** *During the review of development proposals, require surveys of soils and geologic conditions by a state-licensed engineering geologist where appropriate. The purpose of the surveys is to determine the geologic stability of the site and identify design measures to minimize geologic hazards. Require the project design recommendations as conditions of project approval.*

- ***Implementation Plan Policy PS-2:*** *To minimize damage from earthquakes and other geologic activity, implement the most recent state and seismic requirements for structural design of new development and redevelopment.*

A review of the City of South El Monte municipal code did not identify any municipal code revisions relevant to minerals, geology, and soils and the proposed project.

City of Commerce General Plan and Municipal Code

The following City of Commerce General Plan Community Development Element policy is applicable to the proposed project (City of Commerce 2008):

- ***Policy 7.1:*** *The City of Commerce will ensure that all future public facilities and improvements do not have a significant adverse impact on the community and that any such impacts must be mitigated to the fullest extent possible.*

A review of the City of Commerce municipal code did not identify any municipal code sections relevant to minerals, geology, and soils and the proposed project.

City of Bell Gardens General Plan and Municipal Code

The following City of Bell Gardens General Plan Public Safety Element policy is applicable to the proposed project (City of Bell Gardens 1995):

- ***Policy 2:*** *The City of Bell Gardens shall minimize the loss of life, injuries, and property damage through continuing prevention, inspection, and public education programs, including continual updating of the City's Emergency Preparedness Plan.*

A review of the City of Bell Gardens municipal code did not identify any municipal code sections relevant to minerals, geology, and soils and the proposed project.

City of Pasadena General Plan and Municipal Code

The following City of Pasadena General Plan Public Safety Element goals, policy, and program regarding geology and are applicable to the proposed project (City of Pasadena 2002):

- ***Goal S-1:*** *Minimize injury and loss of life, property damage, and other impacts caused by seismic shaking, fault rupture, ground failure, earthquake-induced landslides, and other earthquake-induced ground deformation.*
- ***Policy S2-3:*** *The City shall require geological and geotechnical investigations in areas of potential seismic or geologic hazards as part of the environmental and development review process. The City shall not approve proposals and projects for development or redevelopment which do not provide for mitigation of seismic or geologic hazards to the satisfaction of responsible agencies.*
- ***Goal G-1:*** *Minimize the risk to life or limb, and property damage resulting from soil and slope instability.*
- ***Program G1-2:*** *The city will discourage any grading beyond that which is necessary to create adequate and safe building pads. The City Geologist and Geotechnical Engineer shall conduct regular inspection of grading operations to maximize site safety and compatibility with community character.*

A review of the City of Pasadena municipal code did not identify any municipal code sectons relevant to minerals, geology, and soils and the proposed project.

City of Industry General Plan and Municipal Code

The following City of Industry General Plan Public Safety Element goal and policy regarding geology and soils are applicable to the proposed project (City of Industry 2014):

- ***Goal S1:*** *Minimal loss of life and damage to property resulting from an earthquake or other geologic hazards.*
- ***Policy S1-2****: Cooperate and coordinate with public and quasi-public agencies to assure seismically strengthened or relocated facilities and other appropriate measures to safeguard water, electricity, natural gas, and other transmission and distribution systems.*

A review of the City of Industry municipal code did not identify any municipal code revisions relevant to minerals, geology, and soils and the proposed project.

City of Santa Clarita General Plan and Municipal Code

The following City of Santa Clarita General Plan goal, objectives, and policies regarding geology, soils, and minerals are applicable to the proposed project (City of Santa Clarita 2011):

- ***Goal S1:*** *Protection of public safety and property from hazardous geological conditions, including seismic rupture and ground shaking, soil instability, and related hazards.*
- ***Objective S 1.2****: Regulate new development in areas subject to geological hazards to reduce risks to the public from seismic events or geological instability.*
- ***Policy S 1.2.2:*** *Restrict the land use type and intensity of development in areas subject to fault rupture, landslides, or liquefaction, in order to limit exposure of people to seismic hazards.*
- ***Policy S 1.2.3:*** *Require soils and geotechnical reports for new construction in areas with potential hazards from faulting, landslides, liquefaction, or subsidence, and incorporate recommendations from these studies into the site design as appropriate.*
- ***Objective LU 7.7:*** *Protect significant mineral resources, natural gas storage facilities, and petroleum extraction facilities from encroachment by incompatible uses.*
- ***Objective CO 2.3:*** *Conserve areas with significant mineral resources, and provide for extraction and processing of such resources in accordance with applicable laws and land use policies.*

In addition, as shown in Exhibit CO-2 of the City of Santa Clarita General Plan Open Space Element, work within the Pardee Substation within the City of Santa Clarita would be located within MRZ-2, where geological data indicates that significant aggregate resources are present.

A review of the City of Santa Clarita municipal code did not identify any municipal code sections relevant to minerals, geology, and soils and the proposed project.

4.5.3 Impact Analysis

4.5.3.1 Methodology and Significance Criteria

Information and data from available published resources—including journals, maps, and government websites—were collected and reviewed. This information was evaluated within the context of applicable federal, state, and local laws, regulations, standards, and policies.

The following significance criteria were defined based on the checklist items in Appendix G of the California Environmental Quality Act Guidelines. An impact to geology and soils or mineral resources is considered significant if the project would:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
   i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. Refer to Division of Mines and Geology Special Publication 42;
   ii. Strong seismic ground shaking;
   iii. Seismic-related ground failure, including liquefaction; or
   iv. Landslides.

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

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- 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 UBC (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;

f) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or

g) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

Significance criterion (e) does not apply to the proposed project because septic tanks would not be constructed as part of the proposed project. Therefore, significance criterion (e) is not discussed further herein.

4.5.3.2 Applicant Proposed Measures

There are no Applicant Proposed Measures for geology, soils, or minerals associated with the proposed project.

4.5.3.3 Environmental Impacts

Impact GEO-1: Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault.
LESS THAN SIGNIFICANT

There are a number of active and potentially active faults in the immediate vicinity of the proposed project, as detailed in Table 4.5-3; however, the only proposed project component within an A-P fault zone is Staging Yard 6. It is located at the northwest end of the East Montebello Fault, as shown in Figure 4.5-3. Activities proposed in Staging Yard 6 may include minor ground disturbance for site preparation (e.g., vegetation removal) but would not include trenching or grading at depth. No permanent structures (e.g., buildings or transmission poles) are proposed in staging yard areas and the staging yard would only be used during the construction phase for equipment storage and staging. Therefore, although this Staging Yard would be located within an A-P fault zone on the East Montebello Fault, there would be a less than significant impact associated with the risk of loss, injury or death from the potential rupture of the East Montebello fault. Additionally, construction of the portion of Telecommunications Route 3 near the Montebello Fault (a potentially active, but not an Alquist-Priolo Fault) would not include grading or trenching activities or new structures. Stringing would occur on existing poles and would result in a less than significant impact under this criterion. The Puente Hills Blind Thrust Fault plane (a fault without surface rupture characteristics) is presumed to be active in one study and located underneath all of the proposed project area and extend for 40 km across the northern LA Basin (Shaw et al 2002). Because this fault is a blind thrust, fault it does not have surficial characteristics and would not be expected to result in surface ruptures. Furthermore, activities at Staging Yard 6 or Telecommunications Route 3 would not exacerbate existing fault rupture conditions.

Impact GEO-2: 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 WITH MITIGATION

The proposed project would be located in a seismically active area, in close proximity to active and potentially active fault zones. Therefore, the proposed project could experience moderate to high levels of earthquake-induced ground shaking, although it would not exacerbate the existing seismic conditions in the area. Proposed transmission and subtransmission structures would be designed in accordance with CPUC G.O. 95, which requires overhead line construction to be capable of withstanding wind, temperature, and wire tension loads. Underground infrastructure would be designed in accordance with CPUC G.O. 128. The proposed operations and test and maintenance buildings, as well as the Junior and Senior Mechanical Electrical Equipment Rooms, would be designed in accordance with all applicable regulations, including the California Building Code. Impacts at the substation may be significant given that there are other structures than the Junior and Senior Mechanical Electrical Equipment Rooms that could be damaged due to strong seismic ground shaking. Location-specific seismic analysis would be conducted during the proposed project's final design phase, final design would be reviewed by the CPUC, and the final design of the proposed project would incorporate recommendations from the geotechnical study, as described in Mitigation Measure (MM) GEO-1. Compliance with MM GEO-1 and all applicable regulations would reduce impacts associated with the risk of loss, injury, or death involving strong seismic ground shaking during construction and operation of the proposed project to less than significant.

Impact GEO-3: 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 WITH MITIGATION

None of the proposed project components would be located in an area identified in a city or county general plan as posing a substantial risk of secondary seismic hazards such as ground subsidence or differential settlement. The only proposed project components that would be located within a State of California Liquefaction Seismic Hazard Zone are~~is~~ a portion of Telecommunications Route 3 and the Walnut and Pardee Substations (USGS 2001). The only ground disturbing activity proposed to occur in a State of California Liquefaction Seismic Hazard Zone is the installation of underground conduit and fiber optic cable at the southeast terminus of Telecommunications Route 3 and inside the perimeters of the Walnut and Pardee Substations. Although the proposed project would not exacerbate existing soil conditions related to probability for liquefaction, liquefaction may result in damage to underground infrastructure at the Walnut and Pardee Substations or along Telecommunications Route 3~~'s underground infrastructure~~, which would be a significant impact. MM GEO-1 would require that the applicant prepare a geotechnical report, which would include design measures to minimize potential for liquefaction and incorporate ground improvements in liquefiable zones. The applicant would design the project in accordance with any recommendations set forth in the report, which would reduce impacts associated with seismic-related ground failure, including liquefaction, to less than significant.

Impact GEO-4: Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.

LESS THAN SIGNIFICANT WITH MITIGATION

The proposed project components would be located in areas mapped by the USGS as having low landslide susceptibility. None of the proposed project components would cross an area mapped by the CGS as having seismically induced landslides or where geological conditions indicate a potential for permanent ground displacement during an earthquake. However, there would still be a potential for smaller landslides to occur, including as a result of excavation. This would expose people or structures to potential substantial adverse effects. This would be a significant impact. MM GEO-1 would require the preparation of a site-specific geotechnical investigation and the implementation of recommendations contained in the geotechnical report to mitigate risks involving landslides. Based on the results of the geotechnical investigation the applicant would design the project to avoid highly unstable areas, remove unstable materials, and incorporate design features such as stabilization fills, retaining walls, and slope coverings to avoid potential adverse effects to people or structures resulting from a landslide or reduce the potential for a landslide to occur based on recommendations outlined in the report. Therefore, impacts under this criterion would be less than significant with implementation of MM GEO-1.

Impact GEO-5: Result in substantial soil erosion or the loss of topsoil.

Construction

LESS THAN SIGNIFICANT WITH MITIGATION

Soils in the project area are generally loamy with varying proportions of clay, silt, sand, and gravel or small stones. Most of the soils within the proposed project area have an erosion hazard rating of moderate to severe, as shown in Table 4.5-2. During construction, the majority of ground disturbance would occur during construction of the proposed Mesa Substation, structure removal and installation, and the undergrounding of subtransmission, distribution, and telecommunications lines. Erosion at these sites would occur as a result of wind, water, and tracking from construction vehicles and equipment. Construction of the proposed project would result in a significant impact if the work areas are not properly stabilized and substantial erosion occurs at one or more work areas. Because the proposed project would disturb more than 1 acre, the applicant would be required to apply for coverage under the NPDES permit and obtain a Waste Discharge Identification. To obtain this permit, the applicant would be required to submit a project-specific SWPPP to the State Water Resources Control Board for approval. The applicant would use information about the physical properties of subsurface soils, soil resistivity, and slope stability data from the geotechnical study to inform development of the SWPPP. MM HY-1 outlines specific best management practices that would need to be included in the SWPPP and that would be implemented during construction.

The SWPPP would include a variety of erosion and sediment controls to reduce the potential for increased erosion and sedimentation that could result from construction of the proposed project. Erosion controls consist of source control measures that are designed to prevent soil particles from detaching and being transported in storm water runoff (e.g., applying soil binders, as appropriate, to areas that would remain disturbed for more than two weeks or scheduling major grading operations during non-rainy periods). The SWPPP would also require the applicant to install erosion control devices, where appropriate, such as straw mulch, geotextiles and mats, earth dikes and drainage swales, velocity dissipation devices (at culvert outlets), and slope drains to reduce erosion potential during construction.

In addition to erosion control measures, the SWPPP would require the applicant to implement sediment controls, which are structural measures intended to complement and enhance the selected erosion control measures and reduce sediment discharges from active construction areas. Examples of sediment control measures include silt fences, sediment traps, check dams, fiber rolls, gravel bag berms, street sweeping and vacuuming, and sandbag barriers. These measures would be implemented at appropriate locations throughout the proposed project area. MM HY-1 would reduce impacts to less than significant.

Operation

NO IMPACT

During operations, the potential for soil erosion at the developed Mesa Substation site would be low, due to adequate site drainage and surfacing improvements that would be installed as part of the proposed project. In addition, temporary construction areas would be restored to preconstruction conditions following the completion of construction. Routine operation and maintenance would not require grading or other ground disturbing activities, and further loss of topsoil would not occur. Long-term use of access roads may lead to rutting, which could concentrate runoff and increase rill erosion. However, the applicant would maintain erosion control features that were implemented as part of the SWPPP during the construction phase as needed during operations. Therefore, the proposed project would not result in substantial topsoil erosion or the loss of topsoil during operations and there would be no impacts under this criterion for the proposed project.

Impact GEO-6: Be located on a geologic unit or soil that is unstable, or 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 WITH MITIGATION

Most of tThe proposed project area is located outside State of California Earthquake-Induced Landslide Hazard Zones; the Walnut Substation in the City of Industry is located within this zone. Landslide impacts would not occur at Walnut Substation because all work would be located in a graded area. These zones are areas where the previous occurrence of seismically induced landslides or geologic, topographic, and seismic conditions that indicate a risk of landslides. The main project area is also mapped by the USGS as having low landslide susceptibility. The city and county general plans (except for the City of Industry) covering areas of proposed ground disturbance indicate that secondary seismic hazards such as lateral spreading, subsidence, collapse, and differential settlement are not significant hazards in the proposed project area.

Areas where the natural slope is over-steepened by the construction of access roads, subtransmission structure foundations, or other excavated areas would have increased landslide and lateral spreading susceptibility as a result of the proposed project. This would be a significant impact. MM GEO-1 would require a geotechnical survey and implementation of recommendations outlined in the geotechnical report. Implementation of recommendations in the geotechnical report would reduce the potential for the proposed project to be sited in a highly unstable area and would require, as appropriate, incorporation of design features (e.g., stabilization fills, retaining walls, and slope coverings) to avoid or reduce potential adverse effects to people or structures resulting from a landslide or reduce the potential for a landslide to occur.

Liquefaction and lateral spreading could result in lowland areas where saturated sandy soil loses strength and cohesion due to ground shaking during an earthquake. This would be a significant impact. MM GEO-1 would require that the geotechnical report assess the potential for liquefaction and lateral spreading and that the proposed project be designed in accordance with any recommendations outlined in the report to minimize the potential for liquefaction and incorporate ground improvements in liquefiable zones.

Therefore, implementation of MM GEO-1 would reduce significant impacts associated with the potential for the proposed project to be located on a geologic unit or soil that is unstable, or would become unstable as a result of the proposed project and result in a landslide, liquefaction, or lateral spreading to less than significant.

No areas of subsidence or soil collapse are known or expected to occur within the proposed project area. There would be no impact related to subsidence or soil collapse.

Impact GEO-7: Be located on expansive soil, creating substantial risks to life or property.
LESS THAN SIGNIFICANT WITH MITIGATION

Expansive soils (e.g., those with high-plasticity clay content) can cause structural failure of foundations such as those associated with the proposed project components that involve permanent structures. The shrink-swell potential is an indicator of the potential for encountering expansive soil within a soil map unit. The shrink-swell potential of soil map units throughout the proposed project area varies from low to high, as detailed in Table 4.5-2. A portion of the proposed Main Project Area is underlain by the Altamont Clay Loam, which has a high shrink-swell potential. In addition, other proposed components where ground disturbance is planned, including a portion of the proposed Mesa Substation area, Telecommunications Route 2, work at Pardee and Walnut

Substations, and components in the South Area are underlain by soil components which have a moderate shrink-swell potential (Yolo Loam, Ramona Loam, and Chino Loam). If the site soils are not properly engineered, ~~seismic-related impacts resulting in ground failure~~ damage to structures from the swelling and shrinking of expansive soils could occur and impacts would be significant.

To reduce the impact associated with expansive soil, which may be encountered in various locations in the proposed project area, MM GEO-1 would require that the applicant prepare a geotechnical report for the proposed project that would address expansive soils and require that the applicant comply with any geotechnical recommendations outlined in the report. Implementation of MM GEO-1 would reduce impacts under this criterion to less than significant.

Impact MR-1: Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.
NO IMPACT

The McCaslin Materials Company Pit, listed as a past producer of mineral resources, is mapped in the proposed Main Project Area within the 220-kV corridor north of the proposed Mesa Substation site area. The former McCaslin Materials Company Pit is located within an existing utility corridor. The proposed project would include replacement of poles in the vicinity of the McCaslin Materials Company Pit within the existing ROW, The continued use of this utility corridor would have no impact on the availability of a known mineral resource within this area even if the pit were active. The proposed project would also include the installation of a fiber optic cable along Telecommunications Routes 2A and 2B on existing poles within the existing utility corridor in the vicinity of two past producers and one mineral resource prospect, as shown in Figure 4.5-6. Because work within the vicinity of these former producers and mineral resource prospect would not include ground disturbing activities, it would have no impact on the availability of a known mineral resource. Work in the North Area at Goodrich Substation would occur within an established MRZ-2, where geologic data indicate that significant portland cement-grade aggregate resources are present. However, the presence of the existing Goodrich Substation already precludes development of portland cement-grade aggregate resources in the proposed work area. Therefore, work within the North Area would not result in the loss of availability of a known mineral resource.

Some portions of the proposed project area are located within the administrative boundaries of active oil and gas fields, including the 500-kV transmission corridor and adjacent 220-kV transmission corridor, a small portion of the proposed Mesa Substation site area, the easternmost terminus of Telecommunications Route 1, Telecommunications Route 2, most of Telecommunications Route 3, and LST replacement work and Staging Yard 5 in the South Area. Active oil and gas wells are located adjacent to portions of Telecommunications Routes 2 and 3 as well as work within the South Area. However, no wells (active, idle, or otherwise) that are within the boundaries of active oil and gas fields are located within designated work areas. Figure 4.5-5 shows all oil and gas wells within the vicinity of the proposed and the administrative boundaries of active oil and gas fields. There are no known mineral resources within the perimeter fenceline of Vincent, Pardee, or Walnut Substation and work within the perimeter fenceline of these three satellite substations would have no impact on mineral resources.

Outside of the boundaries of the active oil and gas fields there are five wells located within the Main Project Area, including four plugged wells and one idle well. The applicant conducted pedestrian surveys of the proposed project area and was unable to locate the identified idle well that are located within the Main Project Area. There are no active wells within the Main Project Area, though there are plugged wells. A majority of the project area is located outside of the Montebello

Hills oil field administrative boundary (DOGGR 2003). Wells were drilled in the area in the early twentieth century, but development and production did not take place at the substation area, in contrast to the Montebello Hills area south of the substation site. In the Montebello Hills area, there is a high density of active wells at the center of the Montebello Oil field. This suggests there is limited potential for oil and gas resources within the proposed project area. In addition, because there are no known active wells within the proposed project area, the proposed project would not result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state. Therefore, there would be no impact under this criterion.

Impact MR-2: Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.
NO IMPACT

According to the City of Santa Clarita General Plan, the Pardee Substation is located in an established MRZ-2, where geologic data indicate that significant aggregate resources are present. However, work at Pardee Substation would occur within the perimeter fenceline of the existing substation. The presence of the existing Pardee Substation already precludes development of portland cement-grade aggregate resources in that location. Therefore, proposed work at the substation would have no impact on the availability of a resource within this identified MRZ-2. No other local general, specific, or other land use plans identify locally-important mineral resource recovery sites within the proposed project area. Therefore, there proposed project would not result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan and there would be no impact under this criterion.

4.5.4 Mitigation Measures

MM GEO-1: Geotechnical Investigation. The applicant will conduct a geotechnical investigation for the proposed project and prepare a geotechnical report documenting the results of the investigation. The geotechnical investigation shall assess the potential for liquefaction, landslides, lateral spreading, seismic ground shaking, and expansive soil. The geotechnical report shall make recommendations of engineering and design measures to incorporate into the proposed project, determined appropriate by a California-licensed Geotechnical Engineer or Certified Engineering Geologist, to mitigate impacts associated with liquefaction, landslides, lateral spreading, seismic ground shaking, and expansive soils. Measures that may be used to minimize impacts could include, but are not limited to:

- *Liquefaction:* stabilization of fills, retaining walls, slope coverings, removal of unstable materials, avoidance of highly unstable areas, construction of pile foundations, and/or ground improvements of liquefiable zones.
- *Landslides and lateral spreading:* retaining walls, excavation of unstable materials, avoidance of highly unstable areas.
- *Seismic ground shaking:* energy dissipating devices, bracing, bolting of foundations.
- *Expansive soil:* excavation of expansive soil, draining water away from expansive soils, ground-treatment processes.

SCE shall provide documentation to the CPUC prior to construction that demonstrates these measures have been incorporated into project design.