4.4 GEOLOGY AND SOILS

This section provides an overview of geology and soils and evaluates impacts associated with the Proposed Project. Topics addressed include suitability of soil for development, seismicity, faults, ground shaking, liquefaction, and landslides. This section was prepared utilizing documents and maps published by the United States Geological Survey (USGS), California Department of Conservation, California Geological Survey (CGS), the County of Los Angeles, and the City of Los Angeles, as well as other applicable sources.

REGULATORY FRAMEWORK

FEDERAL

International Building Code (IBC). The IBC is published by the International Code Council and forms the basis of the California's building code. It has been adopted by the California Legislature to address the specific building conditions and structural requirements for California. The IBC contains provisions that are intended to ensure that structures can adequately resist seismic forces during earthquakes. These seismic provisions represent the best available guidance on how structures should be designed and constructed to limit seismic risk. See Section 4.7, Hydrology and Water Quality for further discussion of the National Pollutant Discharge Elimination System (NPDES).

National Pollutant Discharge Elimination System (NPDES). NPDES permits are authorized by Section 402 of the Clean Water Act. The goal of the NPDES diffuse-source regulations is to improve the quality of stormwater discharged to receiving waters to the "maximum extent practicable" through the use of best management practices (BMPs). The NPDES permit system regulates point source discharges (e.g., a municipal or industrial discharge at a specific location or pipe) and certain types of diffuse source dischargers (e.g., municipal stormwater and construction runoff). The NPDES permit sets erosion control standards and requires implementation of nonpoint source control of surface drainage through the application of a number of BMPs to decrease the effects of erosion and sedimentation associated with grading.

STATE

Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act). The Alquist-Priolo Act, which is codified in the Public Resources Code (PRC) Division 2, Chapter 7.5, provides policies and criteria to assist cities, counties, and state agencies in the development of structures for human occupancy across the trace of active faults.[1] The Alquist-Priolo Act was intended to provide the citizens of the state with increased safety and to minimize the loss of life during and immediately following earthquakes by facilitating seismic retrofitting to strengthen buildings, including historical buildings, against ground shaking. This Act requires the State Geologist to establish regulatory zones known as "Earthquake Fault Zones" around the surface traces of active faults and to issue appropriate maps. Before a project can be permitted within an Alquist-Priolo Earthquake Fault Zone, the City of Los Angeles requires a geologic investigation to demonstrate that proposed building(s) will not be constructed across active faults. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back from the fault (generally 50 feet).

Seismic Hazards Mapping Act of 1990. To address the effects of strong ground shaking, liquefaction, landslides, and other ground failures due to seismic events, the State of California passed the Seismic Hazards Mapping Act. Under the Seismic Hazards Mapping Act, which is codified in PRC Chapter 7.8, Section 2690-2699.6, the State Geologist is required to delineate "seismic hazard zones." Cities and counties must regulate certain development projects within these zones to ensure the geologic and soil conditions are investigated and appropriate mitigation measures, if any, are incorporated into development plans. The State

[1] A fault trace is the intersection of a geological fault with the ground surface, leaving a visible mark; also, the line commonly plotted on geologic maps to represent a fault (https://earthquake.usgs.gov/learn/glossary/?term=fault%20trace).

Mining and Geology Board provides additional regulations and policies to assist municipalities in preparing the Safety Element of their General Plan and encourage land use management policies and regulations to reduce and mitigate those hazards to protect public health and safety. Under PRC Section 2697, cities and counties shall require, prior to the approval of a project located in a seismic hazard zone, a geotechnical report defining and delineating any seismic hazard. The requirement for a report may be waived if the city finds that no undue seismic hazard exists, based on information resulting from studies conducted on sites in the immediate vicinity of the project and of similar soil composition to the project site. Each city or county shall submit one copy of each geotechnical report, including mitigation measures, to the State Geologist within 30 days of its approval.

California Building Code (CBC). The CBC, found in California Code of Regulations (CCR) Title 24, is a compilation of the State building standards, including seismic safety standards for new buildings. Each jurisdiction in California must adopt its own building code that incorporates the CBC. Local codes are permitted to be more stringent than the CBC (with limitations), but, at a minimum, are required to meet all State standards and enforce the regulations of the CBC. The CBC standards are based on (1) building standards that have been adopted by State agencies without change from the IBC, (2) building standards based on the IBC that have been changed to address particular California conditions, and (3) building standards authorized by the California legislature but not covered by the IBC.

Given the state's susceptibility to seismic events, the seismic standards within the CBC are among the strictest in the world. The CBC applies to all occupancies in the state, except where stricter standards have been adopted by local agencies. Chapter 16 of the CBC deals with structural design requirements governing seismically resistant construction (Section 1604), including (but not limited to) factors and coefficients used to establish seismic site class and seismic occupancy category for the soil/rock at the building location and the proposed building design (Sections 1613.5 through 1613.7). Chapter 18 includes (but is not limited to) the requirements for foundation and soil investigations (Section 1803); excavation, grading, and fill (Section 1804); allowable load-bearing values of soils (Section 1806); and the design of footings, foundations, and slope clearances (Sections 1808 and 1809), retaining walls (Section 1807), and pier, pile, driven, and cat-in-place foundation support systems (Section 1810). Chapter 33 includes (but is not limited to) requirements for safeguards at worksites to ensure stable excavations and cut or fill slopes (Section 3304).

CBC Appendix J applies to grading, excavation, and earthwork construction, and requires that no grading shall be performed without first having obtained a permit from the building official. Section J104.3 requires the preparation of a geotechnical report that contains at least the following:

- The nature and distribution of existing soils,
- Conclusions and recommendations for grading procedures,
- Soil design criteria for any structures or embankments required to accomplish the proposed grading, and
- Where necessary, slope stability studies, and recommendations and conclusions regarding site geology.

LOCAL

City of Los Angeles General Plan, Conservation Element and Safety Element. The Conservation Element of the General Plan is intended to provide for the conservation and preservation of natural resources. Policies of the Conservation Element address the effect of erosion on such natural resources as beaches, watersheds and watercourses. The Conservation Element cites erosion of hillsides resulting in the loss of natural watersheds and features, as well as flooding and endangerment to structures and people, as continuing issues. The Conservation Element also contains limited policies related to erosion and refers to the Los Angeles Municipal Code (LAMC) Sections 91.700 *et seq*. and Specific Plan for Management of Flood Hazards (Ordinance 172,081) for specific guidance.

State law requires that the City's General Plan includes a safety element, which addresses the issue of protecting its people from unreasonable risks associated with natural disasters (e.g., fires, floods, and earthquakes). The Safety Element of the General Plan contains policies that emphasize seismic safety issues

because seismic events present the most widespread threat of devastation to life and property. The Safety Element provides a contextual framework for understanding the relationship between hazard mitigation, response to a natural disaster, and initial recovery from a natural disaster. Policy 1.1.6 of the Safety Element addresses compliance with applicable state and federal planning and development regulations (e.g., Alquist-Priolo Act, Seismic Hazards Mapping Act and Cobey-Alquist Flood Plain Management Act).

Los Angeles Building Code (LABC). Earthwork activities, including grading, are governed by the LABC, which is contained in LAMC Chapter IX, Article 1. Specifically, Section 91.7006.7 of the LABC includes requirements regarding import and export of material; Section 91.7010 includes regulations pertaining to excavations; Section 91.7011 includes requirements for fill materials; Section 91.7013 includes regulations pertaining to erosion control and drainage devices; Section 91.7014 includes general construction requirements; and Section 91.7016 includes regulations for areas that are subject to slides and unstable soils. Additionally, the LABC includes specific requirements addressing seismic design, site grading, foundation design, cut and fill slope design, soil expansion, geologic investigations and reports before and during construction, retaining walls, soil and rock testing, basement walls, shoring of adjacent properties, and potential primary and secondary seismic effects and groundwater.

City requirements to address grading, excavation, and fill are specified in LABC (i.e., LAMC Chapter IX, Article 1, Division 70). Under this part of the LABC, the Los Angeles Department of Building and Safety (LADBS) has the authority to withhold building permit issuance if a project cannot mitigate potential hazards to the project or which are associated with the project. The Grading Code periodically is revised to reflect new technology and improved standards and requirements.

The LABC incorporates by reference the CBC, with City amendments for additional requirements; LADBS is responsible for implementing the provisions of the LABC. Throughout the permitting, design, and construction phases of a building project, LADBS engineers and inspectors confirm that the requirements of the LABC pertaining specifically to geoseismic and soils conditions are being implemented by project architects, engineers, and contractors.

Standard Urban Stormwater Mitigation Plan (SUSMP) Requirements. On March 8, 2000, SUSMP requirements were approved by the Los Angeles Regional Water Quality Control Board to address stormwater pollution from new construction and redevelopment projects. The SUSMP requirements contain a list of minimum BMPs that must be employed to infiltrate or treat stormwater runoff, control peak flow discharge, and reduce the post-project discharge of pollutants from stormwater conveyance systems. SUSMP requirements include BMPs to decrease the effects of erosion. See Section 4.7, Hydrology and Water Quality for further discussion of the SUSMP.

Stormwater Pollution Prevention Plan (SWPPP). As part of the NPDES permitting system, an SWPPP is required to be prepared prior to the beginning of construction activities. The SWPPP specifies BMPs that will prevent construction pollutants from contacting stormwater with the intent of keeping all products of erosion from moving off-site into receiving waters. See Section 4.7, Hydrology and Water Quality for further discussion of the SWPPP.

EXISTING SETTING

SEISMICITY

The entire Southern California region is considered a seismically active region. Seismic events present the most widespread threat of devastation to life and property. With an earthquake, there is no containment of potential damage. Since 1800, there have been approximately 60 damaging seismic events, or earthquakes, in the Los Angeles Region; in 1857 one earthquake exceeded Richter magnitude 8.0. Since 1933, there have been four moderate-size earthquakes which have caused numerous deaths and substantial property damage in the metropolitan Los Angeles area. These four events are identified by their location as the Long Beach

(March 11, 1933; magnitude 6.3), San Fernando (February 9, 1971; magnitude 6.4), Whittier Narrows (October 1, 1987; magnitude 5.9), and Northridge (January 17, 1994; magnitude 6.7) earthquakes.

The Project Area is located within Seismic Zone 4, which the UBC defines as the zone with the highest potential for seismic hazards to occur. Seismic zones are based on a statistical compilation of the number and the magnitude of past earthquakes. Since the Project Area is within the seismically-active Southern California region, it may be exposed to strong ground shaking during a seismic event. Issues of concern relating to earthquakes include fault rupture, strong ground shaking, liquefaction, landslides, and tsunamis.

Faults. A fault is a fracture or line of weakness in the earth's crust, along which rocks on one side of the fault are offset relative to the same rocks on the other side of the fault. Based on criteria established by the CGS, faults may be categorized as active, potentially active, or inactive. Active faults are those that show evidence of surface displacement within the last 11,000 years (Holocene age). Potentially active faults are those that show evidence of displacement within the last 1.6 million years (Quaternary age). Faults showing no evidence of displacement within the last 1.6 million years may be considered inactive in most cases.

The Alquist-Priolo Act, passed in 1972, requires the State Geologist to establish regulatory zones known as "Earthquake Fault Zones" around the surface traces of active faults and to issue appropriate maps. Before a project can be permitted within an Alquist-Priolo Earthquake Fault Zone, the City of Los Angeles requires a geologic investigation to demonstrate that proposed building(s) will not be constructed across active faults. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back from the fault (at a minimum of 50 feet).

Many active earthquake fault zones are mapped in the Los Angeles area. Typically, they are visible, above ground faults, such as the San Andreas Fault. However, earthquakes along unmapped faults, such as the blind thrust fault associated with the Northridge earthquake, are increasingly becoming the focus of study and concern. These faults may dominate the geology of the Los Angeles Basin in a way not previously known. **Table 4.4-1** provides a summary of major active faults in Southern California.

TABLE 4.4-1: MAJOR NAMED ACTIVE FAULTS IN SOUTHERN CALIFORNIA

Fault	Maximum Magnitude	Slip Rate (mm/yr)	Type of Fault	Most Recent Seismic Event
Cabrillo	6.0 - 6.8	Uncertain	Right normal	Holocene
Cucamonga	6.0 - 7.0	5.0 - 14.0	Thrust	Holocene
Elsinore (Glen Ivy Segment)	6.8	5.0	Right lateral strike-slip	Late Quaternary
Hollywood	5.8 - 6.5	0.33 - 0.75	Left reverse	Holocene
Los Alamitos Thrust	Uncertain	Uncertain	Thrust	Uncertain
Malibu Coast	Uncertain	0.3	Reverse	Late Quaternary
Northridge Thrust	6.5 - 7.5	3.5 - 6.0	Thrust	1994
Newport-Inglewood	6.0 - 7.4	0.6	Right lateral	1933
Oak Ridge	6.5 - 7.5	3.5 - 6.0	Thrust	Holocene
Palos Verdes	6.0 - 7.0	0.1 - 3.0	Right reverse	Holocene
Raymond	6.0 - 7.0	0.1 - 0.22	Left lateral	Holocene
San Andreas (Southern Segment)	6.8 - 8.0	20.0 - 35.0	Right lateral strike-slip	1857
San Cayetano	6.5 - 7.3	1.3 - 9.0	Thrust	Uncertain
San Fernando	6.0 - 6.8	5.0	Thrust	1971
San Gabriel	Uncertain	1.0 - 5.0	Right-lateral strike-slip	Late Quaternary
San Jacinto (San Bernardino Segment)	6.5 - 7.5	7.0 - 17.0	Right lateral strike-slip	1968
Santa Monica	6.0 - 7.0	0.27 - 0.39	Left reverse	Late Quaternary
Sierra Madre	6.0 - 7.0	0.36 - 4.0	Reverse	Holocene
Simi-Santa Rosa	Uncertain	Uncertain	Reverse	Holocene
Verdugo	6.0 - 6.8	0.5	Reverse	Holocene
Whittier	6.0 - 7.2	2.5 - 3.0	Right lateral strike-slip	1987

SOURCE: Southern California Earthquake Data Center, *http://www.data.scec.org/significant/fault-index.html*, accessed March 1, 2017.

Four faults are located within two miles of the Project Area – the Overland Fault, Santa Monica Fault, Newport-Inglewood Fault and Charnock Fault (see **Figure 4.4-1**). A segment of the Overland Fault has been mapped within the Project Area, approximately one half mile southeast of the Westwood/Rancho Park Station. It extends from the northwest flank of Baldwin Hills to Santa Monica Boulevard in the vicinity of Overland Avenue. The next nearest fault to the Project Area is the Santa Monica Fault. This fault is located approximately one-quarter mile north of the Project Area and traverses east-west from the City of Beverly Hills area on the east to the Santa Monica coastline on the west.

A segment of the Newport-Inglewood Fault is located approximately one half mile southeast of the Culver City Station. This fault starts south of the City of Signal Hill, roughly parallels the coastline until just south of Newport Bay, where it heads offshore and becomes the Newport-Inglewood-Rose Canyon Fault Zone. A little further from the Project Area is the Charnock Fault. This fault is a northwest trending fault that runs parallel to the Overland Fault and the Newport-Inglewood Fault Zone and is approximately two miles south of the Project Area. **Figure 4.4-1** identifies the faults in the Southern California region, including the four faults in the vicinity of the Project Area.

Ground Failure. The principal seismic hazard occurring as a result of an earthquake produced by local faults is strong ground shaking. The intensity of ground shaking depends on several factors, including the magnitude of the earthquake, distance from the earthquake epicenter, and the underlying soil conditions. In general, the larger the magnitude of an earthquake and the closer a site to the epicenter of the event, the greater the effects will be. However, soil conditions can also amplify the earthquake shock waves. Generally, the shock waves remain unchanged in bedrock, are amplified to a moderate degree in thick alluvium, and are greatly amplified in thin alluvium, which is present in the Project Area.

Modern, well-constructed buildings are designed to resist ground shaking through the use of shear walls and reinforcements. The entire Southern California area, which includes the Project Area, is considered a seismically active region, and every building in the region is susceptible to ground shaking and earthquakes. The LABC includes regulations and requirements designed to reduce risks to life and property to the maximum extent feasible.

Liquefaction. Liquefaction involves the sudden loss of strength in saturated, cohesionless soils that are subjected to ground vibration and result in temporary transformation of the soil into a fluid mass. If the liquefying layer is near the surface, the effects are much like that of quicksand for any structures located on top of it. If the layer is deeper in the subsurface, it may provide a sliding surface for the material above it. The effects of liquefaction include the loss of the soil's ability to support footings and foundations, which can cause buildings and foundations to buckle. These failures were observed in the 1971 San Fernando and the 1994 Northridge earthquakes. Liquefaction-related phenomena include subsidence and lateral spreading. Subsidence is the gradual settling or sudden sinking of land due to movement or removal of underlying earth materials. Lateral spreading can occur on relatively shallow slopes. Liquefaction of shallow layers causes a loss of shear strength, allowing the surface to move laterally across gentle slopes. Areas with lateral spreading potential would most likely be adjacent to drainages where slopes are steepest and water may be more likely to accumulate.

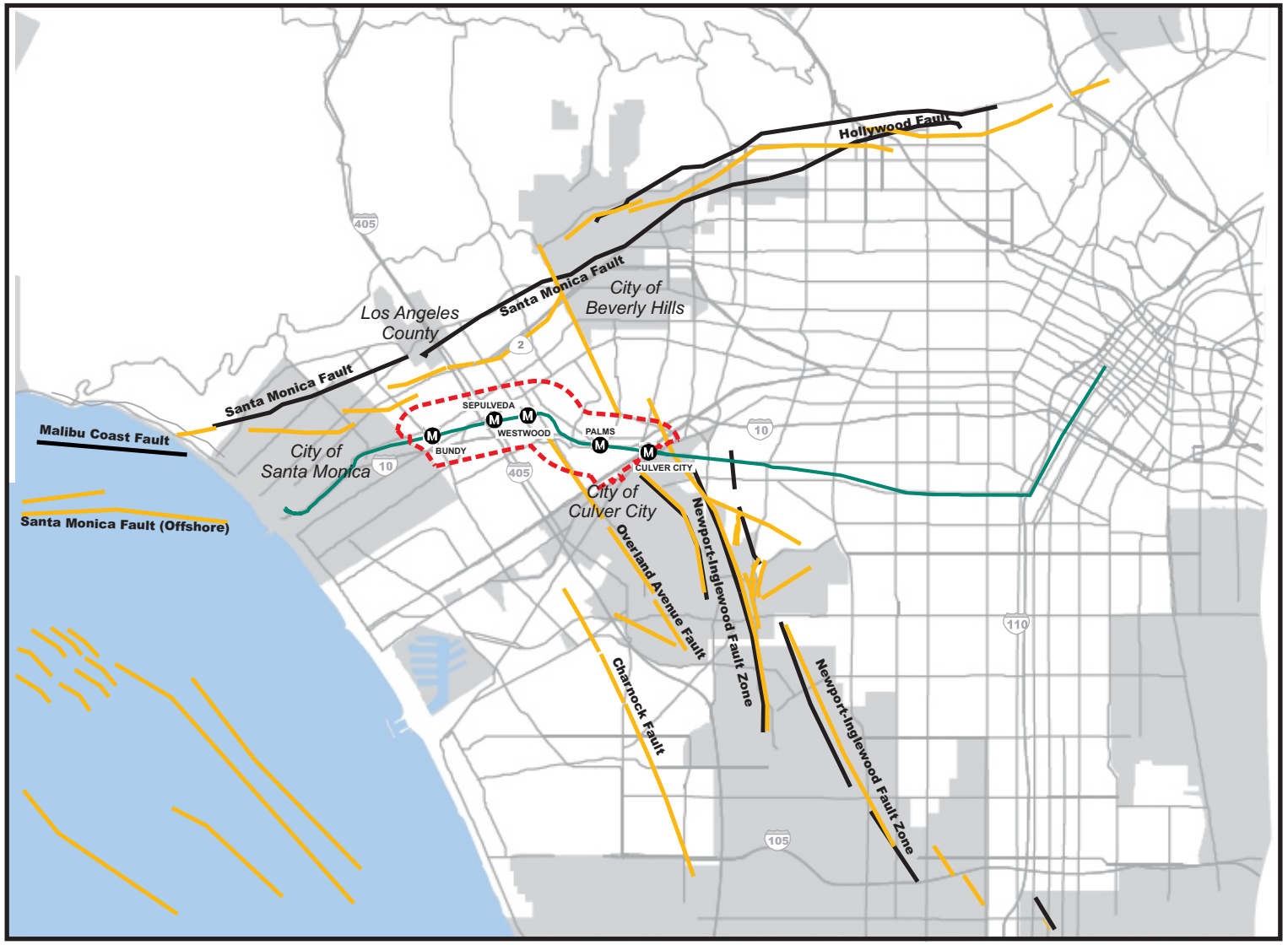
The Beverly Hills Quadrangle Seismic Hazard Zones Map prepared by the California Department of Conservation, Division of Mines and Geology identifies portions of the Project Area, including portions of the Bundy and Culver City Station areas, that are located in a liquefaction zone and is susceptible to liquefaction (**Figure 4.4-2**).[2]

[2]California Department of Conservation, Division of Mines and Geology, State of California, Seismic Hazard Zones, Beverly Hills Quadrangle, Official Map, released March 25, 1999.

Exposition Corridor Transit Neighborhood Plan

Figure 4.4-1 Active Faults

Los Angeles Department of City Planning



LEGEND:

- ECTNP Boundary
- Expo LRT
- Light Rail Station
- Major Faults
- Faults
- Cities and Unincorporated Areas Outside the City of Los Angeles Boundary

Approx. Scale

N

0 1.25 2.5 MILES

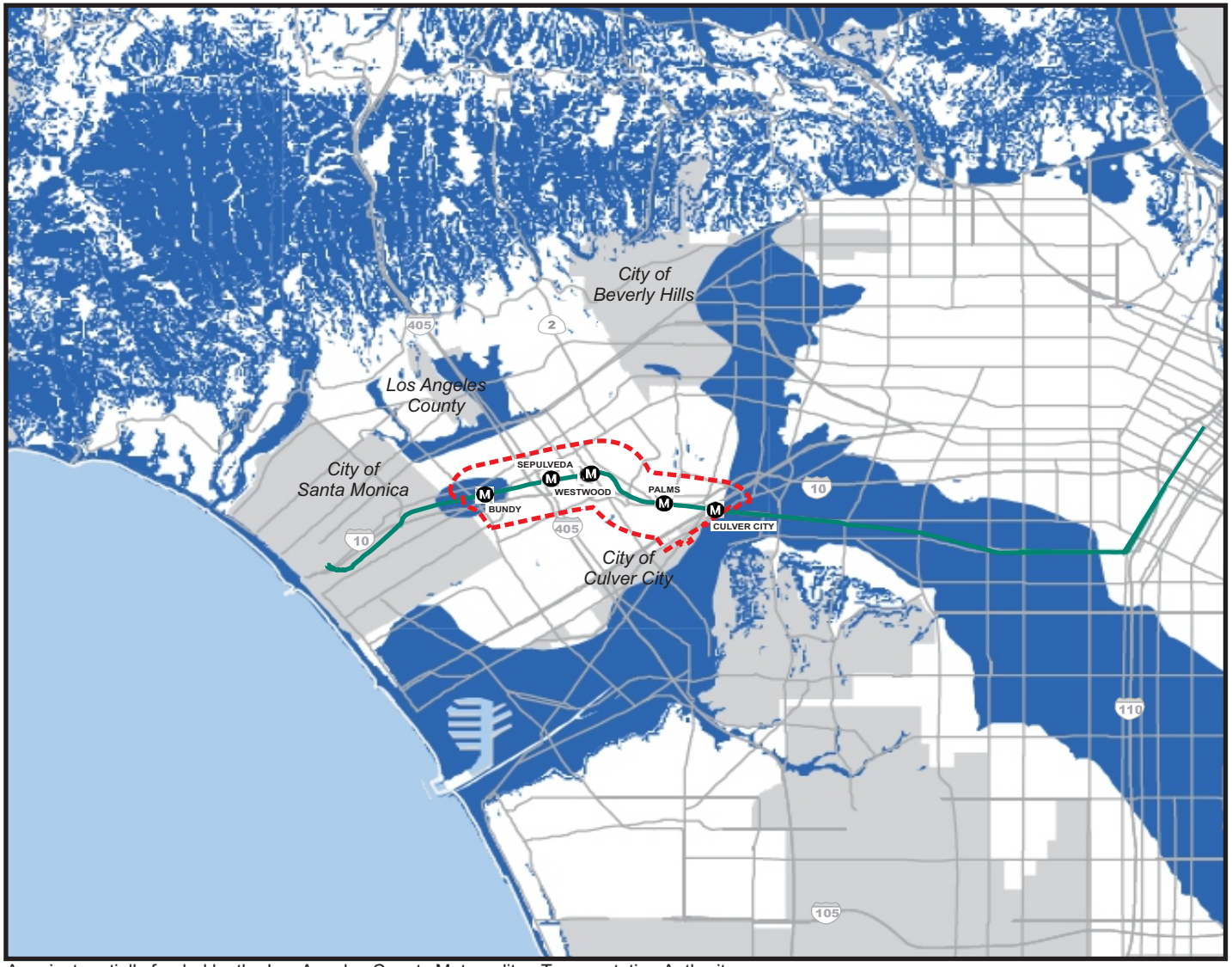
A project partially funded by the Los Angeles County Metropolitan Transportation Authority.

LOS ANGELES TRANSIT NEIGHBORHOOD PLAN

SOURCE: City of Los Angeles and TAHA, 2017.

Figure 4.4-2 Liquefaction Zones

Los Angeles Department of City Planning



LEGEND:

- ECTNP Boundary
- Expo LRT
- Light Rail Station
- Liquefaction Zones
- Cities and Unincorporated Areas Outside the City of Los Angeles Boundary

Approx. Scale

N

0 1.25 2.5 MILES

A project partially funded by the Los Angeles County Metropolitan Transportation Authority.

SOURCE: City of Los Angeles and TAHA, 2017.

Landslide. A landslide is a mass down-slope movement of earth materials under the influence of gravity, and includes a variety of forms including rockfalls, debris slides, mudflows, block slides, soil slides, slumps, and creeps. These mass movements are triggered or accelerated by earthquake-induced ground motion, increased water content, excessive surface loading, or alteration of existing slopes by man or nature. Earthquake-induced landslides, usually associated with steep canyons and hillsides, can originate on, or move down, slopes as gentle as one degree in areas underlain by saturated, sandy materials, such as alluvium, playa, and terrace which are present in the Project Area. The Project Area contains hills to the north of the Palms Station area in the Cheviot Hills neighborhood, north of I-10. According to the City's Safety Element, Exhibit C: Landslide Inventory and Hillside Areas in the City, the center of the Project Area is in an area where small shallow landslides could occur, as shown in **Figure 4.4-3**.[3] According to the Beverly Hills Quadrangle Seismic Hazard Zones Map, there is a small landslide zone area near Overland Avenue and I-10 within the Project Area (see **Figure 4.4-3**).[4]

Soil Erosion. Factors that contribute to potential soil erosion include climate, the physical characteristics of soils, topography, land use, and the amount of soil disturbance. Excessive soil erosion can eventually lead to damage of building foundations, roadways and dam embankments. Rates of erosion can vary depending on the soil material, structure, and placement by human activity. Erosion potential is also directly related to the terrain's steepness. While the Project Area contains the Cheviot Hills area north of the Palms Station area, no change is anticipated in that area. The actual potential for erosion is difficult to predict, as the conditions where erosion occurs are site-specific. LABC regulates grading, excavations, landfill, and other construction activities that might cause or be impacted by slope or ground instability, erosion, or flooding in hillside areas.

Unstable Soils. Under certain circumstances, strong ground shaking can cause densification or compaction of soils, resulting in local or regional settlement of the ground surface. This can result in local differential settlement and damage to foundations and structures, as well as damage to water and sewer lines. The potential for seismically-induced settlement to occur is controlled by the intensity and duration of ground shaking, and the relative density of the subsurface soils.[5]

The Project Area is composed of marine sedimentary rocks, specifically alluvium, lake, playa, and terrace.[6] Recently deposited alluvial sediments within the Project Area are potentially subject to seismically induced settlement.

Expansive Soils. Expansive soils are typically associated with fine-grained clayey soils that have the potential to shrink and swell with repeated changes in the moisture content. The ability of clayey soil to change volume can result in uplift or cracking to foundation elements or other rigid structures, such as slabs-on-grade, rigid pavements, sidewalks, or other slabs or hardscape located on these soils. Expansive soils, such as alluvium, which is clay and silt based, are present within the Project Area.

Septic Tanks. The Project Area is served by City-owned wastewater treatment and disposal facilities and does not utilize a septic system.[7]

[3]City of Los Angeles General Plan, *Safety Element*, 1996.

[4]California Department of Conservation, Division of Mines and Geology, State of California, S*eismic Hazard Zones,* Beverly Hills Quadrangle, Official Map, Released March 25, 1999.

[5]Relative density is the ratio between the in-place density and the maximum density.

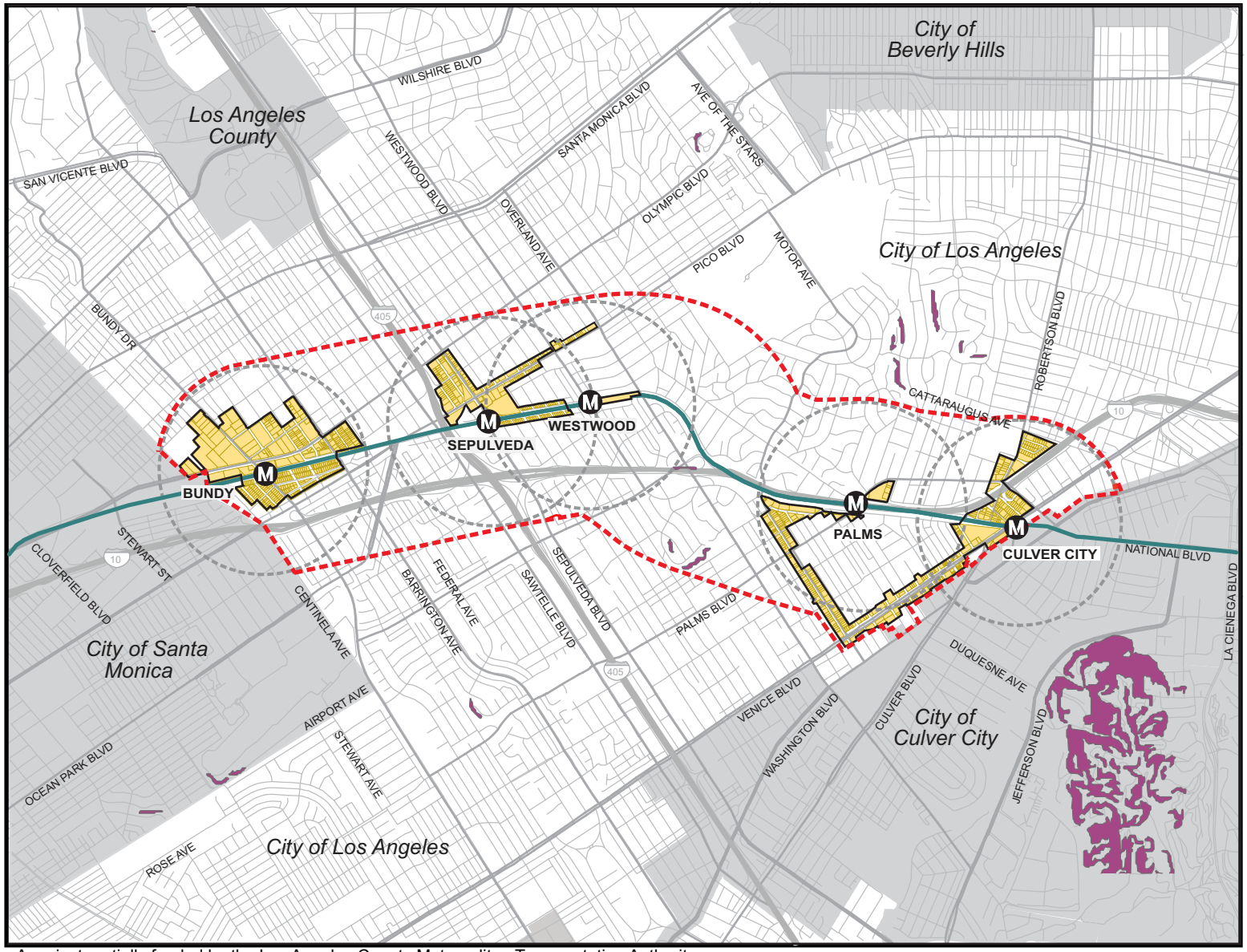
[6]State of California, Department of Conservation, *2010 Geologic Map of California*, http://maps.conservation.ca.gov/cgs/gmc/, accessed March 1, 2017.

[7]City of Los Angeles, *On-Site Wastewater Treatment Systems*, https://www.lacitysan.org/san/faces/home/portal/s-lsh-wwd/s-lsh-wwd-cw/s-lsh-wwd-cw-ssps/s-lsh-wwd-cw-ssps-owts?_adf.ctrl-state=opu7a1vkt_70&_afrLoop=17081135348814452&_afrWindowMode=0&_afrWindowId=opu7a1vkt_67#!, accessed March 1, 2017.

Exposition Corridor Transit Neighborhood Plan

Figure 4.4-3 Landslide Zones

Los Angeles Department of City Planning



LEGEND:

- ECTNP Boundary
- Expo LRT
- Light Rail Station
- 0.5-Mile Radius
- Landslide Zones
- Areas of Proposed Change/ Subareas
- Jurisdictional Boundary

Approx. Scale

N

0 0.35 0.7 MILES

A project partially funded by the Los Angeles County Metropolitan Transportation Authority.

SOURCE: Department of Conservation, State Hazard Mapping, City of Los Angeles and TAHA, 2017.

2012-058

LOS ANGELES TRANSIT NEIGHBORHOOD PLAN

THRESHOLDS OF SIGNIFICANCE

In accordance with Appendix G of the CEQA Guidelines, the Proposed Project would have a significant impact related to geology and soils 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 Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
  - Strong seismic ground shaking;
  - Seismic-related ground failure, including liquefaction;
  - Landslides;
- Be located on a geologic unit 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 Uniform Building Code (1994), creating substantial risks to life or property;
- Result in substantial soil erosion or the loss of topsoil; and/or
- Have soils capable 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.

CITY OF LOS ANGELES CEQA THRESHOLDS GUIDELINES

In addition, based on the criteria set forth in the 2006 Los Angeles CEQA Thresholds Guide (Thresholds Guide), the determination of significance shall be made on a case-by-case basis, considering the following factors.

The Proposed Project would have a significant impact on geologic hazards if:

- The project causes or accelerates geologic hazards which would result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury.

The Proposed Project would have a significant impact on sedimentation and erosion if:

- The project causes or accelerates instability from erosion so as to result in a geologic hazard to other properties; or
- The project accelerates natural processes of wind and water erosion and sedimentation, resulting in sediment runoff or deposition which would not be contained or controlled on-site.

The following threshold is discussed in Section 4.1, Aesthetics. The Proposed Project would have a significant impact on landform alteration if:

- One or more distinct and prominent geologic or topographic features would be destroyed, permanently covered, or materially and adversely modified. Such features may include, but are not limited to, hilltops, ridges, hill slopes, canyons, ravines, rock outcrops, water bodies, streambeds, and wetlands.

METHODOLOGY

This analysis uses Appendix G thresholds to make a significance determination, which is supplemented by screening criteria found in the City's Thresholds Guide for additional guidance as appropriate. The Thresholds Guide sets forth guidance for the determination of significance of geology and soils impacts. This guidance is based on Appendix G of the CEQA Guidelines and provides specific criteria to be considered when making a significance determination. In some cases, the Thresholds Guide includes quantitative

thresholds. For purposes of this analysis, the Thresholds Guide criteria are used, supplemented by the thresholds identified in Appendix G of the CEQA Guidelines, where appropriate.

The Proposed Project would not have a direct effect related to geologic and soils conditions, but development that is likely to occur as a result of the Proposed Project could be subject to geologic or soils hazards. However, a recent court case[8] found that how existing environmental conditions impact a project's future users or residents, is not required to be analyzed in CEQA documents unless a project exacerbates existing risk. The Proposed Project would not change existing risks associated with existing geologic or soils conditions. Nonetheless, for informational purposes, baseline information was compiled from a review of published geologic maps and reports, as well as information compiled and evaluated by the City of Los Angeles in conjunction with its overall planning and hazard mitigation processes to identify geologic conditions and geologic hazards in the Project Area

Potential hazards associated with geologic and soils conditions, as well as regular oil and surface mining, are well regulated by the state and City. The design-controllable aspects of building foundation support, protection from seismic ground motion, and soil instability are governed by existing regulations. The analysis presented herein assumes compliance with all applicable laws, regulations, and standards.

This discussion of geology and soils addresses impacts within the entire Project Area. No distinction is made between areas of change and areas within the Project Area, where zoning controls would not change, because potential impacts related to geology and soils are generally site-specific and not based on whether future development projects are located within or outside of the change areas.

IMPACTS

The Proposed Project would establish a Specific Plan and initiate zone changes, General Plan amendments, and introduce development and urban design standards. The Proposed Project would also involve new streetscape plans that enhance the pedestrian experience, promote transit ridership, and encourage a variety of mobility options. Zone Changes and General Plan amendments would not occur on every parcel within the Project Area; changes would only occur within specific "areas of proposed change," also known as "Subareas" in the Proposed Plan. While there are geology and soil impacts to consider within the Project Area, future development is subject to the federal, state, and local policies and guidelines mentioned above.

IMPACT 4.4-1 WOULD IMPLEMENTATION OF THE PROPOSED PROJECT CAUSE OR ACCELERATE GEOLOGIC HAZARDS THAT WOULD EXPOSE PEOPLE OR STRUCTURES TO POTENTIAL SUBSTANTIAL ADVERSE EFFECTS, INCLUDING THE RISK OF LOSS, INJURY, OR DEATH, INVOLVING THE RUPTURE OF A KNOWN EARTHQUAKE FAULT? THE PROPOSED PROJECT WOULD NOT EXACERBATE EXISTING GEOLOGIC CONDITIONS AND THEREFORE THERE WOULD BE NO IMPACT ASSOCIATED WITH THIS ISSUE. COMPLIANCE WITH EXISTING CALIFORNIA BUILDING CODE AND CITY OF LOS ANGELES BUILDING CODE REGULATIONS WOULD MINIMIZE RISK.

The Project Area is located within Seismic Zone 4, which the UBC defines as the zone with the highest potential for seismic hazards to occur. The Proposed Project would not exacerbate existing conditions and therefore, as noted above, CEQA does not require an analysis of the environment's impact on the project, this discussion is provided for informational purposes. There are four faults, the Overland, Santa Monica, Newport-Inglewood, and Charnock faults, within two miles of the Project Area. However, none of these faults traverse any of the areas of proposed change. In addition, due to the high potential for seismic hazards, all development in the Los Angeles area, including development that would occur under the Proposed

[8] *California Building Industry Association v. Bay Area Air Quality Management District* (2015), Cal.4th (Case No. S213478)

Project, would be required to adhere to the current seismic design requirements of the CBC and the LABC, which ensure new buildings are designed to withstand seismic events through modern construction techniques. Thus, the Proposed Project would not cause or accelerate substantial damage to structures or infrastructure, or expose people to substantial risk of loss, injury, or death involving a known earthquake fault. Therefore, the Proposed Project would result in no impacts related to fault rupture.

MITIGATION MEASURES

The Proposed Project would not exacerbate existing conditions with respect to risks associated with fault rupture. No mitigation measures are required.

SIGNIFICANCE OF IMPACTS AFTER MITIGATION

No impacts related to fault rupture were identified to result from the Proposed Project.

IMPACT 4.4-2 WOULD IMPLEMENTATION OF THE PROPOSED PROJECT CAUSE OR ACCELERATE GEOLOGIC HAZARDS THAT WOULD EXPOSE PEOPLE OR STRUCTURES TO POTENTIAL SUBSTANTIAL ADVERSE EFFECTS, INCLUDING THE RISK OF LOSS, INJURY, OR DEATH FROM STRONG SEISMIC GROUND SHAKING? THE PROPOSED PROJECT WOULD NOT AFFECT EXISTING GEOLOGIC CONDITIONS AND THEREFORE THERE WOULD BE NO IMPACT ASSOCIATED WITH POSSIBLE GROUND SHAKING. COMPLIANCE WITH EXISTING CALIFORNIA BUILDING CODE AND CITY OF LOS ANGELES BUILDING CODE REGULATIONS WOULD MINIMIZE RISKS.

As noted above, the Project Area is located in the seismically active region of Southern California and would likely be subjected to strong ground shaking during the life of the Proposed Project. While the proposed zoning changes would increase development capacity in the identified subareas of the Project Area, thereby potentially increasing the number of people and structures exposed to strong seismic ground shaking, the Proposed Project would not cause or accelerate existing geologic hazards. This condition exists throughout the Los Angeles area given that it is a seismically active area. The Proposed Project would not exacerbate existing conditions and therefore, as noted above, CEQA does not require an analysis of the environment's impact on the project, this discussion is provided for informational purposes. As discussed above, any new development in the State of California would be required to conform to the current seismic design provisions to ensure new buildings are designed to resist ground shaking through modern construction techniques. Therefore, with compliance with the CBC, the LABC, and Policy 1.1.6 of the Safety Element of the General Plan (as described in the Regulatory Framework, above), the Proposed Project would not change existing conditions with respect to risks associated with seismic ground shaking. Therefore, the Proposed Project would result in no impacts related to ground shaking.

MITIGATION MEASURES

The Proposed Project would not exacerbate existing conditions with respect to risks associated with ground shaking. No mitigation measures are required.

SIGNIFICANCE OF IMPACTS AFTER MITIGATION

No impacts related to seismic ground shaking were identified to result from the Proposed Project.

IMPACT 4.4-3 WOULD IMPLEMENTATION OF THE PROPOSED PROJECT CAUSE OR ACCELERATE GEOLOGIC HAZARDS THAT WOULD EXPOSE PEOPLE OR STRUCTURES TO POTENTIAL SUBSTANTIAL ADVERSE EFFECTS, INCLUDING THE RISK OF LOSS, INJURY, OR DEATH FROM SEISMIC-RELATED GROUND FAILURE, INCLUDING LIQUEFACTION? THE PROPOSED PROJECT WOULD NOT EXACERBATE EXISTING GEOLOGIC AND SOIL CONDITIONS AND THEREFORE THERE WOULD BE NO IMPACT ASSOCIATED WITH LIQUEFACTION. COMPLIANCE WITH EXISTING CALIFORNIA BUILDING CODE AND CITY OF LOS ANGELES BUILDING CODE REGULATIONS WOULD MINIMIZE RISKS.

As shown in **Figure 4.4-2** above, portions of the Project Area, including portions of the Bundy and Culver City Station areas are located within a liquefaction zone. The areas of proposed change around the Bundy Station, which are subject to potential liquefaction, are currently developed with existing structures. While the ECTNP would involve the redevelopment of these areas, it would not cause or accelerate geologic hazards which are common to areas throughout the City and region due to its seismically active nature. The Proposed Project would not exacerbate existing conditions and therefore, as noted above, CEQA does not require an analysis of the environment's impact on the project, this discussion is provided for informational purposes. Prior to construction of new structures in liquefaction-prone areas, a site-specific geotechnical evaluation is required as specified by PRC Section 2697 that would specifically address and include measures to minimize liquefaction. The City also requires that site-specific geotechnical analysis be undertaken to address geologic and soil issues, such as liquefaction. Required compliance with recommendations identified in the project-specific geotechnical evaluation, the LABC, and any specific requirements established by the Los Angeles Department of Public Works (LADPW) and/or the City's Engineer would ensure that future development would not be exposed to substantial risks associated with liquefaction. Compliance with the CBC, the LABC, and Policy 1.1.6 of the Safety Element of the General Plan (as described in the Regulatory Framework, above) would minimize risks associated with existing geology. Therefore, the Proposed Project would result in no impacts related to liquefaction.

MITIGATION MEASURES

The Proposed Project would not exacerbate existing conditions with respect to risks associated with liquefaction. No mitigation measures are required.

SIGNIFICANCE OF IMPACTS AFTER MITIGATION

No impacts related to liquefaction were identified to result from the Proposed Project.

IMPACT 4.4-4 WOULD IMPLEMENTATION OF THE PROPOSED PROJECT CAUSE OR ACCELERATE GEOLOGIC HAZARDS THAT WOULD EXPOSE PEOPLE OR STRUCTURES TO POTENTIAL SUBSTANTIAL ADVERSE EFFECTS, INCLUDING THE RISK OF LOSS, INJURY, OR DEATH FROM SEISMIC-RELATED GROUND FAILURE, INCLUDING LANDSLIDES? THE PROPOSED PROJECT WOULD NOT EXACERBATE EXISTING GEOLOGIC CONDITIONS AND THEREFORE THERE WOULD BE NO IMPACT ASSOCIATED WITH GROUND FAILURE. COMPLIANCE WITH EXISTING CALIFORNIA BUILDING CODE AND CITY OF LOS ANGELES BUILDING CODE REGULATIONS WOULD MINIMIZE RISKS.

As shown in **Figure 4.4-3**, above, the central portion of the ECTNP is susceptible to landslides. The Proposed Project would change the zoning and could encourage growth in landslide areas; however, the Proposed Project would not exacerbate the existing conditions. As noted above, CEQA does not require an analysis of the environment's impact on the project, this discussion is provided for informational purposes. Each new development within the landslide area would have the potential to contain expansive soils but again, the Proposed Project would not exacerbate existing conditions. Expansive soils are generally removed during foundation work to avoid structural damage and may have already been removed by previous

development. Additionally, the City requires that specific geotechnical reports are required to address geologic and soil issues, such as landslide potential. Compliance with the CBC, the LABC, and Policy 1.1.6 of the Safety Element of the General Plan (as described in the Regulatory Framework, above) would minimize risks. Therefore, the Proposed Project would result in no impacts related to landslides and/or expansive soils.

MITIGATION MEASURES

The Proposed Project would not exacerbate conditions with respect to ground failure. No mitigation measures are required.

SIGNIFICANCE OF IMPACTS AFTER MITIGATION

No impacts related to ground failure were identified to result from the Proposed Project.

IMPACT 4.4-5 WOULD IMPLEMENTATION OF THE PROPOSED PROJECT BE LOCATED ON GEOLOGIC UNIT 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? THE PROPOSED PROJECT WOULD NOT EXACERBATE EXISTING GEOLOGIC CONDITIONS AND THEREFORE THERE WOULD BE NO IMPACT ASSOCIATED WITH GROUND FAILURE. COMPLIANCE WITH EXISTING CALIFORNIA BUILDING CODE AND CITY OF LOS ANGELES BUILDING CODE REGULATIONS WOULD MINIMIZE RISKS.

See Impact 4.4-3 for a discussion of liquefaction and Impact 4.4-4 for a discussion of landslides. Future development occurring under the Proposed Project could take place on unstable soils, such as alluvium, which is present in the Project Area. The Proposed Project would not exacerbate existing conditions and therefore, as noted above, CEQA does not require an analysis of the environment's impact on the project, this discussion is provided for informational purposes.

Future development on marine sedimentary rocks, specifically alluvium, lake, playa, and terrace, is potentially subject to seismically induced settlement and could result in lateral spreading, subsidence, liquefaction, or collapse, particularly around the Bundy and Culver City Stations, which are located in a liquefaction zone and where the water table is high. As previously stated, the City requires the approval of a site-specific geotechnical report, required under PRC Section 2697, for new developments where unstable soils may be indicated. In addition, all earthwork and grading activities require grading permits from the LADBS that include requirements and standards designed to limit potential impacts related to soil instability. Compliance with the recommendations of required project-specific geotechnical reports and the LABC, which addresses grading, excavation, and fill, as well as with any specific requirements established by the LADPW and/or the City Engineer would reduce hazards related to unstable soils. Compliance with the CBC, the LABC, and Policy 1.1.6 of the Safety Element of the General Plan (as described in the Regulatory Framework, above) would minimize risks. Therefore, the Proposed Project would result in no impacts related to geologic conditions.

MITIGATION MEASURES

The Proposed Project would not exacerbate existing unstable geologic conditions. No mitigation measures are required.

SIGNIFICANCE OF IMPACTS AFTER MITIGATION

No impacts related to existing unstable geologic conditions were identified to result from the Proposed Project.

IMPACT 4.4-6 WOULD IMPLEMENTATION OF THE PROPOSED PROJECT LEAD TO CONSTRUCTION ON EXISTING EXPANSIVE SOILS, AS DEFINED IN TABLE 18-1-B OF THE UNIFORM BUILDING CODE (1994), CREATING SUBSTANTIAL RISKS TO LIFE OR PROPERTY? THE PROPOSED PROJECT WOULD NOT EXACERBATE EXISTING SOIL CONDITIONS AND THEREFORE THERE WOULD BE NO IMPACT ASSOCIATED WITH EXPANSIVE SOILS. COMPLIANCE WITH CALIFORNIA BUILDING CODE AND CITY OF LOS ANGELES BUILDING CODE REGULATIONS WOULD MINIMIZE RISKS.

While the Proposed Project may result in redevelopment in areas of expansive soils such as alluvium, it would not create substantial risks to life and property. The Proposed Project would not exacerbate existing conditions and therefore, as noted above, CEQA does not require an analysis of the environment's impact on the project; this discussion is provided for informational purposes. The City requires the preparation, review, and approval of geotechnical reports for new development required under PRC Section 2697. In addition, all earthwork and grading activities require grading permits from the LADBS, compliance with the LAMC, and adherence to the recommendations of a site-specific geotechnical report. Therefore, with compliance with the existing codes and requirements, the Proposed Project would result in no impacts related to expansive soil.

MITIGATION MEASURES

The Proposed Project would not exacerbate existing expansive soils. No mitigation measures are required.

SIGNIFICANCE OF IMPACTS AFTER MITIGATION

No impacts related to existing expansive soils were identified to result from the Proposed Project.

IMPACT 4.4-7 WOULD IMPLEMENTATION OF THE PROPOSED PROJECT RESULT IN SUBSTANTIAL SOIL EROSION OR THE LOSS OF TOPSOIL? THIS IMPACT WOULD BE LESS THAN SIGNIFICANT WITH COMPLIANCE WITH EXISTING CALIFORNIA BUILDING CODE AND CITY OF LOS ANGELES BUILDING CODE REGULATIONS.

Implementation of the Proposed Project would increase development capacity in the areas of proposed change, which could result in increased grading and subsequent erosion and loss of topsoil within these areas. However, all future construction within these areas of proposed change that would involve earthwork and grading activities would be required to obtain grading permits from the LADBS that include requirements and standards designed to limit potential impacts related to soil erosion. Projects would also be required to comply with the City's Low Impact Development Ordinance (See Section 4.7, Hydrology and Water Quality). All on-site grading and site preparation must comply with applicable provisions of the LABC, which addresses grading, excavation, and fill, as well as recommendations of a site-specific geotechnical report which is required under PRC Section 2697.

Compliance with the City's codes, regulatory requirements, standard grading and building permit requirements, and the application of best management practices would ensure that potential impacts from erosion or loss of top soils would be less than significant. Therefore, the Proposed Project would result in less than significant impacts related to soil erosion and the loss of topsoil.

MITIGATION MEASURES

Impacts related to soil erosion and the loss of topsoil would be less than significant under the Proposed Project. No mitigation measures are required.

SIGNIFICANCE OF IMPACTS AFTER MITIGATION

Impacts related to soil erosion and the loss of topsoil under the Proposed Project would be less than significant without mitigation.

IMPACT 4.4-8 WOULD IMPLEMENTATION OF THE PROPOSED PROJECT INVOLVE THE USE OF SEPTIC TANKS OR ALTERNATIVE WASTE WATER DISPOSAL SYSTEM AND, THEREFORE, RESULT IN HAZARDS RELATED TO CONSTRUCTION ON SOILS INCAPABLE OF ADEQUATELY SUPPORTING THE USE OF SEPTIC TANKS OR ALTERNATIVE WASTE WATER DISPOSAL SYSTEMS? NO IMPACTS WOULD OCCUR.

The Project Area, including the areas of proposed change, is currently served by City-owned wastewater treatment and disposal facilities and does not utilize a septic system. Therefore, no impacts related to soil stability around septic tanks or alternative waste water disposal system would occur.

MITIGATION MEASURES

No impacts related to soil stability around septic tanks or alternative waste water disposal system would occur under the Proposed Project. No mitigation measures are required.

SIGNIFICANCE OF IMPACTS AFTER MITIGATION

No impacts related to septic tanks would occur under the Proposed Project.