5.6 GEOLOGY AND SOILS

This section of the Draft Environmental Impact Report (DEIR) evaluates the potential for implementation of the Southeast Area Specific Plan to impact geological and soil resources in the City of Long Beach. The analysis in this section is based in part on the following technical report:

- *Summary of Geotechnical Conditions for the Southeast Area Specific Plan (SEASP), City of Long Beach, California*, LGC Geotechnical, Inc., March 8, 2016.

Complete copies of these studies are included in the Appendix F of this Draft EIR.

5.6.1 Environmental Setting

5.6.1.1 REGULATORY BACKGROUND

State laws, regulations, plans, or guidelines that are potentially applicable to the proposed project are summarized below.

State

California Alquist-Priolo Earthquake Fault Zoning Act

The California Alquist-Priolo Earthquake Fault Zoning Act was signed into state law in 1972, and amended, with its primary purpose being to mitigate the hazard of fault rupture by prohibiting the location of structures for human occupancy across the trace of an active fault. This act (or state law) was a direct result of the 1971 San Fernando Earthquake, which caused extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. The act requires the State Geologist (California Geologic Survey) to delineate regulatory zones known as "earthquake fault zones" along faults that are "sufficiently active" and "well defined," and to issue and distribute appropriate maps to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Pursuant to this act and as stipulated in Section 3603(a) of the California Code of Regulations, structures for human occupancy are not permitted to be placed across the trace of an active fault. The act also prohibits structures for human occupancy within 50 feet of the trace of an active fault, unless it is proven by an appropriate geotechnical investigation and report that the development site is not underlain by active branches of the active fault, as stipulated in Section 3603(a) of the California Code of Regulations. Furthermore, the act requires that cities and counties withhold development permits for sites within an earthquake fault zone until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting, as stipulated in Section 3603(d) of the California Code of Regulations.

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GEOLOGY AND SOILS

Seismic Hazard Mapping Act

The Seismic Hazard Mapping Act was adopted by the state in 1990 to protect the public from the effects of earthquake hazards other than surface fault rupture, including strong ground shaking, liquefaction, seismically induced landslides, or other ground failure. The goal of the act is to minimize loss of life and property by identifying and mitigating seismic hazards. The California Geological Survey prepares and provides local governments with maps of seismic hazard zones that identify areas susceptible to amplified shaking, liquefaction, earthquake-induced landslides, and other ground failures.

California Building Code

The state regulations protecting human-occupied structures from geoseismic hazards are provided in the most recent (2013) California Building Code (CBC; California Code of Regulations, Title 24, Part 2) and California Residential Code (CRC; California Code of Regulations, Title 24, Part 2.5). Cities and counties were required to enforce the regulations of the CBC and CRC beginning January 1, 2014. The CBC (adopted by reference in Chapter 18.40 [Building Code] of the City's municipal code) and CRC (adopted by reference in Chapter 18.41 [Residential Code] of the City's municipal code) contain provisions to safeguard against major structural failures or loss of life caused by earthquakes or other geologic hazards. For example, the CBC contains provisions for earthquake safety based on factors including occupancy type, the types of soil and rock onsite, and the strength of ground motion with specified probability of occurring at the site. These codes provide minimum standards to protect property and public safety by regulating the design and construction of excavations, foundations, building frames, retaining walls, and other building elements to mitigate the effects of seismic shaking and adverse soil conditions. The procedures and limitations for the design of structures are based on site characteristics, occupancy type, configuration, structural system height, and the strength of ground motion with specified probability of occurring at the site.

Requirements for Geotechnical Investigations

Requirements for geotechnical investigations are included in Appendix J, Section J104 (Engineered Grading Requirements) of the CBC. As outlined in Section J104, applications for a grading permit are required to be accompanied by plans, specifications, and supporting data consisting of a soils engineering report and engineering geology report. Additional requirements for subdivisions requiring tentative and final maps and for other specified types of structures are in California Health and Safety Code Sections 17953 to 17955 and in Section 1802 of the 2013 CBC. Testing of samples from subsurface investigations is required, such as from borings or test pits. Studies must be done as needed to evaluate slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on load-bearing capacity, compressibility, liquefaction, differential settlement, and expansiveness.

Local

City of Long Beach

The City of Long Beach adopted the most recent (2013) CBC and (2013) CRC by reference, with certain amendments, into Chapter 18.40 (Building Code) and Chapter 18.41 (Residential Code), respectively, of the City's municipal code.

5.6.1.2 EXISTING CONDITIONS

Regional Setting

The Project site is in the Los Angeles Basin, a coastal plain at the north end of the Peninsular Ranges Geomorphic Province. The Peninsular Ranges Geomorphic Province is characterized by mountain ranges separated by northwest-trending valleys, and it extends from southwestern California south into Mexico. The Los Angeles Basin is bounded by the Santa Monica Mountains and San Gabriel Mountains on the north, the Santa Ana Mountains on the east, and the Pacific Ocean on the south and west. The Santa Monica Mountains and San Gabriel Mountains are part of the Transverse Ranges Geomorphic Province, an east-west-trending series of steep mountain ranges and valleys extending from Santa Barbara County in the west to central Riverside County in the east.

Project Site

Topography

The Project area is relatively flat and does not contain any significant elevation changes. The Project area slopes from the northwest at approximately 80 feet above mean sea level (amsl) to the south and southeast to 9 feet amsl. Elevations at the wetlands area are from 5 to 10 feet amsl.

Geologic Units

The site is underlain primarily by artificial fill with lesser amounts of Quaternary Young Alluvial Fan Deposits and Quaternary Old Paralic Deposits (see Figure 5.6-1, *Geologic Map*).[1] Artificial fill, consisting of engineered and nonengineered fill materials, is the result of human activities, including mining, quarrying, land development, and construction. It is anticipated that these artificial fill materials are relatively shallow (less than ten feet in thickness). Quaternary Young Alluvium is in the northeastern corner of the subject site and most likely underlies the majority of the mapped artificial fill. These materials generally consist of poorly consolidated clay and silt. Quaternary Old Paralic Deposits overlie the wave-cut platforms that have been preserved by regional uplift and are

[1] The Quaternary Period extends from about 2.6 million years ago to the present. Paralic deposits consist of interfingered continental and marine sediments.

in the northern portion of the site. These deposits generally consist of poorly sorted, interfingered deposits of siltstone, sandstone, and conglomerate.

Groundwater

The project site is above the Los Angeles West Coast and Los Angeles Central groundwater basins. The historical high groundwater levels under the site range from 3 to 20 feet below ground surface (LGC Geotechnical 2016).

Geologic and Seismic Hazards

Faults

Faults showing evidence of surface displacement within the last 11,000 years are classified as active by the California Geological Survey.

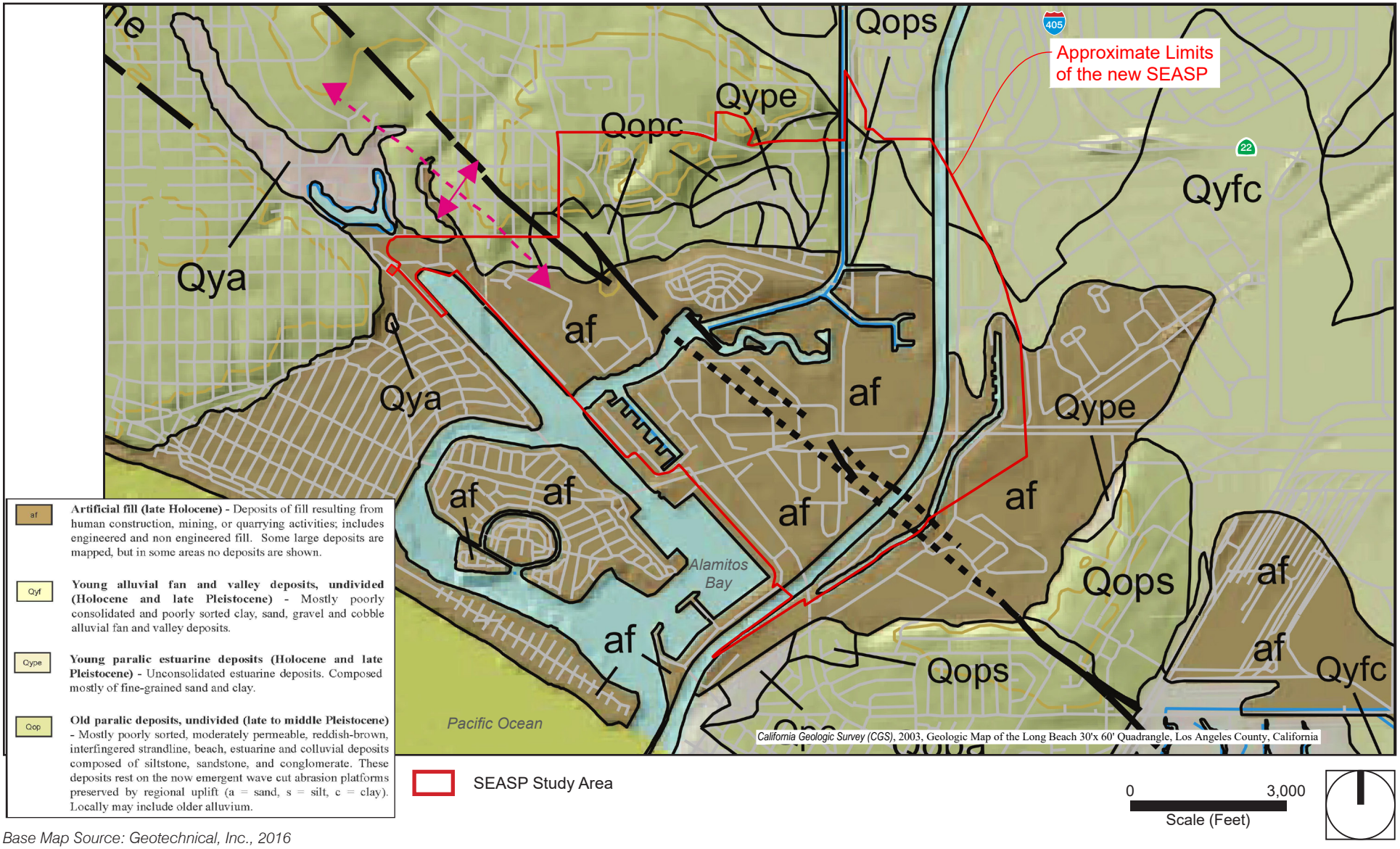
The Newport-Inglewood Fault Zone, composed of several individual faults and considered active, extends northwest-southeast through the southwest half of the site. The Newport-Inglewood Fault Zone extends about 47 miles from the City of Culver City southeast, extending offshore; the offshore segment of the fault is known as the Newport-Inglewood – Rose Canyon Fault (SCEDC 2014a). An earthquake fault zone is a regulatory zone around active faults; the fault zones vary in width, but average about one-quarter mile wide. The Alquist-Priolo Earthquake Fault Zone is designated around the fault and shown in Figure 5.6-2, *Alquist-Priolo Earthquake Fault Zone*. Existing land uses with in this area include residential, hotel, wetlands, and oil operations.

Other active faults in the region include the Palos Verdes Fault Zone, offshore about 7.5 miles to the southwest, and the Whittier Fault about 15.2 miles to the north-northeast (CGS 2016).

Historical Earthquakes

The energy released by an earthquake is measured as moment magnitude. The moment magnitude scale is logarithmic; therefore, each one-point increase in magnitude represents a tenfold increase in amplitude of the waves as measured at a specific location and a 32-fold increase in energy. A magnitude 7 earthquake produces 100 times (10 x 10) the ground motion amplitude of a magnitude 5 earthquake.

Figure 5.6-1 - Geologic Map
5. Environmental Analysis



Base Map Source: Geotechnical, Inc., 2016

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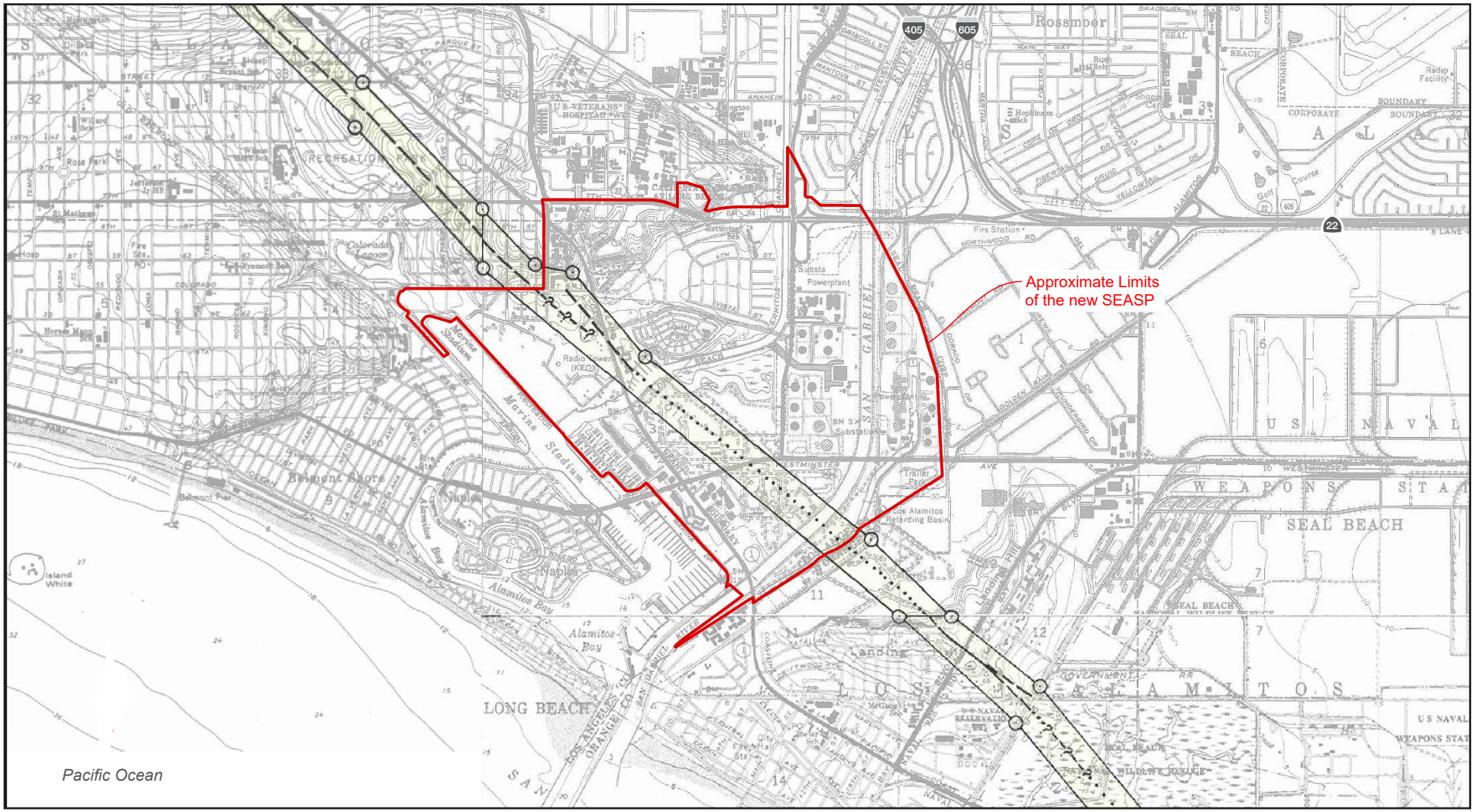
Figure 5.6-2 - Alquist-Priolo Earthquake Fault Zone

5. Environmental Analysis



Base Map Source: Geotechnical, Inc., 2016

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Long Beach Earthquake

The Long Beach Earthquake of 1933, which occurred on the Newport-Inglewood Fault and had a magnitude estimated at 6.4, caused 120 deaths and over $50 million in property damage. Severe property damage occurred in Compton, Long Beach, and other cities in the area. Most of the damage was due to land fill, deep water-soaked alluvium or sand, and poorly-designed buildings. Minor disturbances of groundwater, secondary cracks in the ground, and slight earth slumps occurred, but surface faulting was not observed. Along the shore between Long Beach and Newport Beach, the settling or lateral movement of road fills across marshy land caused much damage to the concrete highway surfaces and to approaches to highway bridges.

In Compton, almost every building in a three-block radius on unconsolidated material and land fill was destroyed. In Long Beach, buildings collapsed, houses were pushed from foundations, walls were knocked down, and tanks and chimneys fell through roofs (NEIC 2014). Many school buildings were destroyed, but students were not at school when the 5:54 PM quake occurred. The earthquake led to passage of the Field Act regulating construction of public school buildings in California (SCEDC 2014b).

Other notable historic earthquakes within 50 miles of the site within the last 50 years include the Northridge Earthquake of 1994 and the San Fernando Earthquake of 1971. The Northridge Earthquake caused 61 deaths, and the San Fernando Earthquake 65 deaths (SCEDC 2015).

Surface (Fault) Rupture

The Newport-Inglewood Fault Zone, considered active, passes through the project site in a northwest-southeast direction. Evidence of surface displacement within the last 11,000 years has been identified in subsurface trenches across several branches of the Newport-Inglewood Fault (City of Long Beach 1988).

Strong Seismic Ground Shaking

The peak horizontal ground acceleration estimated to have a 10 percent chance of exceedance in 50 years, that is, an average return period of 475 years, is 0.5 g, where g is the acceleration of gravity. Ground acceleration of 0.5 g correlates with intensity VIII on the Modified Mercalli Intensity (MMI) Scale (Wald 1999), a subjective scale of how earthquakes are felt by people and the effects of earthquakes on buildings. The MMI Scale is a 12-point scale where Intensity I earthquakes are generally not felt by people; in Intensity XII earthquakes damage is total, and objects are thrown into the air (USGS 2012).

In an intensity VIII earthquake, damage is slight in specially designed structures; considerable damage occurs in ordinary substantial buildings with partial collapse; and damage is great in poorly built structures. Chimneys, factory stacks, columns, monuments, and walls fall, and heavy furniture

are overturned. Effects of ground shaking in the region during the 1933 Long Beach Earthquake are described above under *Historical Earthquakes*.

Seismically Induced Slope Failure

No large landslides are mapped onsite, and the site is largely flat. Onsite changes in topography are minor and not substantial enough to generate landslides or slope failure. .

Liquefaction and Related Ground Failure

Liquefaction is a seismic phenomenon in which loose, saturated, granular soils behave similarly to a fluid when subjected to high-intensity ground shaking. Liquefaction occurs when three general conditions coexist: 1) shallow groundwater, 2) low density noncohesive (granular) soils, and 3) high-intensity ground motion. Loose, saturated, near-surface cohesionless soils exhibit the highest liquefaction potential, and dry, dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential. In general, cohesive soils are not considered susceptible to liquefaction, depending on their plasticity and moisture content. Effects of liquefaction on level ground include settlement, sand boils, and bearing capacity failures below structures. Dynamic settlement of dry sands can occur when the sand particles tend to settle and densify as a result of an earthquake.

Most of the site is in a Zone of Required Investigation for liquefaction mapped by the California Geological Survey (see Figure 5.6-3, *Liquefaction Hazard Zone*).

Other Geologic Hazards

Subsidence

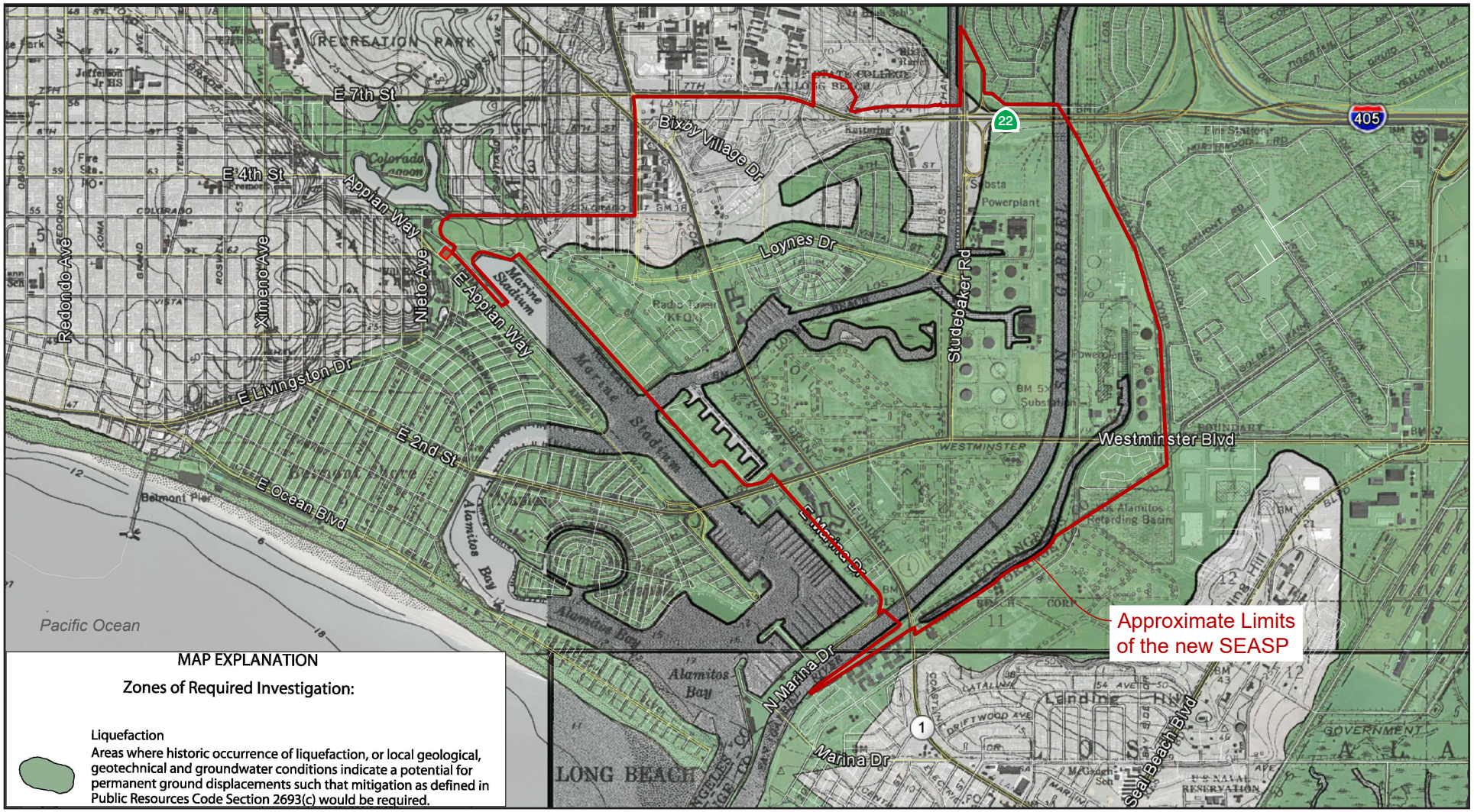
Subsidence is generally defined as the sinking or lowering of earth's surface due to natural geologic and/or man-made causes. Regional subsidence associated with oil and gas withdrawal began in the Long Beach area in the late 1930s and has affected an area over 20 square miles. The withdrawal of oil and gas from subsurface layers of the Wilmington Oil Field created a "subsidence bowl" up to approximately 29 feet deep in the Port of Long Beach that extends eastward under the City of Long Beach coastline, including the Project site. Approximately 1.2 feet to 1.6 feet of subsidence occurred onsite. Water injection to maintain pressure in the oil reservoirs began in 1953, which eventually stopped further subsidence in the region. Although subsidence has been arrested, constant monitoring and control by the Long Beach Gas & Oil Department is ongoing.

Expansive Soils

Expansive soils shrink or swell as the moisture content decreases or increases; the shrinking or swelling can shift, crack, or break structures built on such soils. Expansive clayey soils are known to existing in the Project area.

Figure 5.6-3 - Liquefaction Hazard Zone Map

5. Environmental Analysis



Base Map Source: Geotechnical, Inc., 2016

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Collapsible Soils

Collapsible soils are low-density, silty to very fine-grained, predominantly granular soils containing minute pores and voids. When saturated, these soils undergo a rearrangement of their grains and a loss of cementation, causing substantial, rapid settlement under even relatively low loads. A rise in the groundwater table or an increase in surface water infiltration, combined with the weight of a building or structure, can cause rapid settlement and consequent cracking of foundations and walls. The upper few feet to several feet of existing soils on a project site—whether native soils or soils on a developed site—are often unsuitable to support a building. Geotechnical investigation reports provide recommendations for site preparation, excavation, and grading, including replacement of existing soils with engineered fill soils capable of supporting a building. Shallow soils onsite consist of artificial fill and Quaternary young alluvium consisting of poorly consolidated clay and silt.

5.6.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would:

G-1 Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

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

G-2 Result in substantial soil erosion or the loss of topsoil.

G-3 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.

G-4 Be located on expansive soil, as defined in Table 18-1B of the Uniform building Code (1994), creating substantial risks to life or property.

G-5 Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

The Initial Study, included as Appendix A, substantiates that impacts associated with thresholds G-1.iv and G-5 would be less than significant or no impact. However, due to input received from members of the public, this DEIR has been prepared as a "full scope" EIR, where every environmental topic listed in Appendix G of the CEQA Guidelines is evaluated. Therefore, all the above thresholds are addressed. Impacts related to soil erosion or loss of topsoil [Threshold G-2] are addressed in Section 5.9, *Hydrology and Water Quality*, of this DEIR.

5.6.3 Environmental Impacts

The following impact analysis addresses thresholds of significance related to potential geologic hazards. The applicable thresholds are identified in brackets after the impact statement.

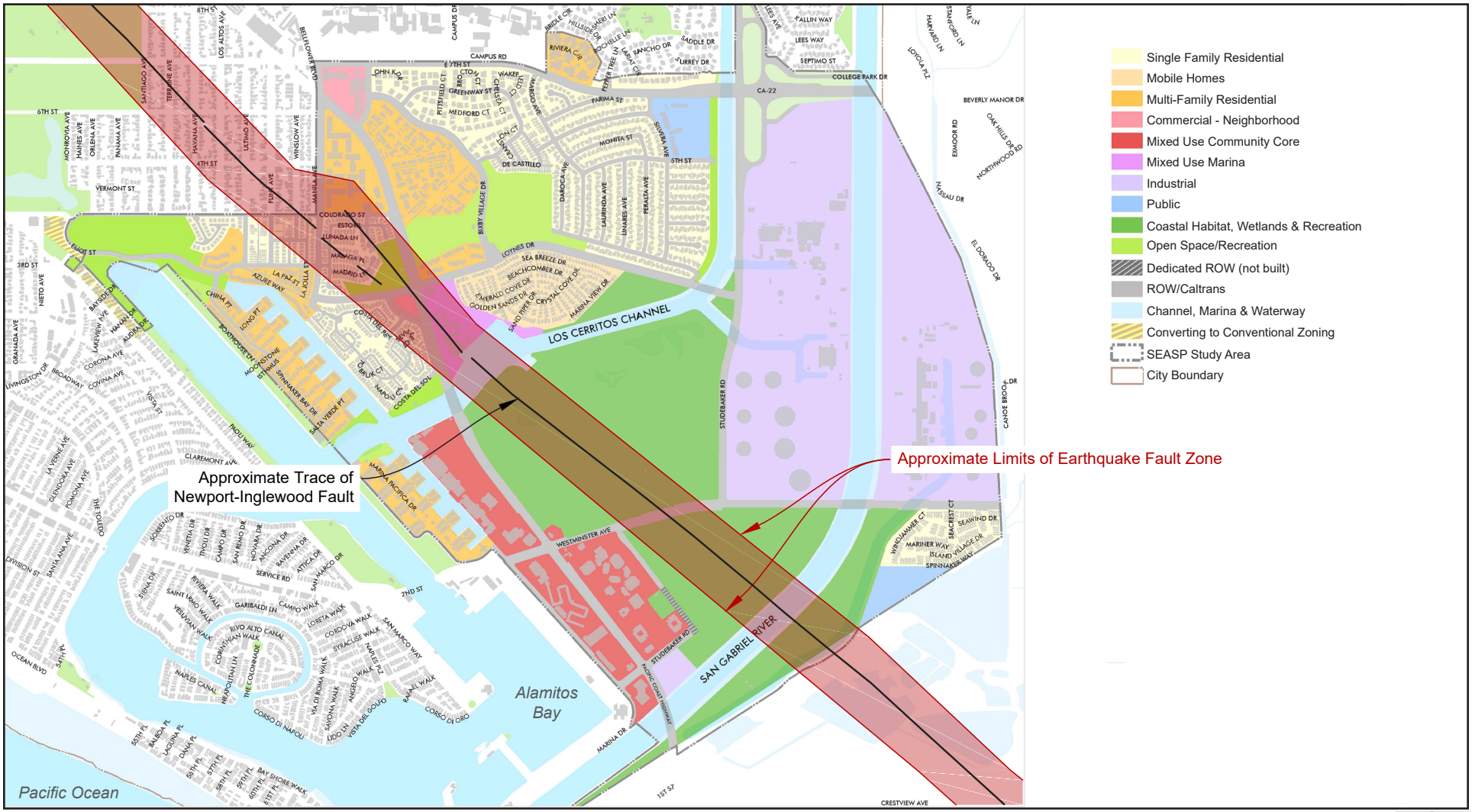
Impact 5.6-1: Future development within the Project area could subject persons and structures from surface rupture of a known Alquist-Priolo Earthquake Fault Zone. [Threshold G-1.i])

Impact Analysis: As shown on Figure 5.6-4, *Earthquake Fault Zone with Proposed Land Use Plan*, the Project area falls within an area designated an Alquist-Priolo Earthquake Fault Zone of the Newport-Inglewood Fault. Existing land uses with in this area include residential, church, hotel, wetlands, and oil operations.

The proposed Specific Plan does not plan changes in the residential use areas; however, land use changes could occur in the area of the church with proposed Multi-Family, the retail center (Marina Plaza) with proposed Commercial-Neighborhood, and the hotel (Best Western) with proposed Mixed Use Marina. The proposed Specific Plan would allow changes within the wetlands area such as visitor-serving recreation, an interpretive center, or consolidation of oil wells. The Alquist-Priolo Earthquake Fault Zone passes through part of the site that would be designated in the proposed Specific Plan as Coastal Habitat, Wetlands, & Recreation; Mixed Use Marina; Commercial-Neighborhood; Single-Family Residential; and Multi-Family Residential.

Figure 5.6-4 - Earthquake Fault Zone Map with Proposed Land Use Plan

5. Environmental Analysis



Base Map Source: Geotechnical, Inc., 2016

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The Alquist-Priolo Earthquake Fault Zoning Act prohibits the location of structures for human occupancy across the trace of an active fault; this prohibition is codified in various state codes and regulations. For example, Section 2621.5 of the California Public Resources Code and Section 3600 of the California Code of Regulations prohibit the location of developments and structures for human occupancy across the trace of active faults. Specifically, Section 2621.5(a) of the California Public Resources Code states: "…prohibit the location of developments and structures for human occupancy across the trace of active faults." Section 3606(a) of the California Code of Regulations states: "No structure for human occupancy…shall be permitted to be placed across the trace of an active fault." Additionally, Section 3603(a) of the California Code of Regulations prohibits structures for human occupancy within 50 feet of the trace of an active fault, unless it is proven by an appropriate geotechnical investigation and report that the development site is not underlain by active branches of the active fault. Furthermore, Section 3603(d) of the California Code of Regulations requires that cities and counties withhold development permits for sites within an earthquake fault zone until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting.

In accordance with Section 2621.5 of the California Public Resources Code and Section 3600 of the California Code of Regulations, any Project-related structures for human occupancy would be prohibited along the fault trace. Additionally, in accordance with Sections 3603(a) and 3603(d) of the California Code or Regulations, application for a development permit for any project that lies within the Newport-Inglewood Fault Zone (whether within 50 feet of the fault trace or within the overall fault zone) is required to be accompanied by a geotechnical investigation and report prepared by a geologist registered in the State of California; the geotechnical investigation and report is required to demonstrate that proposed buildings would not be constructed across an active fault and to determine whether a branch of the active fault passes through or next to the affected development site. For example, 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). The geologic investigation and report would be required to be submitted to the City for review and approval prior to any development occurring on a development site. Therefore, before any development could occur on sites that are within the Newport Inglewood Fault Zone, it would be required to obtain all necessary approvals, clearances, and permits from the City.

Furthermore, Long Beach Municipal Code Section 18.05.030 requires projects designed in an Alquist-Priolo zone, to obtain approval of soils engineering and engineering geology reports and incorporate recommendations into construction documents.

With adherence to the state and local regulations, impacts resulting from an Alquist-Priolo Earthquake Fault Zone are not anticipated to occur and would be less then significant.

Impact 5.6-2: Future development within the Project area could expose increased numbers of persons and structures to strong ground shaking from active faults in the region. [Threshold G-1.ii]

Impact Analysis: The Project area is in a seismically active region—three historical earthquakes in the region caused fatalities and extensive property damage and are mentioned above in Section 5.6.1. Strong ground shaking can be expected to occur during the design lifetimes of structures that would be built in conformance with the Specific Plan.

Buildout in accordance with the proposed Specific Plan would allow for the development of approximately 5,439 residential dwelling units and 573,576 square feet of commercial and employment uses, which would attract 9,208 residents and workers to the area. The Project could expose increased numbers of persons and structures to strong ground shaking..

State and local jurisdictions regulate development in California through a variety of tools that reduce hazards from earthquakes and other geologic hazards. For example, the state regulations protecting human-occupied structures from geoseismic hazards are provided in the most recent (2013) CBC (California Code of Regulations, Title 24, Part 2) and CRC (California Code of Regulations, Title 24, Part 2.5). The CBC (adopted by reference in Chapter 18.40 [Building Code] of the City's municipal code) and CRC (adopted by reference in Chapter 18.41 [Residential Code] of the City's municipal code) contain provisions to safeguard against major structural failures or loss of life caused by earthquakes or other geologic hazards. For example, the CBC contains provisions for earthquake safety based on factors including occupancy type, the types of soil and rock onsite, and the strength of ground motion with specified probability of occurring at the site. The design and construction of future development projects that would be accommodated by the Southeast Area Specific Plan would be required to adhere to the provisions of the CBC and CRC, which are imposed on project developments by the City's Development Services Department during the development review and building plan check process. Compliance with the requirements of the CBC and CRC for structural safety during a seismic event would reduce hazards from strong seismic ground shaking.

Furthermore, future development projects that would be accommodated by the Southeast Area Specific Plan would be required to have site-specific geotechnical investigation reports prepared by the project applicant's/developer's geotechnical consultant, in accordance with Appendix J Section J104 (Engineered Grading Requirements) of the CBC; such investigation would determine seismic design parameters for the site and the proposed building type per CBC requirements. Compliance with the design parameters and recommendations of the geotechnical investigation report would be required as a condition of a grading permit and/or building permit, and would be ensured by the City's Development Services Department during the development review and building plan check process.

Therefore, impacts resulting from strong ground shaking are not anticipated to be significant.

Impact 5.6-3: Future development within certain areas of the Project area could subject persons and structures to hazards from liquefaction. [Threshold G-1.iii, G-3]

Impact Analysis: Liquefaction occurs when three general conditions coexist: 1) shallow groundwater; 2) low density non-cohesive (granular) soils; and 3) high-intensity ground motion. The vast majority of the Project area and all of the proposed areas of land uses changes are in a liquefaction zone. Development within this area could expose people and structures to seismic related ground failure.

Future development projects that would be accommodated by the Southeast Area Specific Plan in a Zone of Required Investigation for Liquefaction would be required to have site-specific geotechnical investigation reports prepared by the project applicant's/developer's geotechnical consultant, in accordance with Appendix J Section J104 (Engineered Grading Requirements) of the CBC; such investigation would assess liquefaction potential onsite and provide any needed recommendations to minimize hazards from liquefaction. Compliance with the recommendations of the geotechnical investigation report would be required as a condition of a grading permit and/or building permit and would be ensured by the City's Development Services Department during the development review and building plan check process. Therefore, impacts resulting from hazards due to liquefaction are not anticipated to be significant.

Lateral spreading is the downslope movement of surface sediment due to liquefaction in a subsurface layer. Compliance with recommendations of geotechnical investigation reports, including recommendations for minimizing liquefaction hazard, would minimize hazards from lateral spreading. Impacts would be less than significant.

Impact 5.6-4: Future development within the Project Site would not result in a risk from landslides. [Thresholds G-1.iv]

Impact Analysis: Slope failures in the form of landslides are common during strong seismic shaking in areas of steep hills. The Project area is generally flat with no significant slopes. The State of California Seismic Hazard Zones Maps for the Los Alamitos, Long Beach, and Seal Beach quadrangles indicate that the Project area is not within an area susceptible to landslides (CGS 1999a, 1999b, 1999c). Therefore, no impacts related to landslides are anticipated.

Impact 5.6-5: Future development within the Project site could subject persons or structures to hazards arising from subsidence, collapsible soils, or expansive soils. [Thresholds G-3 and G-4]

Impact Analysis: Existing soils within a few feet of the ground surface are often unsuitable for supporting a proposed building, even on developed sites. Future development within the Project area could be exposed to collapsible soils. Additionally, ground subsidence within the Project area has historically occurred due to oil operations. While subsidence in the area stopped after 1953 due to the City's efforts and ground elevation monitoring, subsidence has the potential to occur within the proposed Specific Plan area. Expansive soils are also known to exist in the Project area.

Buildout under the Southeast Area Specific Plan would increase development intensity within the Project area by approximately 5,439 dwelling units and 573,576 square feet of employment-generating land uses. Development under the Southeast Area Specific Plan could subject persons and structures to hazards arising from collapsible soils, ground subsidence, or expansive soils by placing buildings on soils subject to subsidence, collapse, or expansion.

However, future development projects that would be accommodated by the proposed Specific Plan would be required to have site-specific geotechnical investigation reports prepared by the project applicant's/developer's geotechnical consultant, in accordance with Appendix J Section J104 (Engineered Grading Requirements) of the CBC; such investigation would assess hazardous soil conditions onsite and would provide recommendations as needed to minimize these potential soils hazards. For example, recommendations from the geotechnical report to address potential hazards related to collapsible soils would include removal of at least the top few feet of existing soil on the affected sites and replacement with engineered, compacted, and moistened fill soils. Compliance with the recommendations of the geotechnical reports is required as a condition of a grading permit and/or building permit, and would be ensured by the City's Development Services Department during the development review and building plan check process. As a result, impacts related to subsidence, collapsible soils, or expansive soils are less than significant.

Impact 5.6-6: The proposed Project does not support the use of septic or other alternative waste water disposal. [Thresholds G-5]

Impact Analysis: Future development in accordance with the proposed Project would not involve the use of septic tanks or alternative wastewater disposal systems. Developments within the Project area would be required to connect to the City's existing sewer lines and wastewater disposal systems. Therefore, no impact would occur.

5.6.4 Cumulative Impacts

Geology and soils impacts are site specific and generally do not combine with impacts of other projects to result in cumulative impacts. Other projects would be required to have site-specific geotechnical investigations conducted. Other projects would be designed and built in compliance with the CBC, Alquist-Priolo Earthquake Fault Zoning Act, and Seismic Hazard Zoning Act. Geology and soils impacts of each related project would be less than significant after compliance with recommendations in the project's geotechnical investigation report and with existing laws and regulations. Cumulative impacts would be less than significant, and project impacts would not be cumulatively considerable.

5.6.5 Existing Regulations

State

- California Public Resources Code Sections 2621 et seq.:Alquist-Priolo Earthquake Fault Zoning Act
- California Public Resources Code Section 2695: Seismic Hazard Mapping Act
- California Code of Regulations Title 24, Part 2: 2013 California Building Code
- California Code of Regulations, Title 24, Part 2.5: 2013 California Residential Code
- California Health and Safety Code Sections 17953-17955: Requirements for Geotechnical Investigations

Local

- City of Long Beach Municipal Code, Chapter's 18.40 (Building Code) and 18.41 (Residential Code)
- Long Beach Municipal Code Section 18.05.030 (Construction Documents)

5.6.6 Level of Significance Before Mitigation

Upon implementation of regulatory requirements and standard conditions of approval, the following impacts would be less than significant: 5.6-1, 5.6-2, 5.6-3, 5.6-4, 5.6-5, and 5.6-6.

5.6.7 Mitigation Measures

No mitigation measures are required.

5.6.8 Level of Significance After Mitigation

Impacts would be less than significant.

5.6.9 References

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