3.4 Geology, Soils, and Seismicity

Section 3.4 evaluates the impacts of the proposed project related to geology, soils, and seismicity and includes the following information:

- A description of the existing geologic, soils, and seismic conditions within the project site and region.
- A discussion of the applicable federal, state, and local policies, ordinances, and regulations.
- An analysis of the impacts related to geology, soils, and seismicity.
- A discussion of whether the project would contribute to cumulative impacts.

3.4.1 Introduction

This section describes the geologic and soil conditions of the proposed project site and general vicinity. The section also analyzes whether the project would expose people and property to geologic and seismic hazards such as earthquakes, expansion, landform alteration, erosion, and liquefaction. This analysis is based on a review of statutory law, local planning documents, and the Preliminary Geohazard Study Report prepared by Converse Consultants (Converse 2016) included as Appendix F to this Draft EIR.

3.4.2 Environmental Setting

Existing Conditions

Regional Geology

The project is located in the Los Angeles Basin, within what is known as the Transverse Ranges geomorphic province. The Transverse Ranges are characterized by east to west trending mountain ranges, making them different from most mountain ranges in California, as most of California’s coastal mountain ranges are north-south oriented. The southern area of the Santa Monica Mountains is marked by east-trending reverse, oblique slip, and left-strike-slip faults extending over 125 miles. The local faults that form the southern boundary of the Transverse Ranges consist of (east to west) the Raymond, Hollywood, Santa Monica, Ancapa-Dume, Malibu Coast, and others. Together these faults are referred to as the Transverse Ranges Southern Boundary Fault System. Most of these faults are considered active and are capable of producing strong ground shaking and ground surface rupture.

The project site is located in a northwest-trending coastal plain, otherwise known as the Torrance Plain. This plain consists of dense silty sand covered with moderately dense silty sand of older alluvial deposits. The Torrance Plain is covered with locally derived sandy silt and sandy clay of younger alluvial deposits. The project site is underlain by deep alluvial deposits.

Extensive estuarine deposits were present at the mouth of Bixby Slough, Dominguez Channel, and the Los Angeles River preceding the development of Los Angeles Harbor. These organic tidal muds have since been covered with artificial fill (Converse 2016).
Seismic Hazards

Seismicity is the geographic and historical distribution of earthquakes, including their frequency, intensity, and distribution. Seismic hazards include surface rupture, ground shaking, liquefaction, landslides, subsidence, expansive soils, and soils and soil erosion. The Southern California area is tectonically active, with known seismic hazards. Potential hazards stemming from local and regional earthquakes may be primary, such as surface rupture and ground motion, or secondary, such as liquefaction and seismically induced slope failures.

Regional Faults

In the Los Angeles Basin, numerous faults accommodate the complex tectonic stresses caused by the convergence of these places. The prominent active fault systems near the project site are the Newport-Inglewood, Palos Verdes fault zone, Whittier-Elsinore, and San Andreas fault (Converse 2016).

The Newport Inglewood fault zone is located at approximately 5.9 miles northeast of the project site (Figure 3.4-1). The Newport Inglewood fault system is about 40 miles long onshore and extends northwest from Huntington Beach through Long Beach to Culver City and Cheviot Hills. The Newport Inglewood fault continues offshore southeast of Huntington Beach and makes landfall in La Jolla as the Rose Canyon fault. The Newport Inglewood fault is characterized by a series of uplifts, including Newport Mesa, Huntington Beach Mesa, Bolsa Chica Mesa, Alamitos Heights and Landing Hill, Signal Hill and Reservoir Hill, Dominguez Hills, and Baldwin Hills. The Newport-Inglewood fault zone is considered capable of generating a maximum moment earthquake with a magnitude 7.1 (Mw) on the Richter scale.

The Palos Verdes fault zone is located south of the city with the active segments of the fault located offshore. It is traceable in the subsurface along the northern front of the Palos Verdes Hills. The Palos Verdes fault zone is considered capable of generating maximum moment earthquake with a magnitude of 7.25 (Mw) on the Richter scale.

The San Andreas and Whittier-Elsinore fault zones are also located within the geographic region of the site. The San Andreas fault zone is located approximately 50 miles north of the project site. Although further away from the project site at approximately 50 miles to the northeast, the San Andreas fault zone is capable of generating an earthquake of moment magnitude 8.25 Mw on the Richter Scale. The Whittier-Elsinore Fault system is located approximately 30 miles east of the project site and is capable of generating a moment magnitude earthquake in the range of 6.0 to 7.2 Mw on the Richter scale.
Figure 3.4-1
Regional Faults
Ground Shaking

The Southern California region is characterized by, and has a history of, faults and associated seismic activity. Earthquakes are classified by their magnitude, a measure of the amount of energy released during an event. During a seismic event, the project site may be subjected to high levels of ground shaking due to proximity to active faults in the area. The amount of groundshaking would depend on a number of factors, including the depth of the earthquake, distance to the epicenter, duration of ground shaking, and the composition of near surface materials. The largest fault in the area is the San Andreas fault, which is considered active. Within the project vicinity, the San Andreas fault’s most recent seismic event occurred in 1857. This magnitude 7.8 earthquake resulted in nearly 200 feet of horizontal movement along the main trace of the fault. Geologists consider this fault as having the potential to generate an earthquake in magnitude of approximately 8.0 on the Richter scale.

Fault Rupture

Surface rupture occurs when movement on a fault deep within the earth breaks through to the surface. Fault ruptures almost always follow pre-existing faults that are zones of weakness. Rupture may occur suddenly during an earthquake or slowly in the form of fault creep. Sudden displacements are more damaging to structures because they are accompanied by shaking. Fault creep is the slow rupture of the earth’s crust. The Alquist-Priolo Earthquake Zoning Act enforces a 50-foot setback zone and regulates development near active faults. The project site is not within a currently established Alquist-Priolo Earthquake Zone for fault rupture hazards. No active or potentially active faults are known to pass directly under the project site.

Liquefaction

Liquefaction is a process by which water-saturated, loose soils lose strength during moderate or strong seismic shaking events. The potential for liquefaction increases when groundwater level is shallow, and when loose, fine sand occurs within a depth of about 50 feet or less. However, liquefaction potential decreases as grain size and clay and gravel content increase. The project site is not located within an area designated by the State of California Seismic Hazard Maps as a Liquefaction Hazard Zone. The mapping is based on alluvial soil type, depth of groundwater tables, and the local seismicity of the area.

According to the geotechnical report for the project site, the results of the subsurface exploration indicate an absence of shallow groundwater, and the data suggests that the liquefaction potential at the site is likely very low and the potential for seismically induced settlement is negligible (Converse 2016).

Lateral Spreading

Lateral spreading of the ground surface during a seismic activity may occur when potentially liquefiable soil is present in conjunction with a sloping ground surface and a “free” face (i.e., retaining wall, slope, or channel). Ground shaking leading to liquefaction of saturated soil can result in lateral spreading where the soil undergoes a temporary loss of strength. If soil within the slope liquefies, the result may be temporary instability resulting in deformation or translation of the slope. In order for this to occur, the liquefiable soil needs to be continuous and the toe of
the slope needs to be unsupported. Later will allow the soil grains to pack closer together. This closer grain packing results in less volume and the lowering of the ground surface. More than 80 percent of identified subsidence in the United States is caused through overdrafting of groundwater. Drainage of organic soils, underground mining, natural compaction, and thawing of permafrost can also cause subsidence. Subsidence causes large areas of land to sink, thereby potentially damaging foundations, walls, and floors.

**Erosion**

Erosion is a condition that can significantly and adversely affect development on any site. Structures located above or below actively eroding natural slopes or manufactured slopes spreading can result in damage to pipelines and utilities.

**Subsidence**

Land subsidence is a gradual settling or sudden sinking of the ground surface elevation due to subsurface movement of soils and other earth materials. Fill and native materials can be water saturated, and a net decrease in the pore pressure and contained waters could be susceptible to the effects of erosion. In addition, development could exacerbate erosion conditions, if they exist, by exposing soils and adding additional water to the soil from irrigation and runoff from new impervious surfaces.

**Unstable/Compressible Soils**

Compressible soils are fine-grained soils (silts and clays) that are susceptible to decreasing in volume (i.e., they compress) when weight is placed on them. The settlement of compressible silts and clays is referred to as **consolidation**, which occurs when groundwater is squeezed from soil pores by added surface loads, such as fills or building foundations. The amount and rate of settlement can vary greatly, depending on a number of factors, including natural moisture and density, the thickness of the compressible layer, the amount of fill placed over the compressible material, and the ability of pore water to escape from soil pores through drainage paths such as sand lenses and soil fissures.

**Expansive Soils**

Fine-grained soils (silts and clays) may contain variable amounts of expansive minerals. These minerals can undergo significant volume changes as a result of changes in moisture content (i.e., they expand when they get wet and shrink as they dry out). This expansive behavior (changes in the water content of an expansive soil) can result in severe distress to buildings and infrastructure constructed upon the soil, which can damage foundations and other building components. Problems associated with expansive soils include foundation damage, jammed doors and windows, ruptured pipelines, and heaving and cracking of sidewalks and roads. Fine-grained sediments with high clay content would be most susceptible to potential expansive soil impacts. Further, expansive clay minerals are common in the geologic units in the adjacent Palos Verdes Peninsula as well as associated with clayey soils in artificial fill.

**Corrosive Soils**
Soil moisture, chemistry, aeration, physical characteristics, bacteria, etc., have important effects on corrosion. In general, fine-grained soils have higher corrosion potential due to the smaller particle size that results in greater surface area with high chemical and moisture affinity. Based on the available subsurface data, relatively granular deposits were encountered in the upper soils across the project site.

**Subsurface Conditions**

According to the preliminary geotechnical investigation for the project site, the site soils consist of existing fill soils placed during previous site grading operations and natural alluvial soils up to the maximum depth explored of 81.5 feet below ground surface (bgs) (Converse 2016). The existing structures vary in age, but date back to as early as 1957, a time of very different construction and fill compaction standards. The observed fill soils consisted primarily of sandy silts. The depth of the fill ranged approximately 3 to 8 feet. The alluvial sediments consisted predominately of silty sand, sandy silt, and clayey sand soils to a depth of approximately 81.5 feet bgs. Groundwater was encountered during the subsurface exploration at a depth of approximately 60 feet bgs (Converse 2016). In addition, the site soils were tested for corrosivity and were found not to be in the corrosive range according to the Caltrans guidelines (Converse 2016).

**Landslides**

Landslides occur in loosely consolidated, wet soil and rock sloping terrain or are associated with bedrock slopes exhibiting unfavorably oriented bedding planes in relation to slope or other weaknesses. However, because of the absence of steep slopes on the project site and in the surrounding area, landslides are not considered a viable geotechnical hazard.

**3.4.3 Regulatory Framework**

**Federal**

**Earthquake Hazards Reduction Act**

The Earthquake Hazards Reduction Act was enacted in 1977 to “reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program.” To accomplish this, the Earthquake Hazards Reduction Act established the National Earthquake Hazards Reduction Program (NEHRP). This program was significantly amended in November 2004, which refined the description of agency responsibilities, program goals, and objectives.

NEHRP’s mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. The NEHRP designates the Federal Emergency Management Agency (FEMA) as the Lead Agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Programs under NEHRP help inform and guide planning and building code requirements, such as emergency evacuation responsibilities, and seismic code standards, such as those to which the proposed project would be required to adhere.
State

California Building Code

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

The earthquake design requirements of the CBC take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, which are used to determine a Seismic Design Category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site and ranges from SDC A (very small seismic vulnerability) to SDC E/F (very high seismic vulnerability and near a major fault). Design specifications are then determined according to the SDC. The proposed project would be required to comply with the CBC, including Part 2, Volume 2, Chapter 18, Soils and Foundations, which outlines the minimum standards for structural design and construction. This includes geotechnical evaluations, which among other requirements, includes a record of the soil profile, regulation of active faults in the area, recommendations for foundation type and design criteria that address issues, as applicable, such as (but not limited to) bearing capacity of soils, provisions to address expansive soils, settlement, and varying soil strength. If a building department or other appropriate enforcement agency, determines that recommended action(s) presented in the geotechnical evaluations are likely to prevent structural damage, the approved recommended action(s) must be made a condition to the building permit (Section 1803.1.1.3 of Chapter 18).

The CBC provides standards for various aspects of construction, including but not limited to excavation, grading, and earthwork construction, preparation of the site prior to fill placement, specification on fill materials and fill compaction and field testing, retaining wall design and construction, foundation design and construction, and seismic requirements. It includes provisions to address issues such as (but not limited to) construction on expansive soils and soil strength loss. In accordance with California law, project design and construction would be required to comply with provisions of the CBC.
South Coast Air Quality Management District – Rule 403 Fugitive Dust

Relative to wind erosion, South Coast Air Quality Management District (SCAQMD) Rule 403 requires the implementation of best available fugitive dust control measures during active operations capable of generating fugitive dust emissions from on-site earth-moving activities, construction/demolition activities, and construction equipment travel on paved and unpaved roads (see SCAQMD Rule 403(d)(2)). During project construction, best available control measures identified in the rule would be required to minimize fugitive dust emissions from proposed earth-moving and grading activities. SCAQMD Rule 403, Table 1, provides specific measures for construction activities to reduce fugitive dust, which includes site pre-watering and re-watering as necessary to maintain soil stabilization, use of tarps to enclose haul trucks, stabilizing sloping surfaces using soil binders until vegetation or ground cover effectively stabilizes slopes, hydroseed prior to rain, washing mud and soils from equipment at the conclusion of trenching activities. Water usage for dust suppression is accomplished with non-potable water, and furthermore, SCAQMD has adopted guidance “increasing reliance on non-toxic chemical dust suppressants to stabilize soil.”

3.4.4 Impacts and Mitigation Measures

Methodology

The description of the environmental setting in Section 3.4.2, was used as the baseline physical conditions by which the project’s impacts were evaluated. Baseline conditions were identified based on a review of existing literature as well as site reconnaissance, and the subsurface geotechnical investigation conducted by Converse Consultants (Appendix F). The geotechnical report prepared by Converse Consultants presented findings, conclusions, and recommendations concerning development of the project site based on the engineering analysis of geotechnical properties of the subsurface conditions, evaluation of geotechnical properties of soils, and a summary of findings, conclusions, and recommendations. The following section discusses geology and soils impacts of the proposed project.

Thresholds of Significance

The project would result in significant impacts to geology, soils, and seismicity 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, strong seismic ground shaking, seismic-related ground failure (including liquefaction), or landslides (see Impact GEO-1, below).
- Result in substantial soil erosion or the loss of topsoil (see Impact GEO-2, below).

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• 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-site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse (see Impact GEO-3, below).

• 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 (see Impact GEO-4, below).

The Initial Study/Notice of Preparation (NOP) (Appendix A) found that the project would result in no impact related to development on an active fault, as no active faults are mapped on the project site under the Alquist-Priolo Earthquake Fault Zoning Map. The nearest zoned fault is the Newport-Inglewood fault located approximately 5.9 miles to the northeast. Therefore, no further analysis of the significance criteria regarding earthquake faults on the project site is included in the Draft EIR. The Initial Study/NOP (Appendix A) found that the project would result in no impacts associated with landslides as the site is relatively flat and there are no slopes on or near the site that could pose a landslide hazard. Thus, no impact would occur. As discussed in the Initial Study/NOP (Appendix A), the proposed project would connect to existing sewer lines and would not require septic or alternative wastewater disposal systems. Therefore, the project would result in no impact related to this criterion.

Impacts and Mitigation

Impact GEO-1: The project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: (ii) strong seismic ground shaking or (iii) seismic-related ground failure, including liquefaction.

The project site has the potential to experience strong ground shaking during an earthquake along the prominent active fault systems near the project site, which include the Palos Verdes, Newport-Inglewood, Whittier-Elsinore, and San Andreas faults. Based on the project site’s proximity to mapped strands of these known faults, the potential for moderate to strong ground shaking at the site resulting from seismic activity in the region is likely to occur and could cause adverse effects if improvements are not designed appropriately.

The proposed project would be required to comply with the most recent version of the CBC standards as adopted by the City. Adherence to these CBC standards would include seismic design criteria that are designed to reduce the structural damage to facilities and corollary indirect impacts associated with seismic-related ground shaking to the extent feasible. The CBC requires structural design that can accommodate ground accelerations expected from known active faults. These final design criteria would determine site preparations and foundation design that would be included in a final design-level geotechnical report. In addition, the final geotechnical report would determine final design parameters for the walls, foundations, foundation slabs, and surrounding related improvements (utilities, roadways, parking lots, and sidewalks). Because the project site is located in a seismically active region, some risk related to seismic ground shaking would remain, but upon compliance with the applicable regulatory standards, this impact would be less than significant.

Secondary seismic hazards such as liquefaction and lateral spreading generally occur when underlying materials consist of loose saturated cohesionless soils that essentially become
liquefied when agitated by significant ground shaking. According to the geotechnical report for the project site, the site is not located within a liquefaction hazard zone, and the site soils were not considered to be liquefiable (Converse 2016). As a result, the secondary seismic hazards including liquefaction would be considered less than significant.

**Mitigation Measures**

No mitigation is required.

**Residual Impacts**

Impacts would be less than significant.

**Impact GEO-2: The project would not result in substantial soil erosion or the loss of topsoil.**

Although the project site is currently developed, construction activity associated with the proposed project would include ground-disturbing activities such as demolition, excavation, trenching, grading and landscaping which would result in disturbance to subsurface soils, and potential exposure to erosive forces of wind and water. During excavation and grading of the proposed project, all earth-disturbing activities associated with construction of the proposed project would be temporary and erosion effects would depend largely on the characteristics of soils disturbed, the quantity of disturbance, and the length of time soils are subject to conditions that would be affected by erosion processes. However, all project construction activities would be required to comply with Chapter 29 of the CBC, which regulates excavation activities and the construction of foundations and retaining walls, and Chapter 70 of the CBC, which regulates grading activities, including drainage and erosion control.

In addition, because the site is larger than 1 acre in size, it would require compliance with National Pollutant Discharge Elimination System (NPDES) Construction General Permit criteria, including preparation of a stormwater pollution prevention plan (SWPPP) and the inclusion of best management practices (BMPs) to control erosion and off-site transport of soils. SWPPP is required to include a menu of BMPs to be selected and implemented based on the phase of construction and the weather conditions to effectively control erosion, sediment, and other construction-related pollutants. Erosion control BMPs would be implemented during construction, such as: physical stabilization through hydraulic mulch, soil binders, straw mulch, bonded fiber matrices, and/or erosion control blankets (i.e., rolled erosion control products); soil roughening of graded areas (through track walking, scarifying, sheep’s foot rolling, or imprinting) to slow runoff, enhance infiltration, and reduce erosion; dust control through the application of water or other dust palliatives as necessary to prevent and alleviate dust nuisance. Sediment control BMPs during construction would include, as applicable: perimeter protection through silt fences, fiber rolls, gravel bag berms, sand bag barriers, and straw bale barriers; storm drain inlet protection, sediment capture through sediment traps, storm drain inlet protection, and sediment basins; velocity reduction through check dams, sediment basins, and/or outlet protection/velocity dissipation devices; reduction in off-site sediment tracking through stabilized construction entrance/exit, construction road stabilization, and/or entrance/exit tire wash. Implementation of such control measures during construction would prevent substantial soil erosion or the loss of topsoil from exposed soils. Section 3.8, *Hydrology and Water Quality*, of this Draft EIR presents
additional information regarding the project’s NPDES permitting requirements, and SWPPP requirements. Adherence to SCAQMD Rule 403 (Fugitive Dust) would also help to minimize wind erosion through soil stabilization measures. Table 1, presented in SCAQMD Rule 403 provides measures for construction activities to reduce fugitive dust. This includes measures for the application of water or stabilizing agents to prevent generation of dust plumes, pre-watering materials prior to use, use of tarps to enclose haul trucks, stabilizing sloping surfaces using soil binders until vegetation or ground cover effectively stabilize slopes, hydroseed prior to rain, washing mud and soils from equipment at the conclusion of trenching activities (see SCAQMD Rule 403, Table 1, for additional details). Implementation of erosion-control BMPs would prevent substantial soil erosion or loss of topsoil.

Upon completion of construction, the project site would be covered in surfaces (e.g., pavement, buildings, structures, etc.), landscaping and include drainage improvements that would reduce the potential for soil erosion or loss of topsoil in accordance with requirements for post-construction erosion-control measures that are part of the City’s drainage control requirements (see Section 3.8, Hydrology and Water Quality). Therefore, with implementation of the existing regulatory requirements for construction and drainage control, impacts related to erosion or loss of topsoil would be less than significant during both construction and operation.

**Mitigation Measures**

No mitigation is required.

**Residual Impacts**

Impacts would be less than significant.

**Impact GEO-3:** The project would not 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-site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

The preliminary geotechnical investigation for the proposed project included a subsurface investigation of underlying soil conditions, and review of topographic conditions and the State of California Seismic Hazard Zones, Torrance Quadrangle for liquefaction potential. According to the geotechnical report for the project site, the results of the subsurface exploration indicate an absence of shallow groundwater, and the data suggests that the liquefaction potential at the site is likely very low and the potential for seismically induced subsidence is negligible. The report also determined the project site is not located in an area that is considered to result in on- or off-site landslides due to the relatively flat topography. As discussed above, the site is not located in a liquefaction hazard zone and the soils were found to have a very low potential for being susceptible to liquefaction or lateral spreading (Converse 2016).

The existing structures at the site vary in age, dating back to as early as 1957 when building and fill compaction standards differed significantly from modern standards. The preliminary geotechnical investigation identified the presence of undocumented fill materials that may not be currently sufficient to withstand the new loadings associated with the proposed improvements. The report recommended over-excavation of artificial fills and replacement with engineered fill
materials compacted to specifications in accordance with current building code requirements. Implementation of these recommendations that are required by the CBC would ensure that proposed improvements do not become damaged from unanticipated subsidence or settlement and would result in an overall improvement in stability during static and seismic conditions.

Implementation of industry standard remedial measures (e.g., use of engineered fill, compaction standards, meeting moisture content thresholds, bearing capacity minimums and overall foundation design) in accordance with current building code requirements would ensure the project site is developed such that the underlying soils are capable of supporting the proposed improvements. Design and construction specifications, in accordance with CBC requirements, would ensure that any identified unstable materials would be improved to accommodate the proposed structure or improvement so that unstable soil impacts would be less than significant.

**Mitigation Measures**

No mitigation is required.

**Residual Impacts**

Impacts would be less than significant.

**Impact GEO-4: The project would not 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.**

Expansive soils are typically characterized by containing clays or silts and that will swell and shrink over time through various wetting and drying cycles. Soils with shrink-swell or expansive properties typically occur in fine-grained clay sediments and cause damage through the resultant volume changes that occur as a result of periodic wetting and drying cycles. Structural damage can occur over a long period of time, usually the result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils.

According to the preliminary geotechnical investigation conducted for the project, soils at the site generally have a very low potential for expansion (Converse 2016). Furthermore, site-specific design criteria would include minimum standards for any imported fill materials. The CBC includes provisions for construction on expansive soils. Proper fill selection, moisture control, and compaction during construction can prevent expansive soils from causing significant damage. Continued compliance with the CBC and the preliminary geotechnical investigation recommendations would ensure that this impact would be less than significant.

**Mitigation Measures**

No mitigation is required.

**Residual Impacts**

Impacts would be less than significant.
3.4.5 Cumulative Impacts

Geologic hazard impacts tend to be location-specific, and do not compound or increase in combination with past, present or future projects. Any future development within the city would encounter geologic and seismic risks based on individual site constraints. Therefore, while the geographic scope for considering cumulative impacts related to geology and soils can generally be considered the Los Angeles Basin; due to widely varying conditions on a site-by-site basis, the impacts related to geology and soils are generally site-specific.

As previously discussed, the project site is located in a seismically active area that is bordered by major fault systems, including the Newport-Inglewood, Whittier-Elsinore, and San Andreas faults. No areas of the Los Angeles Basin are considered seismically inactive; therefore, other past, present, and future projects (i.e., cumulative projects) in the region share similar seismic hazards. However, because of the site-specific nature of geology and soils impacts, the effects of the cumulative projects are not of a nature to combine with project impacts associated with strong seismic ground shaking or seismic-related ground failure such as liquefaction. Therefore, the implementation of the proposed project and cumulative projects would result in less than significant cumulative impacts. As a result, the project’s contribution to cumulative seismic impacts would be less than cumulatively considerable.

Additionally, as discussed earlier, implementation of site-specific SWPPPs and BMPs, required of all projects that would disturb at least 1 acre, would reduce erosion from the project site. All planned projects in the project vicinity as well as the proposed project are subject to review, preparation of environmental documents, and require conformance to the local grading and building code requirements, which would reduce soil erosion impacts for each project and cumulative impacts to less than significant. As a result, the project’s contribution to cumulative impacts would be less than cumulatively considerable (Impact GEO-1).

Implementation of CBC requirements for design and construction specifications would reduce unstable soil or geologic units to impact structures associated with the proposed project and cumulative projects. Following the CBC requirements would prevent damage from unanticipated subsidence or settlement. Therefore, the implementation of the proposed project and cumulative projects would result in less than significant cumulative impacts. As a result, the project’s contribution to cumulative impacts would be less than cumulatively considerable (Impact GEO-2).

Furthermore, similar to the proposed project, as cumulative development is proposed, site-specific design criteria is identified through compliance with the CBC and site-specific geotechnical investigations. Compliance with the existing regulations as well as any site-specific investigation would reduce impacts from expansive soils on cumulative projects, similar to the proposed project. Therefore, the implementation of the proposed project and cumulative projects would result in less than significant cumulative expansive soil impacts. As a result, the project’s incremental contribution to cumulative expansive soil impacts would be less than cumulatively considerable (Impact GEO-3).
3.4.6 Significant Unavoidable Impacts

No significant and unavoidable geology, soils, or seismicity impacts were identified for the proposed project.

3.4.7 References

Converse Consultants (Converse), Preliminary Geohazards Study Report, South Bay Galleria
1815 Hawthorne Boulevard, Redondo Beach, California, February 24, 2016.