

## **IV. Environmental Impact Analysis**

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### **E. Geology and Soils**

#### **1. Introduction**

This section addresses potential geologic and soils hazards attributable to the Proposed Project. This section is based, in part, upon the *Preliminary Geotechnical Engineering Exploration and Analysis, Baldwin Hills Crenshaw Plaza Crenshaw Boulevard and M. L. King Jr. Boulevard, Los Angeles, California* (“Geotechnical Report”), prepared by Giles Engineering Associates, Inc., October 22, 2008, which is included in Appendix E to this Draft EIR. The Geotechnical Report includes a review of previous geologic and geotechnical reports prepared for the Project Site, site reconnaissance, and recommendations based on site conditions and local regulations for the Proposed Project.

#### **2. Environmental Setting**

##### **a. Existing Conditions**

The Project Site is approximately 43 acres and is generally rectangular in shape. It is located at the confluence of the Crenshaw and Leimert Park Districts in the City of Los Angeles as well as the unincorporated area of Baldwin Hills. The Project Site is currently developed with retail and mall buildings and associated parking.

##### **(1) Geologic Setting and Topography**

The Project Site is approximately 6 miles southwest of downtown Los Angeles and is located within the northern portions of the Peninsular Ranges Province. This range extends from Baja California to the Los Angeles Basin and then westerly to the offshore islands including Santa Cruz and San Nicolas islands. The northern and northeast boundaries of this geologic province abuts the Transverse Ranges Province, which contains the Santa Monica Mountains, San Gabriel Mountains, and San Bernardino Mountains. The Colorado–Sonoran Desert Province borders this range to the east. The Peninsular Ranges are characterized by a northwest grain caused primarily from faulting. San Jacinto and Elsinore are two active major faults that cause right-lateral displacement. These fault zones are complex with numerous smaller faults toward the southeast.

The Puente–Repetto Hills divide the Los Angeles Basin into two distinct geomorphic features. The northern one-third is comprised of valleys, namely San Gabriel and San Bernardino, while the southern two-thirds consist of a gentle sloping coastal plain. Faults also define the basin by dividing the area into four blocks, with the central block bound to the northeast by the Whittier fault and the southwest by the Newport–Inglewood fault. These blocks behave independently and some or all have rotated over the last million years.

The dominant structural feature of the Los Angeles Basin is a large syncline with the axis extending northwest from Santa Ana to Beverly Hills. These features were created with subsidence of the Los Angeles Basin about 15 million years ago during the Miocene period and the extrusion of volcanic material and continued throughout the Pliocene and Pleistocene ages with the largest deposits of sediment reaching 31,000 feet.

The present-day Los Angeles Basin is characterized as a coastal plain with occasional hills and mesas. The Project Site contains depositional materials of alluvium underlain by Pleistocene sedimentary beds. These materials are underlain by Pliocene sandstone, siltstone, shale, and conglomerate. The floor of the basin consists of volcanic material comprised of faulted igneous and metamorphic rocks.

The topography of the Project Site and surrounding area is relatively flat. The elevation of the Project Site ranges from approximately 150 feet above mean sea level at the southern corner to 110 feet above mean sea level at the north end. The topographic gradient is to the north.

#### *(a) Faults*

The Project Site is located in the seismically active region of Southern California. The numerous faults in Southern California are classified as active, potentially active, and inactive faults. The criteria for these major groups are based on criteria developed by the California Geological Survey (“CGS”), previously the California Division of Mines and Geology, for the Alquist-Priolo Earthquake Fault Zoning Program. An active fault is defined as one that has had surface displacement within Holocene time (about the last 11,000 years). A potentially active fault is a fault that has demonstrated surface displacement of Quaternary age deposits (last 1.6 million years). Inactive faults have not moved in the last 1.6 million years.

Numerous active and potentially active faults have been mapped within the Los Angeles metropolitan region; however, the Project Site itself is not located within an established State of California Alquist-Priolo Earthquake Fault Zone, and no active or

potentially active faults are known to underlay the Project Site. Additionally, the Project Site is not included in a City of Los Angeles Fault Rupture Study Area.

While the Project Site is not located within an identified fault zone, active faults in the Los Angeles metropolitan region could affect on-site development by resulting in substantial ground shaking at the Project Site. The closest known active or potentially active fault to the Project Site is the Newport–Inglewood fault zone, which is approximately 2.9 kilometers (“km”) from the Project Site. The Hollywood fault is located approximately 10.2 km from the Project Site and the Santa Monica fault is located approximately 10.3 km from the Project Site. Although the Project Site is found to be within 60 km of numerous active fault zones that are capable of generating strong ground motion, the Project Site is not considered to be at a particularly greater level of seismic risk compared to other areas in the region.

Additional active faults in the Los Angeles metropolitan area that could affect the Project Site include the Hollywood, Newport–Inglewood, Puente Hills Blind Thrust, Malibu Coast, Raymond, Verdugo, and Palos Verde Faults. The Mojave segment of the active San Andreas fault zone is located approximately 38 miles northeast of the Project Site. This fault zone trends northwest for almost the entire length of the state.

Based on available geologic data, active or potentially active faults with the potential for surface fault rupture are not known to be located directly beneath or projecting toward the Project Site. It should however be noted that the Initial Study prepared and circulated with the Notice of Preparation for the Proposed Project (see Appendix A to this EIR) states the vicinity of the Project Site is within a Fault Rupture Study Area as identified on the Department of City Planning Environmental and Public Facilities Maps (September 1996). As required by the City’s General Plan Safety Element, comprehensive geologic-seismic design-foundation investigations shall be conducted and submitted to the Department of Building and Safety. For a detailed discussion of all faults within the Project vicinity, including potentially active and inactive faults, refer to the Geotechnical Report included as Appendix E to this Draft EIR.

*(i) Active Faults*

Santa Monica Fault

The Santa Monica fault is located approximately 10.3 km from the Project Site and extends east from the coastline in Pacific Palisades through Santa Monica and West Los Angeles and merges with the Hollywood fault. The Santa Monica fault is a reverse left-dip fault, consists of one or more strands, and is approximately 40 km long. Its surface illustrations include offset stratigraphy, fault-produced physiographic features, and

groundwater impediments with the Late Quaternary alluvial deposits. Pleistocene and Holocene movement is evident locally along some fault segments, and especially eastward to its intersection with the Newport–Inglewood fault zone. This fault is considered to be active and the most recent surface rupture was during the Late Quaternary period with the time between surface ruptures unknown. This fault has the capability of producing magnitudes ranging from a moment magnitude of 6.0 to 7.0 depending on whether the fault ruptures all at once.

#### Hollywood Fault

The Hollywood fault is located approximately 10.2 km from the Project Site and extends east, northeast for a distance of 14 km through Beverly Hills, West Hollywood, and Hollywood to the Los Angeles River and Interstate 5. It is truncated on the west by the West Beverly Hills Lineament. The Hollywood fault is a left-lateral, reverse fault that separates the Los Angeles Basin and the Santa Monica Mountains. Its most recent surface rupture occurred during the Holocene age with the interval between major surface ruptures of approximately 1,600 years. The probable magnitudes for this fault range from a moment magnitude of 5.8 to 6.5, but could be larger if rupture is simultaneous with an adjacent fault.

#### Newport–Inglewood Fault

Based on a review of geotechnical maps and literature in reference to faulting, the onshore segment of the Newport–Inglewood fault is the closest known fault to the Project Site. It is located approximately 2.9 km southwest of the Project Site. The Newport–Inglewood fault zone is a complex structure with right-lateral displacement that heads in a northwesterly direction and is marked by a series of mesas and hills from Newport Bay to Beverly Hills. The zone produces a vertical displacement in the underlying material of nearly 4,000 feet. The fault zone in the overlying sedimentary rocks consists of short parallel overlapping segments with displacements decreasing upwards with an offset in the youngest beds of only 200 to 300 feet. This zone has a history of intermittent activity with the Long Beach earthquake of 1933 verifying its existence. The most notable earthquake along this fault was magnitude 6.2 with the epicenter offshore, 3 miles southwest of Newport Beach in 1933.

#### *(ii) Blind Thrust Fault Zones*

Another category of fault is known as thrust faults or blind faults. These faults are hidden miles below the earth's surface and their movement is defined as dip-slip faulting. Dip-slip faults are characterized by a vertical slip along angled fault planes which are not vertical but are more like steep ramps. Several examples of these faults include the 1971 moment magnitude 7.1 San Fernando and 1994 moment magnitude 6.7 Northridge

earthquakes with shallow fault planes and a steep dip. The 1987 moment magnitude 6.1 Whittier Narrows earthquake occurred on blind thrust faults with a dip of about 25 degrees and caused secondary slumping and ground cracks.

## (2) Site-Specific Characteristics

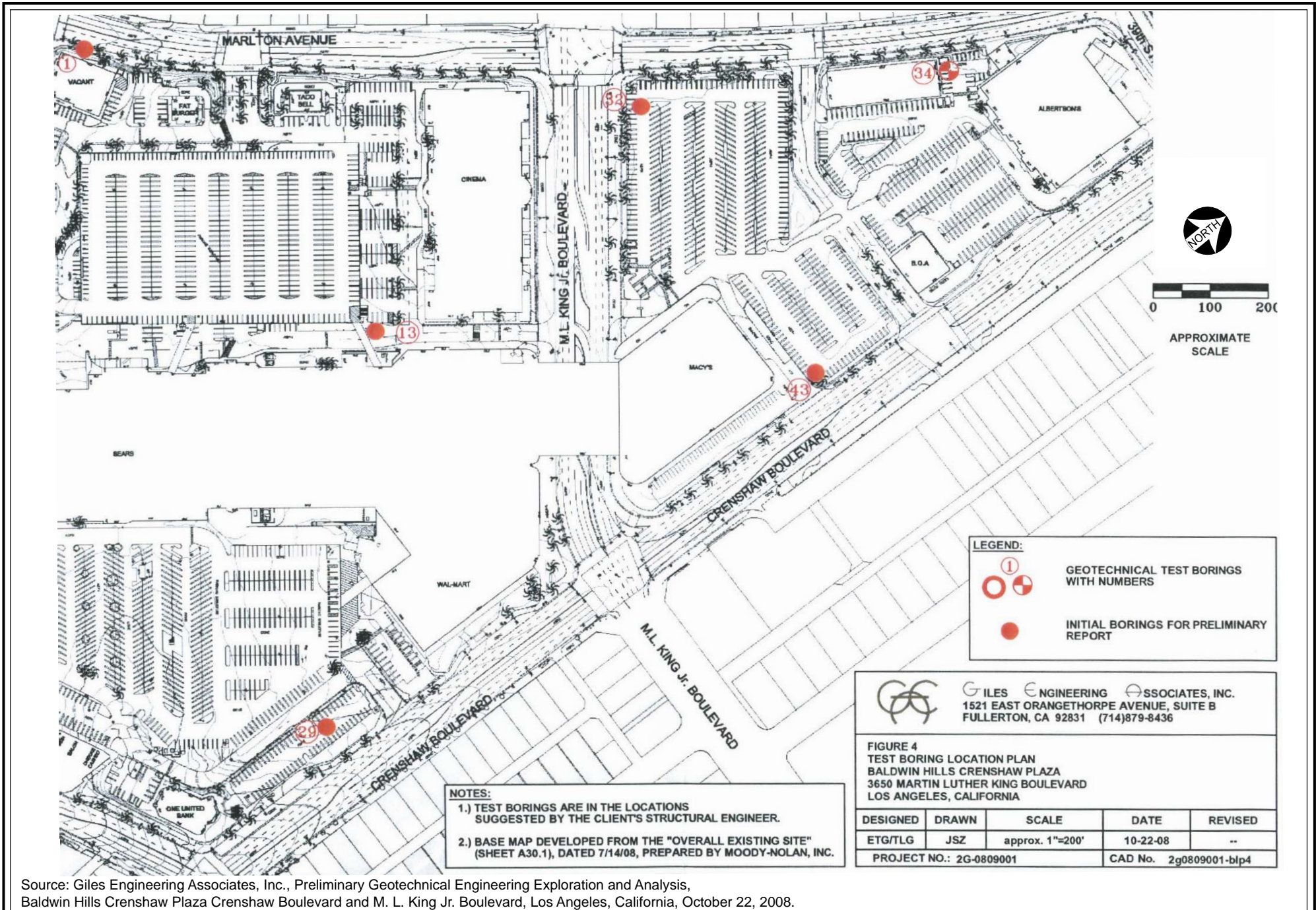
### *(a) Soils and Fill Material*

The Project Site is underlain by alluvial floodplains, and alluvial fan deposits. Older Quaternary deposits exist beneath the southern portion of the Project Site with materials consisting of layers of fine to coarse clayey sand and sandy clay, with traces of silt. The northern half of the Project Site contains younger Quaternary sediments that have sand, silt, and clay materials. These native materials were overlain with artificial fills to existing grades that have been made during urbanization. These soil profiles were confirmed during the subsurface exploration. Figure IV.E-1, Test Boring Location Plan, on page IV.E-6 shows the location of the subsurface exploration conducted by Giles Engineering Associates, Inc.

Subsurface exploratory borings revealed existing fill materials, with a thickness of three to 11 feet. Deeper fill soils may be encountered between borings or elsewhere within the Project Site. The existing fill consists of firm to very dense, silty and clayey fine to coarse sands with gravel, and stiff to hard, sandy silts and sandy clays. The fill is underlain by native soils that consist of loose to very dense silty sands and fine to coarse sands with gravel, and medium stiff to hard sandy silts, sandy clays, and clays. Soils vary from dry to wet, with moisture content typically dependent on grain size and local proximity to the water table.

### *(b) Groundwater*

According to the Geotechnical Report, groundwater, static or perched, was encountered in some of the borings (mostly located along the northern portion of the Project Site) at depths of approximately 25 to 60 feet below existing ground surfaces. The shallower perched groundwater level (25 feet) was encountered in Test Boring No. 34 which is located at the northerly portion of the Project Site, while the deeper groundwater levels (60 feet) were encountered in Test Borings No. 13 and 32 located along the middle portion of the Project Site. No perched or static water was encountered in the test borings located along the southern portion of the Project Site up to the maximum depth explored (80 feet). Based on a review of the California Division of Mines and Geology ("CDMG") Seismic Hazard Zone report for the Hollywood Quadrangle, the historical highest groundwater depth for the Project Site is approximately ten feet below the surface.



Source: Giles Engineering Associates, Inc., Preliminary Geotechnical Engineering Exploration and Analysis, Baldwin Hills Crenshaw Plaza Crenshaw Boulevard and M. L. King Jr. Boulevard, Los Angeles, California, October 22, 2008.

According to the Geotechnical Report, fluctuations of the groundwater table, localized zones of perched water, and rise in soil moisture content should be anticipated during and after the rainy season. Irrigation of landscape areas on or adjacent to the Project Site can also cause fluctuations of local or shallow perches of groundwater.

*(c) Liquefaction and Seismic Settling*

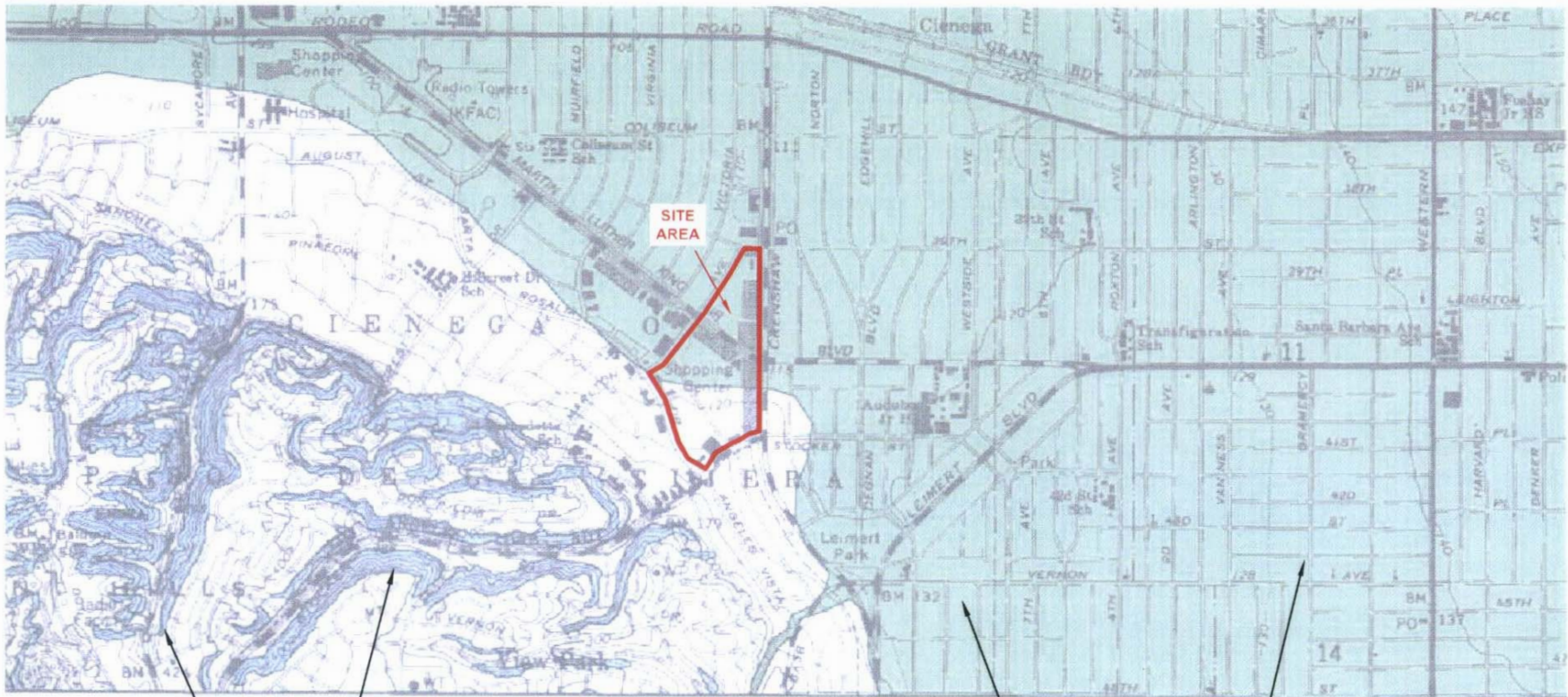
Liquefaction is the process in which loose granular soils below the groundwater table temporarily lose strength during strong ground shaking as a consequence of increased pore pressure and thereby, reduced effective stress. The vast majority of liquefaction hazards are associated with sandy soils and silty soils of low plasticity. Potentially liquefiable soils (based on composition) must be saturated or nearly saturated to be susceptible to liquefaction. Key factors that affect liquefaction include water level, soil type, particle size and gradation, relative density, confining pressure, intensity of shaking, and duration of shaking. Liquefaction potential has been found to be the greatest where the groundwater level is shallow and submerged loose, fine sands occur within a depth of about 50 feet or less.

According to the Seismic Hazards Zone Map for this area, prepared by the California Division of Mines and Geology, the Project Site is located within a liquefiable area.<sup>1</sup> As shown in Figure IV.E-2, Liquefaction Hazard Map, on page IV.E-8, the northern and middle portions of the Project area are located within a designated Liquefaction Hazard Zone. General types of ground failures that might occur as a consequence of severe ground shaking typically include landsliding, ground subsidence, ground lurching, and shallow ground rupture. The probability of occurrence of each type of ground failure depends on the severity of the earthquake, distance from faults, topography, subsoils, and groundwater conditions, in addition to other factors. A quantitative assessment of the Project Site's liquefaction potential was conducted as part of the preliminary geotechnical engineering analysis (see Appendix E) that estimated potential liquefaction-induced settlement at approximately 0.29 to 1.23 inches during the design level earthquake. The consulting geotechnical engineer concluded that liquefaction-related ground hazards affecting this site are not significant.<sup>2</sup>

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<sup>1</sup> *State of California, Division of Mines and Geology, Seismic Hazard Evaluation Report of the Hollywood Quadrangle, 1994.*

<sup>2</sup> *Giles Engineering Associates, Inc., Preliminary Geotechnical Engineering Exploration and Analysis, Baldwin Hills Crenshaw Plaza Crenshaw Boulevard and M. L. King Jr. Boulevard, Los Angeles, California, October 22, 2008.*



**EARTHQUAKE-INDUCED LANDSLIDES**  
 (AREAS WHERE PREVIOUS OCCURRENCE OF LANDSLIDE MOVEMENT, OR LOCAL TOPOGRAPHIC, GEOLOGICAL, GEOTECHNICAL AND SUBSURFACE WATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(c) WOULD BE REQUIRED).


**LIQUEFACTION AREAS**  
 (WHERE HISTORIC OCCURRENCE OF LIQUEFACTION, OR LOCAL GEOLOGICAL, GEOTECHNICAL AND GROUNDWATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(c) WOULD BE REQUIRED).



**NOTES:**

- 1.) BASE MAP DEVELOPED FROM THE "SEISMIC HAZARD ZONES MAP", REV. 1994, OBTAINED FROM THE CALIFORNIA DEPT. OF CONSERVATION'S INTERNET SITE.

Source: Giles Engineering Associates, Inc., Preliminary Geotechnical Engineering Exploration and Analysis, Baldwin Hills Crenshaw Plaza Crenshaw Boulevard and M. L. King Jr. Boulevard, Los Angeles, California, October 22, 2008.

 <b>GILES ENGINEERING ASSOCIATES, INC.</b> 1521 EAST ORANGETHORPE AVENUE, SUITE B FULLERTON, CA 92831 (714)879-8436				
<b>FIGURE 3</b> <b>LIQUEFACTION HAZARD MAP</b> <b>BALDWIN HILLS CRENSHAW PLAZA</b> <b>3650 MARTIN LUTHER KING BOULEVARD</b> <b>LOS ANGELES, CALIFORNIA</b>				
<b>DESIGNED</b>	<b>DRAWN</b>	<b>SCALE</b>	<b>DATE</b>	<b>REVISED</b>
ETG/TLG	JSZ	NTS	10-22-08	--
<b>PROJECT NO.: 2G-0809001</b>			<b>CAD No. 2g0809001-blp3</b>	



**Figure IV.E-2**  
 Liquefaction Hazard Map

*(d) Tsunamis, Inundation, and Flood Zones*

Tsunamis are large ocean waves resulting from sudden water displacement due to a submarine earthquake, landslide, or volcanic eruption. The Project Site is not located in a coastal area. Therefore, tsunamis (seismic sea waves) are not considered to be a significant hazard at the Project Site. According to the Safety Element of the City of Los Angeles General Plan, the Project Site does not lie within the areas identified to be potentially impacted by tsunamis.<sup>3</sup> Seiches, caused by the seismic ground shaking associated with earthquakes, are oscillations generated within enclosed bodies of water. According to the Safety Element of the City of Los Angeles General Plan, the Project Site is identified as being located within a potential inundation area.<sup>4</sup> While the Safety Element does not identify specific inundation areas by name, the Project Site is located within inundation proximity of the Silver Lake and Hollywood Reservoirs. However, the Project Site is not located near a large body of water that could have an adverse effect on the Project Site in the event of earthquake-induced failures or seiches (wave oscillations in an enclosed or semi-enclosed body of water).<sup>5</sup>

*(e) Subsidence*

Subsidence is the downward settling of the earth's surface as a result of fluid withdrawal from deep geologic formations. Unless these voids are refilled, they may collapse causing subsidence in the shallower earth layers between the ground surface and the pumped geologic units. According to the Los Angeles Citywide General Plan Framework Element Draft EIR, hazards associated with subsidence are not known to be present in this area.<sup>6</sup>

*(f) Expansive Soils*

The on-site earth materials are in the medium expansion range. The Expansion Index was found to be 67 and 60 for Test Boring No. 13 and 43 respectively. The Expansion Index is used to measure a basic index property of soil. The classification of a

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<sup>3</sup> *City of Los Angeles, Safety Element of the General Plan, Safety Element, Safety Element Exhibit G, Inundation & Tsunami Hazard Areas, in the City of Los Angeles, September 1996.*

<sup>4</sup> *Ibid.*

<sup>5</sup> *Giles Engineering Associates, Inc., Preliminary Geotechnical Engineering Exploration and Analysis, Baldwin Hills Crenshaw Plaza Crenshaw Boulevard and M. L. King Jr. Boulevard, Los Angeles, California, October 22, 2008.*

<sup>6</sup> *City of Los Angeles, General Plan Framework Draft EIR, Table GS-10, Geologic/Seismic Hazards, Distribution and Relative Hazard Level by Community Plan Area, Southwest Los Angeles Subregion, West Adams–Baldwin Hills–Leimert CPA, January 1995.*

potentially expansive soil is based on the following criteria: 0–20 = Very Low; 21–50 = Low; 51–90 = Medium; 91–130 = High; >130 = Very High. When the expansion index is greater than 20, the engineer must make recommendations and the designer must incorporate these recommendations in the building design.

*(g) Landslides*

Landslides may be triggered by earthquakes, rainstorms, or construction-related activities (e.g., improper grading, structural design, landscaping, etc.). The Project Site is located within the West Adams–Baldwin Hills–Leimert Community Plan Area. According to the Safety Element of the City of Los Angeles General Plan, this area is not located in an area at risk for on- or off-site landslides.<sup>7</sup> In addition, a review of the published Seismic Hazard Evaluation Report for the Hollywood Quadrangle indicates the Project Site does not lie within a designated Landslide Hazard Zone.<sup>8</sup>

## **b. Regulatory Framework**

### **(1) State Level**

The State of California adopted the 2013 California Building Code (“CBC”), which became effective on January 1, 2014.<sup>9</sup> The CBC is a compilation of building standards, including seismic safety standards for new buildings. The purpose of the CBC is to establish minimum standards for safeguarding public health and safety through structural strength, means of egress facilities, and general stability by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and structures.

The Alfred E. Alquist Seismic Safety Commission provides oversight, review, and recommendations to the Governor and State Legislature regarding seismic issues. The Commission has adopted several documents based on recorded earthquakes, such as the 1994 Northridge earthquake, 1933 Long Beach earthquake, and the 1971 Sylmar earthquake. Some of these documents relevant to the Proposed Project are:

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<sup>7</sup> *City of Los Angeles, Safety Element of the General Plan, Safety Element Exhibit C, Landslide Inventory and Hillside Areas, in the City of Los Angeles, 1996.*

<sup>8</sup> *Giles Engineering Associates, Inc., Preliminary Geotechnical Engineering Exploration and Analysis, Baldwin Hills Crenshaw Plaza Crenshaw Boulevard and M. L. King Jr. Boulevard, Los Angeles, California, October 22, 2008.*

<sup>9</sup> *California Building Standards Commission, California Building Standards Code (Title 24, California Code of Regulations), [www.bsc.ca.gov/codes.aspx](http://www.bsc.ca.gov/codes.aspx), accessed February 5, 2014.*

- Research and Implementation Plan for Earthquake Risk Reduction in California 1995 to 2000, report dated December 1994;
- Commercial Property Owner's Guide to Earthquakes Safety, report dated October 2006;
- California Earthquake Loss Reduction Plan 2007–2011, report dated July 2007.

The Alquist-Priolo Geologic Hazards Zone Act was enacted by the State of California in 1972 to address the hazard and damage caused by surface fault rupture during an earthquake. It was renamed the Alquist-Priolo Earthquake Fault Zoning Act ("Alquist-Priolo Act"), effective January 1, 1994. The Alquist-Priolo Act requires the State Geologist to establish "earthquake fault zones" along known active faults in the State. Cities and counties that include earthquake fault zones are required to regulate development projects within these zones.

The Seismic Hazard Mapping Act of 1990 was enacted, in part, to address seismic hazards not included in the Alquist-Priolo Act, including strong ground shaking, landslides, and liquefaction. The State Geologist is assigned the responsibility of identifying and mapping seismic hazards zones.

The CGS has also adopted seismic design provisions in Special Publication 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California, March 13, 1997.

## (2) City Level

The City's primary seismic regulatory policy is the Safety Element of the City of Los Angeles General Plan, adopted November 26, 1996. The City's regulations incorporate the State's requirements. The objective of the Safety Element is to better protect occupants and equipment during various types and degrees of seismic events. In the City's Safety Element, specific guidelines are included for the evaluation of liquefaction, tsunamis, seiches, non-structural elements, fault rupture zones, and engineering investigation reports. The City's Emergency Operations Organization ("EOO") helps to administer certain policies and provisions of the Safety Element. The EOO is a City department comprised of all City agencies. The Administrative Code, EOO Master Plan, and associated EOO plans establish the chain of command, protocols, and programs for integrating all of the City's emergency operations into one unified operation. Each City agency in turn has operational protocols, as well as plans and programs, to implement EOO protocols and programs. A particular emergency or mitigation triggers a particular set of protocols that are addressed by implementing plans and programs. The City's emergency operations program encompasses all of these protocols, plans, and programs.

The Safety Element goals, objectives, and policies are broadly stated to reflect the comprehensive scope of the EOO.

The City of Los Angeles has integrated the 2012 International Building Code and the 2013 CBC into the City of Los Angeles Building Code (“LABC”). The LABC includes Seismic Design provisions for Foundations, Retaining Walls, and Expansive and Compressible Soils, provisions for Site Work, Demolition, and Construction, and provisions for Grading, Excavation, and Fills. The provisions of the LABC address issues related to site grading, cut and fill slope design, soil expansion, geotechnical investigations before and during construction, slope stability, allowable bearing pressures and settlement below footings, effects of adjacent slopes on foundations, retaining walls, basement walls, shoring of adjacent properties, and potential primary and secondary seismic effects.<sup>10</sup>

The City of Los Angeles Department of Building and Safety (“LADBS”) Grading Division has also adopted Rules of General Application (“RGA”), a series of Geotechnical Standards that supplement the requirements of the LABC. These include specific requirements for seismic design, slope stability, grading, foundation design, geologic investigations and reports, soil and rock testing, and groundwater. The LADBS is responsible for implementing the provisions of the LABC and RGA.

### **3. Environmental Impacts**

#### **a. Methodology**

An assessment of grading, site design, and seismicity was performed to identify potential Project impacts associated with geology and soils. As indicated above, the analysis is based on the *Preliminary Geotechnical Engineering Exploration and Analysis*, which was prepared by Giles Engineering Associates, Inc and is included as Appendix E of this Draft EIR. The geotechnical reports were prepared based on review of existing documentation, field investigations including subsurface exploration, and laboratory testing.

#### **b. Thresholds of Significance**

The *L.A. City CEQA Thresholds Guide* (2006) requires the geology and soils analysis to address the following four areas of study: (1) geologic hazards; (2) sedimentation and erosion; (3) landform alteration; and (4) mineral resources. Based on the criteria set forth

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<sup>10</sup> See LABC Sections 91.7006.7, 91.7010, 91.7011, 91.7013, 91.7014, and 91.7016.

in the *L.A. City CEQA Thresholds Guide*, a project would have a significant impact under the following criteria if:

### (1) Geologic Hazards

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

### (2) Sedimentation and Erosion

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

### (3) Landform Alteration

- 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, hillslopes, canyons, ravines, rock outcrops, water bodies, streambeds and wetlands.

### (4) Mineral Resources

- The project might result in the permanent loss of, or loss of access to a mineral resource that is located in a MRZ-2 or other known or potential mineral resource area (and the degree to which this would occur); and
- Whether the mineral resource is of regional or statewide significance, or is noted in the Conservation Element as being of local importance.

## **c. Regulatory Compliance Measures and Project Design Features**

### (1) Regulatory Compliance Measures

The Proposed Project would comply with all applicable regulatory standards. Implementation of the following Regulatory Compliance Measures, as currently required and/or as may be amended in the future, is intended to reduce impacts related to geology and soils:

**Regulatory Compliance Measure E-1:** In accordance with California law, the Proposed Project shall comply with all provisions of the California Building Standards Code and CAL-OSHA requirements.

**Regulatory Compliance Measure E-2:** All structural elements shall be designed and built to resist strong ground motions in accordance with the requirements of the City of Los Angeles Building Code. These measures shall be reviewed and approved by the City of Los Angeles Department of Building and Safety prior to issuance of building permits.

**Regulatory Compliance Measure E-3:** The Proposed Project shall be designed in accordance with the requirements of the latest edition of the City of Los Angeles Building Code.

## (2) Project Design Features

The Proposed Project would implement the following specific project design features with regard to geology and soils:

**Project Design Feature E-1:** A final design-level geotechnical, geologic, and seismic hazard investigation report that complies with all applicable State and local code requirements shall be prepared for the Proposed Project by a qualified geotechnical engineer and certified engineering geologist and shall be submitted to the Los Angeles Department of Building and Safety, consistent with City of Los Angeles Building Code requirements. The site-specific geotechnical report shall be prepared to the written satisfaction of the City of Los Angeles Department of Building and Safety. The site-specific geotechnical report shall address each of the recommendations provided in the *Preliminary Geotechnical Engineering Exploration and Analysis, Baldwin Hills Crenshaw Plaza Crenshaw Boulevard and M. L. King Jr. Boulevard, Los Angeles, California*, prepared by Giles Engineering Associates, Inc., October 22, 2008, including, but not limited to the requirements set forth in Project Design Features E-2 through E-18.

**Project Design Feature E-2:** Clearing operations shall include the removal of all existing structural features such as building foundations and floor slabs, asphaltic concrete pavement, concrete walkways within the area of the proposed buildings, parking structures and site improvements.

**Project Design Feature E-3:** Existing pavement within areas of proposed development shall be removed or processed to a maximum of 3-inch size and stockpiled for use as compacted fill or stabilizing material for the new buildings and parking structures.

- Project Design Feature E-4:** Due to moisture sensitivity of the on-site soils, the pavement shall remain in-place as long as possible to protect the subgrade area from construction.
- Project Design Feature E-5:** Shoring shall be required for certain excavations pursuant to conditions established by the City of Los Angeles Department of Building and Safety.
- Project Design Feature E-6:** A mat foundation shall be utilized throughout the Project Site as permitted by the City of Los Angeles Department of Building and Safety.
- Project Design Feature E-7:** Heavily loaded portions of the proposed development shall be supported by straight shaft piers.
- Project Design Feature E-8:** Deep foundations for heavily loaded areas shall be supported by auger cast piles.
- Project Design Feature E-9:** Walls below-grade shall be designed to resist the applicable lateral earth pressures.
- Project Design Feature E-10:** All walls shall be designed to support any adjacent structural surcharge loads imposed by other nearby walls or footings in addition to the above recommended active and at-rest earth pressures.
- Project Design Feature E-11:** Backfill behind shallow retaining walls or walls below grade shall consist of appropriate materials and shall be properly compacted.
- Project Design Feature E-12:** Below-grade wall backfill shall be drained to reduce the lateral earth pressures and help control wall dampness.
- Project Design Feature E-13:** An appropriate drainage system shall be incorporated in the wall design along the base of the wall or foundation.
- Project Design Feature E-14:** Portland Cement Concrete pavements shall be used in areas where traffic is concentrated such as the entrance/exit aprons as well as areas subjected to heavy loads such as the trash enclosure loading zone, the approach ramp within the truck wells of the loading docks, at sharp corners and where heavy trucks might be parked.
- Project Design Feature E-15:** Portland Cement Concrete pavements in high stress areas shall be at least 6 inches thick and contain No. 4 bars at 10-inch on-center spacing each way with a properly prepared subgrade.
- Project Design Feature E-16:** In the event that shallow perched water is encountered in shallow excavations, filter sump pumps placed within

pits in the bottoms of excavations shall be used for construction dewatering.

**Project Design Feature E-17:** If perched water conditions are encountered during shoring operations, a dewatering system shall be installed prior to the subterranean area being excavated below the ground water level.

**Project Design Feature E-18:** When periods of extended rainfall are forecast (i.e., two days or more), work shall be stopped for the day or earlier, to ensure proper compaction of all fill that has been spread and awaits compaction.

## d. Project Impacts

As discussed in Section III (Project Description) of this Draft EIR, the Proposed Project would revitalize the existing Baldwin Hills Crenshaw Plaza to include mixed-use retail, commercial uses, office uses, a hotel, and 961 new dwelling units for a total of approximately 3,072,956 square feet of net floor area.

### (1) Geologic Hazards

#### (a) *Fault Rupture*

The Project Site is located in the seismically active region of Southern California. Numerous active and potentially active faults with surface expressions (fault traces) have been mapped adjacent to, within, and beneath the City of Los Angeles. The Project Site does not lie within the boundaries of an "Earthquake Fault Zone" as defined by the State of California in the Alquist-Priolo Earthquake Fault Zoning Act. Based on available geologic data, active or potentially active faults with the potential for surface fault rupture are not known to be located directly beneath or projecting toward the Project Site. However, the vicinity of the Project Site is within a Fault Rupture Study Area as identified on the Department of City Planning Environmental and Public Facilities Maps (September 1996). As required by the City's General Plan Safety Element, comprehensive geologic-seismic design-foundation investigations shall be conducted and submitted to the Department of Building and Safety. In accordance with Regulatory Compliance Measures E-1 through E-3 and Project Design Feature E-1, the Proposed Project would comply with City and State Building Codes and a final design-level geotechnical, geologic, and seismic hazard investigation report would be prepared and would be subjected to the LADBS for review and approval. Therefore, impacts related to fault rupture would be less than significant.

*(b) Strong Seismic Ground Shaking*

The principal seismic hazard to the Proposed Project is moderate-to-strong ground shaking caused by earthquakes produced by local or regional faults. Although the Project Site is located within approximately 2.9 km of the active Newport–Inglewood fault, and by many other faults on a local and regional level, the potential seismic hazard to the Project Site would be similar to most areas located in the seismically active region of Southern California. The Proposed Project would include modern, well-constructed buildings that are designed to resist ground shaking through the use of shear walls and reinforcements. Furthermore, in accordance with Regulatory Compliance Measures E-1 through E-3 and Project Design Feature E-1, the proposed construction would be consistent with all applicable provisions of the City and State Building Codes and a final design-level geotechnical, geologic, and seismic hazard investigation report would be prepared and would be subjected to the LADBS for review and approval. Therefore, while the Proposed Project could be subject to future seismic-related ground shaking, the proposed building design, compliance with applicable building codes, and implementation of the geotechnical recommendations would reduce damages to structures and infrastructure and the exposure of people to substantial risk of injury to the maximum extent feasible. With respect to City of Los Angeles threshold (a), the Proposed Project would have a less than significant geologic hazard impact since it would not cause or accelerate geologic hazards which result in substantial damage to structures or infrastructure, or expose people to substantial risk of injury. As such, impacts from ground shaking would be less than significant.

*(c) Liquefaction*

As discussed previously, the Project Site is within an area identified by the City of Los Angeles as being prone to liquefaction. According to the Geotechnical Report, the northern portion of the Project Site is located within an area that has been designated by the State Geologist as a “zone of required investigation” due to the potential for earthquake-induced liquefaction. Therefore, a site liquefaction evaluation consistent with the guidelines contained in the CDMG Special Publication 117 has been performed as part of the current investigation. A historic high water level of 10 feet was adopted for the liquefaction analysis.

The Geotechnical Report determined that maximum total liquefaction-induced ground settlements at the Project Site would be approximately 0.29 inch to 1.23 inches during the design level earthquake. The maximum differential settlement resulting from liquefaction is, therefore, estimated to be the difference between the total settlement in Borings No. 34 and 43 or 0.94 inch across a distance of 600 feet. Although liquefaction-induced ground settlements could occur at the Project Site, future structures built at the Project Site would be constructed in accordance with the City and State Building Codes and would adhere to all modern earthquake standards, including those relating to soil

characteristics, in accordance with Regulatory Compliance Measures E-1 through E-3. In addition, the Project would comply with Project Design Features E-2 through E-18 that include the site development recommendations from the Geotechnical Report provided to reduce liquefaction impacts. Furthermore, with implementation of Project Design Features E-2 through E-18, development of the Proposed Project would not expose people to significant liquefaction impacts such as seismic settlement and differential compaction. Therefore, the Proposed Project would not result in significant liquefaction related impacts, and impacts associated with liquefaction and ground failure would be less than significant.

*(d) Landslides*

The Project Site is located approximately 1.0 mile east of the Baldwin Hills. The highest point in the Baldwin Hills is 511 feet and is the highest elevation along the Newport–Inglewood Structural zone. However, the topography at the Project Site is relatively flat. The Preliminary Geotechnical Engineering Exploration and Analysis considers the probability of a seismically-induced landslide occurrence low due to the general lack of elevation difference slope geometry across or adjacent to the Project Site. Furthermore, according to the Safety Element of the City of Los Angeles General Plan, the Project Site is not located in an area at risk for on- or off-site landslides. In addition, a review of the published Seismic Hazard Evaluation Report for the Hollywood Quadrangle indicates the Project Site does not lie within the designated Landslide Hazard Zone. Finally, in accordance with Regulatory Compliance Measures E-1 through E-3, the Proposed Project would be subject to the design requirements set forth in the City and State Building Codes. Therefore, the Proposed Project would not result in or expose people to landslide related hazards, and no impact would occur.

*(e) Tsunamis, Inundation, and Flooding*

According to the Safety Element of the City of Los Angeles General Plan, the Project Site does not lie within the areas identified to be potentially impacted by tsunamis. Seiches, caused by the seismic ground shaking associated with earthquakes, are oscillations generated within enclosed bodies of water. However, according to the Safety Element of the City of Los Angeles General Plan, the Project Site is identified as being located within a potential inundation area. While the Safety Element does not identify specific inundation areas by name, the Project Site is located within inundation proximity of the Silver Lake and Hollywood Reservoirs. However, the Project Site is not located near a large body of water that could have an adverse effect on the Project Site in the event of earthquake-induced failures or seiches (wave oscillations in an enclosed or semi-enclosed body of water). Additionally, the Project Site is not located in an identified 100-year flood hazard area as mapped on a FEMA Federal Hazard Boundary or Flood Insurance Rate Map. Therefore, Project impacts related to tsunamis, inundation, and flooding would be less than significant. No mitigation is required.

*(f) Geologic and Soil Instabilities and Subsidence*

Excavation would be required for the subterranean structures of the Proposed Project. As discussed above, the Project Site is underlain by fill consisting of firm to very dense, silty and clayey fine to coarse sands with gravel, and stiff to hard, sandy silts and sandy clays. The fill is underlain by native soils that consist of loose to very dense silty sands and fine to coarse sands with gravel, and medium stiff to hard sandy silts, sandy clays, and clays. Soils vary from dry to wet, with moisture content typically dependent on grain size and local proximity to the water table. As stated in more detail in the Project Design Features, local excavation and earthwork would be conducted to provide footings, foundations, and subterranean walls to support the proposed parking structures and buildings.

Perched groundwater was encountered at an approximate depth of 25 feet within Test Boring No. 34 located along the northern portion of the Project Site, and at deeper depths of about 59 to 60 feet during the subsurface investigation. Therefore, the Project Site may be susceptible to the development of shallow perched water conditions especially along the northern portion of the Project Site. In the event that shallow perched water is encountered in shallow excavations, filter sump pumps would be placed within pits in the bottoms of excavations as a method of construction dewatering.

The lowermost portion of the excavation of the proposed basement located along the northerly portion of the Project Site would extend below the perched groundwater condition, approximately 25 feet below existing grade. This groundwater may cause an unstable condition within the bottom and lower portions of the sidewalls of the subterranean area along the northerly portion of the Project Site. If a perched water condition is encountered during shoring operation, a dewatering system would be installed prior to the subterranean area being excavated below the groundwater level. Based on the requirements of the City of Los Angeles for the construction of basements or excavations near property lines, a submerged dewatering system is required instead of wells to avoid damage from dewatering under adjoining properties. The dewater design should take into consideration the potential for subsidence within the adjacent properties and on-site structures as a result of the dewatering process. In the event perched water is encountered, Project Design Features E-16 and E-17 ensure the Proposed Project would include an appropriate dewatering system to the satisfaction of the Department of Building and Safety.

Some slope stability problems may be encountered in steep, unbraced excavations considering the nature of the subsoils. In accordance with Regulatory Compliance Measure E-1, all excavations must be performed in accordance with City and State Codes, and Cal/OSHA requirements. In addition, extreme caution should be exercised with any

excavation that extends into the foundation influence zone of existing foundations. Slot excavation techniques may be necessary depending on location and elevation of excavations with respect to existing foundations to ensure against undermining or removal of lateral support. However, with the implementation of the identified regulatory compliance measures and project design features, impacts related to soil stability would be less than significant.

Subsidence is most often caused by human activities, mainly from the removal of subsurface water. No subsidence associated with fluid withdrawal, peat oxidation, or hydrocompaction is known to have occurred on or in the vicinity of the Project Site. As discussed above, the Proposed Project includes excavation of the proposed basement located along the northerly portion of the Project Site that would extend below the perched groundwater condition, approximately 25 feet below existing grade. This groundwater may cause an unstable condition within the bottom and lower portions of the sidewalls of the subterranean area along the northerly portion of the Project Site. If perched water conditions are encountered during shoring operation, a dewatering system would be installed prior to the subterranean area being excavated below the groundwater level. The dewatering system would be designed in accordance with the geotechnical recommendations for the site-specific conditions as they are encountered in a manner to reduce the potential for subsidence from dewatering activities. Therefore, with the implementation of the identified regulatory compliance measures and project design features, development of the Proposed Project would not result in, or expose people to, significant subsidence related impacts.

*(g) Expansive Soils*

The on-site earth materials are in the medium expansion range. The Geotechnical Report found the Expansion Index to be 67 and 60 for Test Boring No. 13 and 43 respectively. Therefore, the preliminary geotechnical study determined it would not be necessary to reinforce the structure beyond the code requirements by the City of Los Angeles Department of Building and Safety, and the recommendations provided in the Preliminary Geotechnical Engineering Exploration and Analysis noted in Project Design Features E-2 through E-18. Therefore, the Proposed Project would not result in or expose structures to expansive soils, and impacts with respect to expansive soils would be less than significant.

*(h) Sedimentation and Erosion*

The potential for soil erosion during the construction and operation of the Proposed Project is relatively low due to the generally level topography of the development area. As discussed in more detail in Section IV.G, Hydrology and Water Quality, of this Draft EIR,

the greatest risk of soil erosion during the construction phase occurs when site disturbance peaks due to grading activity and removal and re-compaction or replacement of fill areas. As noted in Section IV.G, Hydrology and Water Quality, of this Draft EIR, the Project Applicant would be required to prepare and implement a SUSMP, in accordance with the NPDES General Permit. The SUSMP would detail the treatment measures and BMPs to control pollutants and would include an erosion control plan that outlines erosion and sediment control measures that would be implemented during the construction and post-construction phases of Project development. Furthermore, in accordance with Regulatory Compliance Measure E-3, the Proposed Project would comply with all City building codes enforced by the Department of Building and Safety which would prevent the Proposed Project from causing a geologic hazard to other properties by causing or accelerating instability from erosion. In accordance with Regulatory Compliance Measure E-3 and with implementation of the BMPs detailed in Section IV.G, Hydrology and Water Quality, of this Draft EIR (see Table IV.G-2), the Proposed Project would also not accelerate natural processes of wind and water erosion and sedimentation. Accordingly, impacts related to soil erosion and loss of topsoil would be less than significant.

*(i) Landform Alteration*

The Proposed Project would require excavation and export of fill material from the Project Site. As the relatively flat Project Site is located in an urbanized area and was previously disturbed during the construction of the existing on-site buildings, no prominent geologic or topographic features are located on the Project Site. As such, no distinct or prominent geologic or topographic features would be destroyed, permanently covered or materially or adversely modified. Thus, there would be no impact related to landform alteration under the Proposed Project.

## **4. Cumulative Impacts**

Impacts related to future development in the City of Los Angeles would involve geotechnical hazards associated with site-specific soil conditions, erosion, and ground-shaking during earthquakes. Impacts associated with geologic and soil issues are typically confined to a project site and/or within a localized area around a project site. As such, geologic or soil impacts under the Proposed Project would not affect off-site areas associated with the related projects or ambient growth within the vicinity. Cumulative development in the area would, however, increase the overall potential for exposure to seismic hazards by potentially increasing the number of people exposed to existing seismic hazards. Nevertheless, all of the related projects are subject to established guidelines and regulations pertaining to seismic hazards. As such, adherence to applicable building regulations and standard engineering practices would ensure that cumulative impacts would be less than significant under the Proposed Project.

## **5. Mitigation Measures**

As the Proposed Project is not anticipated to result in any significant impacts related to geology and soils, no mitigation measures would be required.

## **6. Level of Significance After Mitigation**

Project impacts related to geology and soils would be less than significant.