3.4 GEOLOGY AND SOILS

This section discusses the existing geologic and soils conditions and evaluates the potential impacts related to geology and soils as a result of the proposed project. This section addresses seismic conditions, soil erosion, stability of the underlying geologic unit, and soil conditions. The analysis of the potential project impacts related to geology and soils information is summarized from the *Geotechnical Engineering Investigation – Proposed Robertson Lane Hotel and Retail Structures and Subterranean Parking Structure Extension below West Hollywood Park*, prepared by Geotechnologies Inc. This report is included as Appendix E of this EIR and is referred to in this section as the "Geotechnical Investigation."

3.4.1 Environmental Setting

Regional Geology

The project site is located along the northern margin of the Los Angeles Basin. The Los Angeles Basin, also referred to as the Coastal Plain of Los Angeles, is situated between the Santa Monica Mountains on the north, the Puente Hills and Whittier fault to the east, the Palos Verdes Peninsula and Pacific Ocean on the west, and the Santa Ana Mountains and San Joaquin Hills on the south.

Locally, the project site is situated on an alluvial apron at the base of the Hollywood Hills known as the La Brea Plain. Topography in the area slopes to the south. Regionally, the Los Angeles Basin, including the site, is located in the northern portion of the Peninsular Ranges geomorphic province. The boundary between the Peninsular Ranges and Transverse Ranges geomorphic provinces is a system of faults that include the active Malibu Coast, Santa Monica, Hollywood, Raymond, and Sierra Madre fault zones.

Local Geology

Fill materials underlying the project site and park site consist of silty sands to sandy and clayey silts, which are dark brown in color, moist, medium dense to stiff, fine grained, with occasional construction debris. Fill thickness ranging from 2 to 7.5 feet was encountered in the exploratory borings and test pits. Native soils consist of stratified layers of silty to clayey sands, sands, sandy to clayey silts, and sandy clays. The native soils are brown, dark gray and grayish brown in color, moist to wet, medium dense to dense, stiff, fine to medium grained. The native soils consist predominantly of sediments deposited by river and stream action typical to this area of Los Angeles County.

Seismic Faulting

Faults are fractures or zones of fracture along which displacement of one side occurs relative to another side. This displacement can take a number of forms, including vertical, horizontal, or a combination of displacement directions. Horizontal movement of adjacent land masses, such as occurs along the San Andreas Fault, are known as strike-slip faults. In the case of the San Andreas Fault, the Pacific Plate is moving in a north-westerly direction, relative to the North American plate. Faults may also cause vertical movement, in which a section of land is elevated above another section. This occurs at dip-slip faults, and may result in a previously buried mass of land being exposed as a fault scarp. There are several types of dip-slip faults, including normal, reverse and thrust faults. Oblique faults, such as the Santa Monica Hollywood, Raymond and Cucamonga Faults, cause both vertical and horizontal displacement.

Based on criteria established by the California Division of Mines and Geology (CDMG) now called California Geologic Survey (CGS), faults may be categorized as active, potentially active, or inactive. Active faults are those which show evidence of surface displacement within the last 11,000 years (Holocene-age). Potentially-active faults are those that show evidence of most recent surface displacement within the last 1.6 million years (Quaternary-age). Faults showing no evidence of surface displacement within the last 1.6 million years are considered inactive for most purposes.

Ground Rupture

Ground rupture is defined as surface displacement which occurs along the surface trace of the causative fault during an earthquake. Based on research of available literature, and results of site reconnaissance, no known active or potentially active faults underlie the project site or the park site. The closest surface fault to the project site and park site is the Hollywood Fault, which trends approximately east-west along the base of the Santa Monica Mountains from the West Beverly Hills Lineament in the West Hollywood-Beverly Hills area to the Los Feliz area of Los Angeles. It is located approximately 0.5 miles north of the project site and park site. In addition, the project site is not located within an Alquist-Priolo Earthquake Fault Zone. Based on these considerations, the potential for surface ground rupture at the project site and park site is considered low.

The City of West Hollywood has identified fault zones requiring additional fault studies. These zones were created based on geologic evidence of active fault movement (within the last 11,000 years) along the Hollywood Fault. A state sponsored fault evaluation report has not yet assigned Earthquake Fault Zones to these faults for this particular area. The width and shape of the zones defined by West Hollywood are different than those assigned by the CGS to other faults. The project site and park site are not located within a Fault Precaution Zone (FP-1 or FP-2) for the City of West Hollywood, as shown in General Plan EIR Figure 3.5-2, City of West Hollywood Fault Location and Precaution Zone Map.

Groundwater

On the project site and park site, groundwater was encountered at depths between 22 and 32.5 feet below the existing site grade in the exploratory borings. The historically highest groundwater level was established by review of California Geological Survey Seismic Hazard

Zone Report of the Beverly Hills Quadrangle. Review of this report indicates that the historically highest groundwater level is on the order of 10 feet below the existing site grade (Appendix E).

Liquefaction

Liquefaction typically occurs when loose sand and silt that is saturated with water can behave like a liquid when shaken by an earthquake. Earthquake waves cause water pressures to increase in the sediment and the sand grains to lose contact with each other, leading the sediment to lose strength and behave like a liquid. The soil can lose its ability to support structures, flow down even very gentle slopes, and erupt to the ground surface to form sand boils. Many of these phenomena are accompanied by settlement of the ground surface—usually in uneven patterns that damage buildings, roads and pipelines.

The Seismic Hazards Maps of the State of California (CDMG 1999), classifies both the project site and park site as part of the potentially "liquefiable" area. This determination is based on groundwater depth records, soil type and the distance from a fault capable of producing a substantial earthquake.

Groundwater was encountered at depths between 22 and 32.5 feet below grade in the geotechnical explorations. The historically highest groundwater level was established by review of California Geological Survey Seismic Hazard Zone Report of the Beverly Hills Quadrangle. Review of this report indicates that the historically highest groundwater level is on the order of 10 feet below grade. The historic highest groundwater level was conservatively utilized for the liquefaction analysis that was conducted by Geotechnologies.

The liquefaction analysis conducted for the project site and park site indicates that the soil layer between approximately 10 and 37.5 feet has a factor of safety against liquefaction less than 1.3, and is therefore considered to be potentially liquefiable (Appendix E).

Lateral Spreading

Lateral spreading is the most pervasive type of liquefaction-induced ground failure. During lateral spread, blocks of mostly intact, surficial soil displace downslope or towards a free face along a shear zone that has formed within the liquefied sediment. The model earthquake magnitude which contributes the majority of the ground motion to the site is 6.7.[1] The project site and park site are relatively level, with no free face or sloping ground in the vicinity of the sites. In addition, the proposed subterranean levels would remove the liquefiable soils below the sites. Therefore, the potential for lateral spread is considered remote (Appendix E).

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[1] The modal magnitude of 6.7 for the project site was obtained from the USGS Probabilistic Seismic Hazard Deaggregation program.

Expansive Soils

Expansive soils are composed largely of clays, which greatly increase in volume when saturated with water and shrink when dried. Because of this effect, building foundations may rise during the rainy season and fall during the dry season. If this expansive movement varies underneath different parts of a single building, foundations may crack, structural portions of the building may be distorted, and doors and windows may become warped so that they no longer function properly. The potential for soil to undergo shrink and swell is greatly enhanced by the presence of a fluctuating, shallow groundwater table. Changes in the volume of expansive soils can result in the consolidation of soft clays after the lowering of the water table or the placement of fill. The on-site geologic materials are in the moderate expansion range (Appendix E).

Collapsible Soils

Collapsible soils are characterized as typically young, loose deposits that have the potential for significant abrupt volumetric change when wetted. An increase in surface water infiltration, such as from heavy irrigation or prolonged rainfall or from a rise in the groundwater, combined with the weight of a structure, can initiate settlement. These materials typically affect foundations, slabs, and exterior improvements to properties. Collapsible soils are known to exist within the City. However, the severity of this hazard in West Hollywood is only considered low to moderate (City of West Hollywood 2010).

Landslides and Slope Instability

A landslide is the downhill movement of masses of earth material under the force of gravity. The factors contributing to landslide potential are steep slopes, unstable terrain, and proximity to earthquake faults. This process typically involves the surface soil and an upper portion of the underlying bedrock. Movement may be very rapid, or so slow that a change of position can be noted only over a period of weeks or years (creep). The size of a landslide can range from several square feet to several square miles.

The project site slopes very gently to the southeast, with approximately 15 feet of elevation change, and the park site is generally flat, with a gentle slope to the southeast. The sites are fully developed, and no natural drainage courses or other topographical features are present. The probability of seismically induced landslides occurring on the project site and park site is considered to be low due to the general lack of elevation difference slope geometry across or adjacent to the sites (Appendix E).

Seismically Induced Flooding

Seismically induced flooding is inundation of flood waters caused by the failure of dams or levees or the creation of large waves due to earthquakes.

Tsunamis are generated wave trains generally caused by tectonic displacement of the sea floor associated with shallow earthquakes, sea floor landslides, rock falls, and exploding volcanic islands. The project site is approximately 8 miles east from the Pacific Ocean, and approximately 230 feet above mean sea level. Review of the County of Los Angeles Flood and Inundation Hazards Map (Leighton 1990, as cited in Appendix E) indicates the site does not lay within the mapped tsunami inundation boundaries.

Seiches are oscillations generated in enclosed bodies of water which can be caused by ground shaking associated with an earthquake. No major water-retaining structures are located immediately up gradient from the project site or park site. The risk of flooding from a seismically induced seiche is considered to be remote.

Review of the County of Los Angeles Flood and Inundation Hazards Map (Leighton 1990, as cited in Appendix E) indicates the site does not lie within mapped inundation boundaries due to a seiche or a breached upgradient reservoir.

3.4.2 Relevant Plan, Policies, and Ordinances

Federal

National Pollution Discharge Elimination System

Direct discharges of pollutants into waters of the United States are not allowed, except in accordance with the NPDES program established in Section 402 of the Clean Water Act (CWA). A Storm Water Pollution Prevention Plan (SWPPP) prepared in compliance with an NPDES Permit describes erosion and sediment controls, runoff water quality monitoring, means of waste disposal, implementation of approved local plans, control of post construction sediment and erosion control measures and maintenance responsibilities, and non-stormwater management controls. Dischargers are also required to inspect construction sites before and after storms to identify stormwater discharge from construction activity and to identify and implement controls where necessary.

Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act 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 reduction program. To accomplish this goal, the act established the National Earthquake Hazards Reduction Program (NEHRP). This program was substantially amended in November 1990 by the National Earthquake Hazards Reduction Program Act (NEHRPA), which refined the description of agency responsibilities, program goals, and objectives.

The mission of NEHRPA includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improved building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improved mitigation capacity; and accelerated application of research results. The NEHRPA designates the Federal Emergency Management Agency as the lead agency of the program and assigns several planning, coordinating, and reporting responsibilities. Other NEHRPA agencies include the National Institute of Standards and Technology, National Science Foundation, and USGS.

State

Alquist-Priolo Earthquake Fault Zoning Act (1972)

The Alquist-Priolo Act (PRC Sections 2621–2630) was passed in 1972 to mitigate the hazard of surface faulting to structures designed for human occupancy. The main purpose of the law is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Alquist-Priolo Act requires the State Geologist to establish regulatory zones known as Earthquake Fault Zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning efforts. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

Seismic Hazard Mapping Act (1990)

The Seismic Hazards Mapping Act of 1990 (PRC Sections 2690–2699.6) addresses earthquake hazards from non-surface fault rupture, including liquefaction and seismically induced landslides. The act established a mapping program for areas that have the potential for liquefaction, landslide, strong ground shaking, or other earthquake and geologic hazards. The act also specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

California Building Code (2010)

The 2010 California Building Code is based on the 2009 International Building Code, which is a model building code developed by the International Code Council that sets rules specifying the minimum acceptable level of safety for constructed objects such as buildings in the United States. In addition, the California Building Code contains necessary amendments based on the American Society of Civil Engineers Minimum Design Standards 7-05, which provide requirements for general structural design and include means for determining earthquake and other types of loads (flood, snow, wind, etc.) for inclusion in building codes. The provisions of the California Building Code 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.

California Health and Safety Code

Sections 17922 and 17951-17958.7 of the California Health and Safety Code require cities and counties to adopt and enforce the current edition of the California Building Code, including a grading section. The City enforces these provisions (refer to Title 13 of the City's Municipal Code). Sections of Volume II of the California Building Code specifically apply to select geologic hazards. Chapter 16 (Structural Design) of the California Building Code addresses requirements for seismic safety. Chapter 18 regulates excavation, foundations, and retaining walls. Chapter 33 contains specific safeguard requirements pertaining to site demolition and construction.

Local

City of West Hollywood General Plan 2035 Safety and Noise Element

City and county governments typically develop safety and seismic elements in their general plans that identify goals, objectives, and implementing actions to minimize the loss of life, property damage and disruption of goods and services from man-made and natural disasters including floods, fires, non-seismic geologic hazards and earthquakes. Local governments may provide policies and develop ordinances to ensure acceptable protection of people and structures from risks associated with these hazards. Ordinances may include those addressing unreinforced masonry construction, erosion or grading.

The Safety and Noise Element of the City of West Hollywood General Plan 2035 aims at reducing death, injuries, damages to property, and economic and social dislocation resulting from earthquakes and other geologic hazards. This element identifies several policies pertaining to ground motion, fault rupture, liquefaction, and emergency response (City of West Hollywood 2011).

West Hollywood Municipal Code

The City of West Hollywood's Municipal Code includes Chapter 19.32, which establishes seismic safety standards that are designed to protect development proposed for hazardous areas within the dam failure inundation areas, fault precaution zones, and liquefaction susceptibility zones.

Separation from Active Faults

The City has defined two fault precaution (FP) zones for future development. The first precaution zone (FP-1) comprises a region approximately 200 feet north and 500 feet south of the interpreted main Hollywood Fault location. A wider precaution zone is prescribed to the south of the fault because of the greater uncertainty in the location and width of the fault zone due to the thick cover of alluvial sediments. New development in the FP-1 zone is required to conduct a fault location investigation, to verify that the main trace or a recently active splay of the fault does not project through critical site structures or facilities.

The second zone (FP-2) comprises a region approximately 200 feet south of the FP-1 zone. For properties in this zone, the fault rupture hazard is considered significant, but considerably less than for properties in the FP-1 zone. Furthermore, geologic study of the potential for fault rupture may not be practical for properties within zone FP-2 because of the significant thickness of overburden material overlying rock. New development in the FP-2 zone will require either a fault location investigation, to verify that the main trace or a recently active splay of the fault does not project through critical site structures or facilities, or default provisions for a strengthened foundation system. Structures or habitable buildings must be a minimum of 50 feet from the fault, measured between the closest portion of the fault to the closest edge of the structure or building foundation.

As shown as shown in General Plan EIR Figure 3.5-2, City of West Hollywood Fault Location and Precaution Zone Map,, the proposed project is not located within a fault precaution zone.

Liquefaction

The City requires a soils report by a registered civil engineer in areas susceptible to liquefaction. This report must include a study of liquefaction potential; where liquefaction potential is identified, mitigating siting and design features are required.

3.4.3 Thresholds of Significance

The following thresholds of significance are based on Appendix G of the CEQA Guidelines. Based on these thresholds, implementation of the proposed project would have a significant adverse impact related to geology and soils if it would:

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

b. Result in substantial soil erosion or the loss of topsoil

c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse

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

e. 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

3.4.4 Methodology

To assess the impacts of the proposed project with respect to geologic and soil conditions, geotechnical investigation and field explorations were undertaken by Geotechnologies Inc. The resulting Geotechnical Investigation provides geotechnical recommendations for the development of the site, including earthwork, seismic design, retaining walls, excavations, shoring and foundation design. The Geotechnical Investigation is provided in Appendix E.

The project site and park site were explored between October 29, 2014, and September 9, 2015, by excavating eight borings, two exploratory test pits, and performing seven Cone Penetration Test Soundings (CPTs). The exploratory borings were excavated to depths between 50 and 100 feet below the existing site grade with a mud-rotary drill rig. The test pits were excavated to depths of 20 feet with the aid of hand labor and hand auger equipment. The CPT soundings were advanced to depths between 50.5 and 100.5 feet below the existing site grade. The exploratory boring locations, CPT sounding locations, and interpretations of the geologic materials encountered are provided in Appendix E of this EIR.

Soils, geologic, and seismic hazards, as identified based upon the report/literature reviews and the site investigation, were assessed with respect to significance within the context of Appendix G of the Guidelines for the California Environmental Quality Act (CEQA Guidelines).

3.4.5 Impact Analysis

Threshold A: Would the project 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?

The City of West Hollywood, like most of Southern California, is subject to strong seismic ground shaking in the event of a major earthquake. As discussed in Section 3.4.1, no known active, or potentially active faults underlie the project site or park site. The nearest known active fault is the Hollywood Fault, located approximately 0.5 miles to the north of the project site. The project site and park site are not located within an Alquist-Priolo Fault Zone. Furthermore, the project site and park site are not located within a fault precaution zone, as mapped by the City. As discussed in Section 3.4.1, the City has mapped zones FP-1 and FP-2 to designate areas where fault studies and/or strengthened foundations are required for new development. (Development projects in zone FP-1 generally require more detailed studies than those in FP-2, since FP-2 is located farther from the approximate surface trace of the Hollywood Fault.) The project site and park site are located approximately 0.3 miles south of the southern boundary of zone FP-2. As such, the project is well outside the area where the City has determined that fault location investigations or strengthened foundation systems are necessary. As such, while seismic ground shaking remains a concern at the project site and park site due to their proximity to a known active fault, the potential for surface ground rupture is considered low, and impacts would be **less than significant**.

ii. Strong seismic ground shaking

The primary geologic hazard at the project site and park site is moderate to strong ground motion (acceleration) caused by an earthquake on any of the local or regional faults. As with all of Southern California, ground shaking generated by fault movement has the potential to damage building structures and foundations. In addition to the Hollywood Fault, there are numerous other active fault systems within the greater Los Angeles region that can cause strong ground shaking at the project site and park site (e.g., the Newport-Inglewood Fault Zone, the Sierra Madre Fault Zone, and the San Jacinto Fault Zone). A large earthquake on any of these faults—or a “blind” fault (which was the case for the 1994 Northridge Earthquake)—could expose the site to strong seismic ground shaking. Seismic hazards from ground shaking are typical for many areas of Southern California and the potential for seismic activity would not be greater than for much of the Los Angeles area.

The proposed project would expose people and structures to hazards related to seismic ground shaking; however, compliance with the California Building Code, Section 1613 earthquake load requirements, and incorporation of mitigation measure MM-GEO-1 would ensure that proposed structures can withstand the expected worst-case seismic ground shaking. The City’s plan check and building inspection procedures would ensure that the proposed project is constructed according to these standards and according to the recommendations provided in the Geotechnical Investigation (see Appendix E). Compliance with existing state and local regulations, implementation of the recommended geotechnical design standards, and incorporation of MM-GEO-1 would reduce the impact from seismic ground shaking to a **less than significant level with mitigation incorporated**.

iii. Seismic-related ground failure, including liquefaction

The results of the exploration and lab testing conducted at the project site indicate that (a) cohesionless soil layers below the site are potentially liquefiable to a maximum depth of 37.5 feet and (b) total seismically induced settlement (when combining liquefaction and dry sand settlement) of 3.25 inches (with differential settlement of 1.6 inches) on the project site could occur during a major seismic event. As such, the project site and park site are susceptible to impacts related to liquefaction.

The proposed multi-use hotel building and the parking garage below the park site would be constructed over three subterranean parking levels extending approximately 47.5 feet below grade. Given that the potentially liquefiable soils are located at a maximum depth of 37.5 feet on the project site and park site, excavation for the proposed project would extend beyond the potentially liquefiable layers into the underlying firm native soils. Because the seismic base of the hotel structure and parking garage would be located in native soils below a depth of 37.5 feet, the potential hazards related to seismic induced settlement would be eliminated by the design of the project. Furthermore, given that the relative thicknesses of liquefiable soils to overlying non-liquefiable surface material fall well outside the bounds within which surface effects of liquefaction have been observed during past earthquakes, the likelihood that surface effects of liquefaction would occur on the sites would be considered very low. Should liquefaction occur within the potentially liquefiable zones surrounding the excavated areas, there would be a negligible effect on the proposed structures. The excavation of the subterranean levels and the foundation elements would therefore remove the majority of the potentially liquefiable layers and would bear into the underlying firm native soils (Appendix E). Furthermore, due to the potential presence of groundwater above the lowest levels of the parking garage, the proposed mat foundation and perimeter basement walls of the project would be designed to withstand hydrostatic pressure and hydrostatic uplift pressure. Micropiles may also be installed under the mat foundation to resist uplift forces as necessary. (Micropiles would be used if the hydrostatic uplift pressure acting on the base of the foundation is determined to be greater than the weight of the structure.) These design parameters would further ensure that the subterranean levels of the parking garage would remain stable in the event of ground failure. Implementation of MM-GEO-1 would ensure that the project would comply with the site-specific recommendations set forth in the Geotechnical Investigation, which address liquefaction hazards.

Excavation of the potentially liquefiable soils to construct the subterranean parking structure, compliance with existing state and local regulations, and implementation of MM-GEO-1 would reduce potential impacts from seismic-related ground failure to a **less than significant level with mitigation incorporated**.

iv. Landslides

The project site and surrounding areas have relatively flat topography, and the project site is not within the earthquake-induced landsliding zone designated on the Seismic Hazard Zones map in the City's general plan (City of West Hollywood 2011). The nearest areas that would be subject to landslides are the Hollywood Hills, located approximately one mile north of the project site. Numerous structures stand between the project site and the base of the hills. There are no landslides on the project site and no known landslides extend onto the project site. Given the minimal amount of topographic relief on the project site and the lack of substantial topographic relief on adjoining properties, the potential for landslides as a result of the proposed project is minimal. Therefore, the proposed project would result in **no impacts** related to landslides.

Threshold B: Would the project result in substantial soil erosion or the loss of topsoil?

The relatively flat nature of the project site precludes it from being readily susceptible to erosion. However, construction of the proposed project would result in ground surface disruption during grading and excavation that could create the potential for erosion to occur. Since the project site is greater than one acre, the construction contractor would be required to comply with the Storm Water Construction Activities General Permit, which requires the construction contractor to prepare and comply with a SWPPP. The SWPPP must include erosion control measures such as covering exposed soil stockpiles and working slopes, lining the perimeter of the construction site with sediment barriers, and protecting storm drain inlets. After construction and establishment of the landscaped areas, erosion potential would be minimal. With implementation of the required erosion control measures, adherence to existing regulations and implementation of standard construction recommendations within the Geotechnical Investigation, impacts related to soil erosion would be **less than significant**.

Threshold C: Would the project 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?

As stated in Threshold A(iv), the probability of seismically induced landslides occurring on the site is considered to be low due to the general lack of elevation difference across or adjacent to the site. Impacts related to on- or off-site landslides due to implementation of the proposed project would be less than significant.

As described in Section 3.4.1, the project site slopes very gently to the southeast, with approximately 15 feet of elevation change across 350 feet and no free face is located in the vicinity of the site. The park site also slopes gently to the southeast. Given the underlying geologic conditions, the potential for lateral spreading is considered to be remote for the project site and park site (Appendix E). Compliance with current California Building Code and seismic design recommendations from the Geotechnical Investigation in accordance with MM-GEO-1 would result in less than significant impacts, with mitigation incorporated, related to lateral spreading.

Although liquefiable soils are present to a depth of 37.5 feet, these soils would be excavated to construct the subterranean parking structure. As stated in Threshold A(iii), excavation and removal of potentially liquefiable soils, compliance with existing state and local regulations, and implementation of the recommended geotechnical design standards in accordance with MM-GEO-1 would reduce potential impacts from seismic-related ground failure to a less than significant level, with mitigation incorporated.

Hydroconsolidation is a phenomenon in which the underlying soils collapse when wetted. Hydroconsolidation could potentially result in significant foundation movements, over a long period of time of wetting. Per the Geotechnical Investigation, soil samples collected from the underlying native soils are subject to a very minor degree of hydroconsolidation strains. Design recommendations are provided in the Geotechnical Investigation to address potential impacts related to hydroconsolidation. Due to the potential presence of groundwater above the lowest levels of the parking garage, the proposed mat foundation and perimeter basement walls of the project would be designed to withstand hydrostatic pressure and hydrostatic uplift pressure. Micropiles may also be installed under the mat foundation to resist uplift forces as necessary. These design parameters have been incorporated into the project to ensure that the subterranean levels of the parking garage would remain stable in the event of unstable geologic conditions. Additional recommendations that would protect the project from hydroconsolidation would be incorporated per MM-GEO-1. Such recommendations include maintaining proper drainage of the site throughout the life of the structure, checking and maintaining all utility and irrigation lines and drainage devices, and properly controlling landscape irrigation to reduce the amount of water infiltration into the underlying soils that provide support to the proposed structure.

As stated above, impacts related to landslides, lateral spreading, subsidence, liquefaction, and collapsible soils would be **less than significant with mitigation incorporated**.

Threshold D: Would the project 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?

The Geotechnical Investigations indicate that on-site geologic materials are in the moderate expansion range. The proposed development and subterranean parking would be supported on a mat foundation bearing in the underlying firm native soils below the lowest subterranean level. Given the size of the proposed mat foundation, the average bearing pressure of 5,000 pounds per square foot is well below the allowable bearing pressures. For design purposes, an average bearing pressure of 5,000 pounds per square foot, with locally higher pressures up to 7,500 pounds per square foot may be utilized in the mat foundation design. With proper site preparation, foundation design, and compliance with recommendations from the Geotechnical Investigation per MM-GEO-1, implementation of the project would not create substantial risks to life or property. Impacts related to potential expansive soils would be **less than significant, with mitigation incorporated**.

Threshold E: Would the project 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 proposed project would connect to the existing City sewer system, and no septic tanks or alternative wastewater disposal system are proposed as part of the project. Therefore, the proposed project would not result in significant, adverse impacts related to alternative wastewater disposal systems. **No impact** would occur as a result of the proposed project.

3.4.6 Mitigation Measures

MM-GEO-1 The proposed project shall be designed in accordance with the recommendations from the site-specific Geotechnical Investigation. In the event that changes are made in the recommendations set forth in the final geotechnical report, the project design shall be updated in accordance with those changes. Prior to the issuance of a building permit, the applicant shall submit the final design and construction plans for review and approval by the City Building Official or designee and the City Engineer or designee. The final design and construction plans shall show that the recommendations from the Geotechnical Investigation regarding foundation, site coefficient and seismic zonation, walls below grade, waterproofing and drainage, floor slab support, dewatering and groundwater control, excavation and slopes, and shoring have been incorporated into the final design.

3.4.7 Significance after Mitigation

Implementation of MM-GEO-1 would ensure that project design incorporates all applicable building code requirements and site-specific recommendations formulated by the project’s geotechnical engineer, which have both been set forth to minimize structural safety hazards. As such, MM-GEO-1 would ensure that the proposed building is constructed in a manner that would reduce hazards caused by strong seismic ground shaking, liquefaction, geologic instability, and expansive soils to the extent feasible. Upon implementation of MM-GEO-1, impacts related to geology and soils would be less than significant.

3.4.8 References

City of West Hollywood. 2010. Final PEIR. City of West Hollywood General Plan and Climate Action Plan. Volume 1.

City of West Hollywood. 2011. "Safety and Noise" in *West Hollywood General Plan 2035.* Adopted September 6, 2011. Accessed October 1, 2014. http://www.weho.org/city-hall/download-documents/-folder-155.

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