EXHIBIT 7

4.4 GEOLOGY, SOILS, AND SEISMICITY

INTRODUCTION

This section identifies the potential for geological and seismic hazards to occur in or around the project site. Issues of concern include suitability of soil for development; geologic faults; and direct and indirect seismic hazards such as floods, subsidence, liquefaction, and landslides. This section was prepared utilizing documents and maps published by the United State Geological Survey (USGS), California Department of Conservation, California Geological Survey (CGS), City of Azusa, and County of Los Angeles, as well as other applicable sources.

EXISTING SETTING

Geologic Materials and Soils

The geologic nature of the larger San Gabriel Valley region, including the City of Azusa, consists of steep mountains, low foothills, and relatively flat valleys. The San Gabriel Mountains border the City on the north. The San Gabriel Mountains occupy the central portion of the Transverse Ranges.[1] The San Gabriel Mountains are bounded by the San Andreas Fault on the north, the Cucamonga and Sierra Madre Faults on the south, and the San Bernardino Mountains and Castaic Block on the east and west, respectively. The San Gabriel Mountains are composed of ancient crystalline rocks.[2]

The City's soil is comprised of Hanford Association, Ramona-Placentia Association, and Vista-Armargosa Association soils.[3] Hanford Association soil makes up the majority of the City's soil. Hanford Association soil is a pale brown, course sandy loam, located on gently sloping alluvial fans and soil is known to have good natural drainage properties and a slight erosion hazard.[4] The site is underlain by a thick layer of alluvium, primarily composed of sand and silt with some clay. Soils with a certain percentage of clay have the potential to expand when water is added and shrink when water is lost, resulting in expansive soils. Expansive soils can result in damage to overlying structures. Hanford Association soil is not expansive and occurs on gently sloping alluvial fans between elevations near sea level and 3,500 feet above mean sea level (amsl). The area south of 11th Street, including the project site, contains soil of the Hanford Association. The Ramona-Placentia Association soil is found in the northeastern portion of the City. Ramona-Placentia Association soil is located on strongly sloping and rolling terraces. Soil of the Vista-Armargosa Association is found on steep slopes, which occur in the northern portion of the City.

Seismicity

The project site is within the seismically-active Southern California region. Earthquakes and other seismically-induced effects are constant potential hazards. The project site may be exposed to strong ground shaking during a seismic event. Issues of concern relating to earthquakes include fault rupture, strong ground shaking, liquefaction, and landslides, which are described below.

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[1]California State University Long Beach Department of Geology, *Geological Overview of the San Gabriel Mountains*, available at. http://seis.natsci.csulb.edu/deptweb/SkinnyCalSites/TrnsverseRng/SanGabriels/SanGablOview2.html, accessed November 12, 2007.

[2]United States Geological Survey, *Southern California Geology: San Gabriel Mountains*, available at http://scamp.wr.usgs.gov/scamp/html/scg_trans_sgm.html, accessed November 12, 2007.

[3]Los Angeles County, General Soils Map and Document, 1969.

[4]Los Angeles County, General Soils Map, 1969.

Fault Rupture. Los Angeles County contains areas of active faulting. A fault is a fracture in the Earth's crust along, which, rocks on one side have moved relative to rocks on the other side. Most faults are the result of repeated displacement over long periods of time.[5]

The Alquist-Priolo Earthquake Fault Zone Map was reviewed to determine if the project site is located within an earthquake fault zone. The Alquist-Priolo Fault Zone is named after the Alquist-Priolo Special Studies Zone Act of 1972. The Act was passed as a direct result of the 1971 San Fernando Earthquake. The Act's purpose is to mitigate the hazards associated with fault rupture by "preventing construction of buildings used for human occupancy on the surface trace of active faults."[6] The Act has been revised eleven times, most recently in 2007, to reflect changes and additions of affected cities. Prior to the revisions to the Act in 1988, faults that were believed to pose a seismic risk were designated as "potentially active." This term was found to be subjective and broad and was dismissed. Currently, faults that have been determined to pose a seismic threat are defined under the Act as "substantially active" or "well-defined." A fault is considered to be substantially active if one or more of its segments or strands shows evidence of surface displacement during the Holocene era[7]. A fault is considered well-defined if its trace can be identified clearly by a trained geologist at the ground surface, or in the shallow subsurface using standard professional techniques, criteria, and judgement.[8]

The City of Azusa is not designated as a city affected by earthquake fault zones under the Alquist-Priolo Act as of August 2007.[9] However, there are three principal active faults within approximately 15 miles of the project site. The Raymond Hill Fault is the nearest substantially active fault to the project site, located approximately seven miles to the west. The Cucamonga Fault is located approximately ten miles to the east, and the Whittier Fault is located approximately 13 miles to the south of the project site. The Sierra Madre Fault Zone, previously defined as potentially active prior to 1988, passes through the City of Azusa. The Sierra Madre Fault Zone is approximately 34 miles in length and has five main segments designated "A" through "E." Segment "D", known as the Duarte Fault, is the segment which splits and traverses the City.[10] The Upper Duarte Fault is approximately 0.4 miles north of the project site spanning horizontally near 12th Street.[11] The Duarte Fault also spans horizontally south of 3rd Street, approximately 0.6 miles south of the project site. Regional faults surrounding the project area are shown in **Figure 4.4-1**. **Table 4.4-1** identifies faults and distances to the project site.

Ground Shaking. Ground shaking is the actual trembling or jerking motion of the ground during an earthquake. The most widespread damaging effects of earthquakes are caused by strong ground shaking and can vary widely across an area depending on factors such as magnitude, distance to the epicenter, fault mechanism, duration of shaking, soil conditions, type of building, and other factors.

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[5]California Geological Survey, *Alquist-Priolo Earthquake Fault Zones* (2007), available at http://www.consrv.ca.gov/CGS/rghm/ap/, accessed October 24, 2007.

[6]*Ibid.*

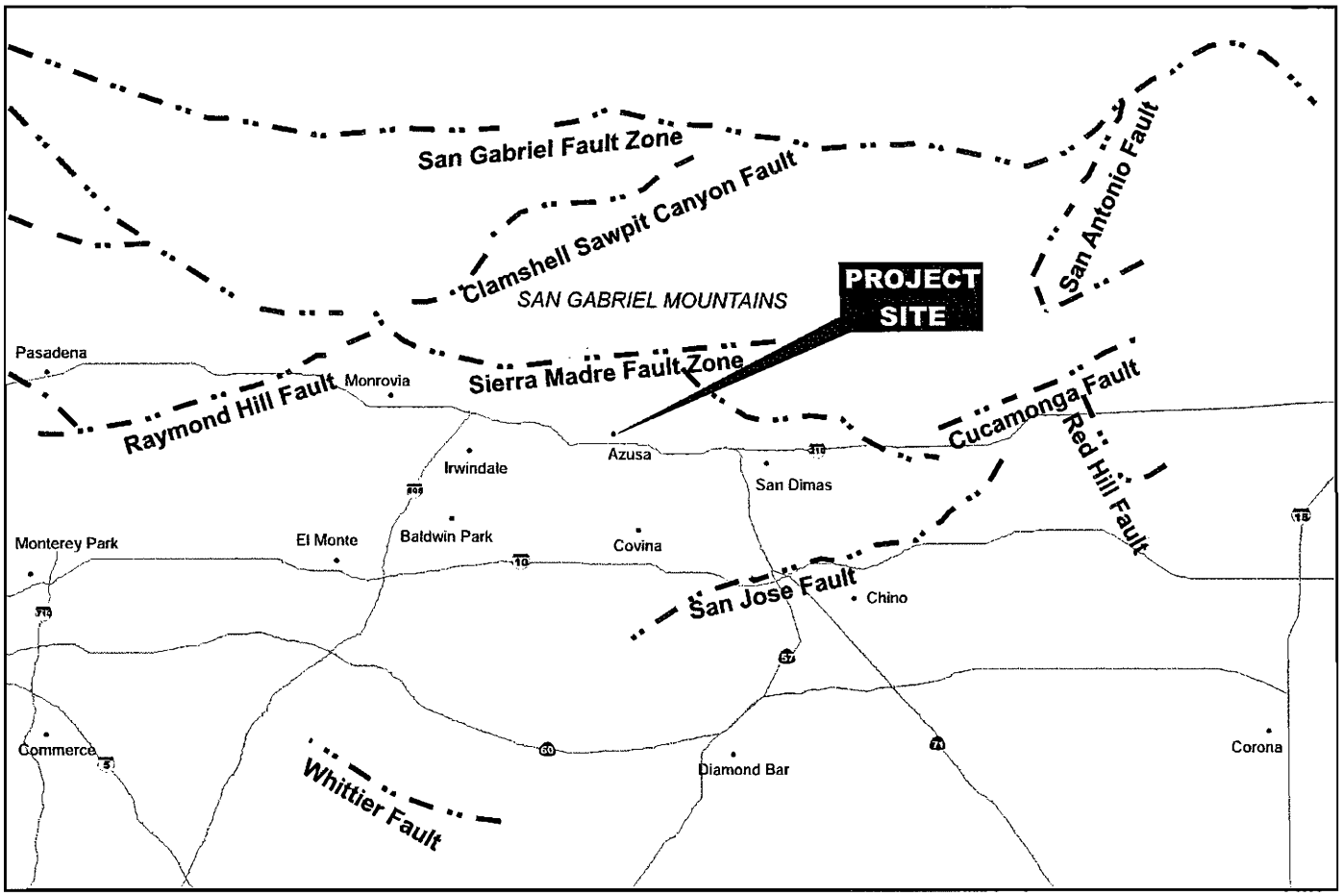
[7]Defined as the last approximately 11,000 years.

[8] California Geological Survey, *Special Publication 42 Fault-Rupture Hazard Zones in California, Interim Revision*, August, 2007.

[9]*Ibid.*

[10]Southern California Earthquake Data Center, *Sierra Madre Fault Zone*, available at http://www.data.scec.org/fault_index/madre.html, accessed November 8, 2007.

[11]United States Geological Survey, *Earthquake Hazards Program: Quaternary Fault and Fold Database of the United States*, Google Earth Files, available at http://earthquake.usgs.gov/regional/qfaults/google.php, accessed on November 8, 2007.



LEGEND:

–·– Fault

SOURCE: United States Geological Survey, Southern California Earthquake Data Center, & TAHA, 2008

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FIGURE 4.4-1

REGIONAL FAULTS

TABLE 4.4-1: SUBSTANTIALLY ACTIVE FAULTS NEAR PROJECT SITE

Fault Name	Distance and Orientation to Project Site	Probable Magnitudes
Upper Duarte Fault/a/	0.4 miles north	6.0 to 7.0
Duarte Fault/a/	0.6 miles south	6.0 to 7.0
Raymond Hill	7 miles west	6.0 to 7.0
Cucamonga	10 miles west	6.0 to 7.0
Whittier	13 miles south	6.0 to 7.2

/a/ The Upper Duarte and Duarte Faults make up segment D of the five-segment Sierra Madre Fault Zone.
SOURCE: California Department of Conservation, 2007

As with all properties in the seismically-active Southern California region, the project site is susceptible to strong seismic ground shaking. Earthquakes generally occur on faults, which are the planar features within the earth. Numerous regional and local faults are capable of producing severe earthquakes of magnitude 6.0 or greater. Typically, the effect of an earthquake originating from any given fault will depend upon its distance from the project site and the size of the earthquake the fault generates. Soil consisting of alluvial deposits, such as Hanford Association soil, is more susceptible to ground shaking. However, the more distant the fault or the smaller the earthquake is, the less the effect of the event is on the project site.

The magnitude of an earthquake is measured on the Richter scale, a logarithmic scale of base ten, that calculates the amplitude of the largest seismic wave recorded. The intensity of an earthquake is measured by the Modified Mercalli Intensity scale, which ranges from I to XII. An earthquake has only one magnitude but can have many intensities depending on the distance from the epicenter. **Table 4.4-2** shows intensities that are typically observed near the epicenter of earthquakes of different magnitudes.

TABLE 4.4-2: MODIFIED MERCALLI INTENSITY SCALE

Magnitude	Intensity	Description
1.0-3.0	**I**	I. Not felt except by a very few.
3.0-3.9	**II-III**	II. Felt only by a few persons at rest, especially on upper floors of buildings. III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Vibrations similar to the passing of a truck.
4.0-4.9	**IV-V**	IV. Felt indoors by many, outdoors by few during the day. Dishes, windows, doors disturbed. Sensation like heavy truck striking building. V. Felt by nearly everyone. Some windows broken. Pendulum clocks may stop.
5.0-5.9	**VI-VII**	VI. Felt by all, many frightened. Some heavy furniture moved. Damage slight. VII. Damage negligible in buildings of good design and construction; considerable damage in poorly built or badly designed structures.
6.0-6.9	**VII-IX**	VIII. Damage slight in specifically designed structures. Damage great in poorly built structures. Fall of chimneys and walls. Heavy furniture overturned. IX. Damage considerable in specifically designed structures; Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and Higher	**VIII or Higher**	X. Most masonry and frame structures destroyed with foundations. Rails bent. XI. Few structures remain standing. Bridges destroyed. Rails bent greatly. XII. Damage total. Lines of sight and level are distorted. Objects airborne.

SOURCE: California Department of Conservation, 1998

Liquefaction. Liquefaction is a phenomenon where soil, saturated with water, behaves like liquid when shaken by an earthquake.[12] Liquefaction results in lateral spreading, ground settlement, sand boils, and soil falls. Liquefaction typically occurs in areas with a high ground water table and low-density, fine sandy soils. Liquefaction also occurs with high-density ground motion. The City of Azusa has areas of low water tables. Groundwater in the project area can be found at depths between approximately 50 and over 150 feet below ground surface (bgs) and generally flows to the southwest.[13] As shown in **Figure 4.4-2**, the liquefaction zones requiring investigation comprise the majority of City of Azusa. The project site is located in a zone where there is a potential for liquefaction.

Landslides. Landslides are defined as a "movement of a mass of rock, debris, or earth down a slope." [14] Landslides begin as a result of rainfall, earthquakes, volcanic activity, changes in groundwater, disturbance and change of a slope by man-made construction activities, or any combination of these factors. Landslides occur in hillside areas with unstable geological conditions or soil types that would be susceptible to failure when saturated. The project site is relatively flat with an elevation of approximately 620 feet amsl. The regional topography slopes gently to the southwest. No landslides are mapped in the vicinity of the project site.[15] As **Figure 4.4-2** illustrates, the southwestern portion of the City has potential for an earthquake-induced landslide. The project site is not in a location where there is a potential for landslides.

THRESHOLDS OF SIGNIFICANCE

The proposed project would result in a significant impact related to geology, soils, and seismicity if it would:

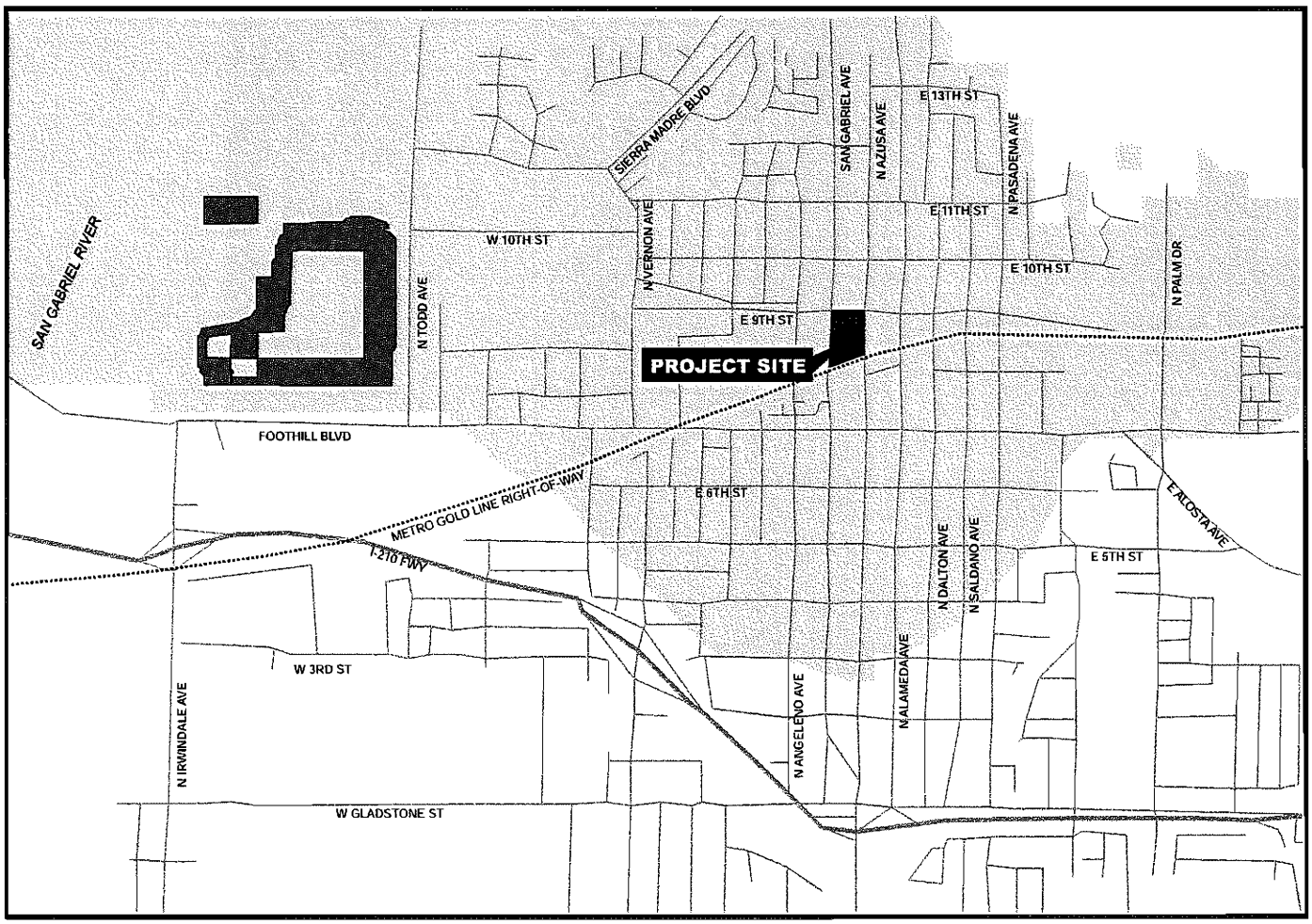
- Result in substantial soil erosion or the loss of topsoil;
- Be located on expansive soil creating substantial risks to life or property;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the proposed project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; and/or
- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
- Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault; and/or
- Strong seismic ground shaking, seismic-related ground failure (i.e., liquefaction), and landslides.

[12]United States Geological Survey, *About Liquefaction*, available at http://geomaps.wr.usgs.gov/sfgeo/liquefaction/aboutliq.html, accessed November 8, 2007.

[13]SCS Engineers, *Phase I Environmental Site Assessment 800 & 802 N. San Gabriel Avenue, Azusa, California*, October 2006.

[14]United States Geological Survey, *Landslides Hazards Program*, available at http://landslides.usgs.gov, accessed on November 8, 2007.

[15]*Ibid.*



LEGEND:

Project Site

Liquefaction Zone

Liquefaction and Landslide Zone

SOURCE: TAHA, 2008

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FIGURE 4.4-2

LIQUEFACTION AND LANDSLIDES

IMPACTS

Geologic Materials and Soils

Potential for Soil Erosion. Hanford Association soil is well-drained and has a slight erosion hazard.[16] Because Hanford Association soil is well-drained, it has faster infiltration rates, higher levels of organic matter and improved soil structure. These are soil composition factors which result in greater resistance to soil erosion. In addition to soil composition, climate and slope are factors in creating a potential for soil erosion. The proposed project is in a flat, highly urbanized area, with an extensive drainage system and impervious surfaces. The project area is not subject to high levels of wind or rain, factors that may contribute to soil erosion.

Loss of Topsoil. During construction of the proposed project, the potential exists for the release of fugitive dust, resulting in a small, temporary, loss of topsoil. However, this loss would not be considered substantial with the implementation of Best Management Practices (BMPs), required as part of the National Pollutant Discharge Elimination System (NPDES) permit and application of South Coast Air Quality Management District (SCAQMD) Rule 403. The proposed zoning under the proposed project is compatible with the existing commercial uses and would continue to cover nearly the entire project site with impervious surfaces. The proposed project would improve the existing drainage system and would not contribute to the loss of topsoil during operation.

Expansive Soil. Hanford Association soil found in the project area is not expansive and occurs on gently sloping alluvial fans between elevations from near sea level to 3,500 feet amsl. The proposed project would not be located on expansive soil, which would create substantial risks to life or property.

Hanford Association soil does not erode, is not expansive, and, therefore, would not possess any constraint to the building of the proposed project. In addition, the use of septic tanks or alternative wastewater disposal systems is not anticipated with the proposed project due to the location of the project site in a developed area where existing sewer lines would be utilized. Therefore, less-than-significant impacts related to the loss of topsoil, erosion, expansive soils, and the support of the use of septic tanks or alternative wastewater disposal systems, are anticipated.

Seismicity

Fault Rupture. The Raymond Hill, Cucamonga, and Whittier Faults are designated active earthquake fault zones under the Alquist-Priolo Earthquake Fault Zoning Act and are located within 15 miles of the project site. Although the project area is not located within these fault zones, the impact of a large earthquake along these zones would produce strong or intense ground motion in the project area, potentially resulting in fault rupture. However, this risk is present throughout the Southern California region. The proposed project would be required to comply with the seismic safety requirements established by the Uniform Building Code, applicable sections of the City's Development and Municipal Codes, and the California Department of Conservation, CGS *Special Publications 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California* (1997), which provides guidance for evaluation and mitigation of earthquake-related hazards. Although the project site is not located within a fault zone, the implementation of all applicable building and design specifications, and compliance with applicable building codes and current engineering practices, would ensure that the foundation design, including columns supporting parking, would reduce potential fault rupture impacts to less-than-significant levels.

[16]Los Angeles County, General Soils Map, 1969.

Ground Shaking. As mentioned above, the project site is located within 15 miles of active fault systems, as well as the Upper Duarte and Duarte Faults, which are less than one mile from the project site. Therefore, as with all of Southern California and Los Angeles County, the project area is susceptible to high-intensity ground shaking, which can affect any structure within the City of Azusa. The proposed project would be required to comply with the seismic safety requirements established by the Uniform Building Code, applicable sections of the City's Development and Municipal Codes, and the California Department of Conservation, CGS *Special Publications 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California* (1997), which provides guidance for evaluation and mitigation of earthquake-related hazards. With implementation of all applicable building and design specifications, and compliance with applicable building codes and current engineering practices, potential impacts related to strong ground shaking would be reduced to less-than-significant levels.

Liquefaction. Liquefaction involves the sudden loss in strength of a saturated, cohesionless soil (predominantly sand) caused by the build-up of pore water pressure during cyclic loading, such as produced by an earthquake. This increase in pore water pressure can temporarily transform the soil into a fluid mass, resulting in vertical settlement and can also cause lateral ground deformations. Typically liquefaction occurs in areas where there are loose sands and the depth of groundwater is less than 50 feet from the surface. Seismic shaking can also cause soil compaction and ground settlement without liquefaction occurring including settlement of dry sands above the water table.

The project site is within a liquefaction zone and development of the proposed project would be subjected to liquefaction.[17] Groundwater depths near the project site have been found from approximately 50 to 150 feet bgs. The relatively high water table combined with the alluvium soil composition in the area makes the potential for damage caused by liquefaction high. The City of Azusa's General Plan contains implementation programs that would minimize the impacts associated with liquefaction. With the implementation of all applicable building and design specifications, and compliance with applicable building codes and current engineering practices, potential liquefaction impacts would be reduced to less-than-significant levels. However, to ensure that potential impacts are reduced to less-than-significant levels, additional mitigation measures are recommended, as presented below.

Landslides. The project site has a flat terrain and is not in close proximity to any hillside area or within a City-designated slope stability area or a designated landslide area.[18] Therefore, the project site is not subject to earthquake-induced landslides, and no impacts related to landslides are anticipated.

MITIGATION MEASURES

Geologic Materials and Soils

GS1 Best Management Practices (BMPs), required as part of the National Pollutant Discharge Elimination System (NPDES) permit and application of South Coast Air Quality Management District (SCAQMD) Rule 403, shall be implemented for the proposed project to reduce potential soil erosion due to grading and excavation activities. BMPs would comply with applicable UBCs and include, but are not limited to, scheduling excavation and grading activities during dry weather, covering stockpiles of excavated soils with tarps or plastic sheeting, and debris traps on drains.

[17]California Department of Conservation, California Geology Survey, "*State of California Seismic Hazard Zones*" Azusa Quadrangle, March 25, 1999.
[18]*Ibid.*

Seismicity

GS2 A liquefaction assessment shall be preformed by a certified engineering geologist or registered civil engineer, as specified in Division of Mines and Geology's *Special Publication 117 Guidelines*, and its recommendations shall be incorporated into the foundation design of the proposed project.

SIGNIFICANCE AFTER MITIGATION

Geologic Materials and Soils

Implementation of Mitigation Measure **GS1** would ensure the reduction of soil erosion from grading and excavation associated with the construction of the proposed project. Therefore, a less-than-significant impact is anticipated.

Seismicity

The proposed project would comply with seismic standards and criteria set forth by the California Building Code and the Structural Engineers Association, reducing impacts related to fault rupture, ground shaking, and liquefaction. After Implementation of Mitigation Measure **GS2**, liquefaction impacts would be reduced by determining the extent of liquefaction and the potential consequences of depth and lateral extent affecting the proposed project. Liquefaction impacts would be reduced when all requirements of the liquefaction assessment are incorporated into the design foundation element of the proposed project. Therefore, less-than-significant impacts are anticipated.

CUMULATIVE IMPACTS

Geologic, soil, and seismic hazards are site-specific, and there is little, if any, cumulative geological relationship between the proposed project and the 15 related projects in the area. Geologic impacts typically would be the result of the environment's effect on the related projects, not the related project's effect on the environment. The related projects would not create earthquakes, but the related projects would be exposed to the risk of earthquakes. Therefore, the combination of related projects would not contribute cumulatively to additional risk of an earthquake. Similarly, a proposed project's contribution to soil erosion or loss of topsoil would be site-specific, and also not cumulative. Nevertheless, cumulative development in the area would increase the overall residential and 24-hour population, thus, increasing the risk of exposure to seismically-induced hazards. However, with adherence to applicable State and federal regulations, building codes, and sound engineering practices, geologic hazards would be reduced to less-than-significant levels.

The analysis of the proposed project's geology and soils impacts concluded that, through the implementation of the recommended mitigation measures, the proposed project's impacts would be reduced to less-than-significant levels. Therefore, the proposed project would not result in a considerable cumulative contribution to any potential impacts, and cumulative geologic, soil, and seismic impacts would be less than significant.