5.9 Geology and Soils

5.9 GEOLOGY AND SOILS

This section evaluates the geologic and seismic conditions within the City of Azusa and evaluates the potential for geologic hazard impacts associated with implementation of the proposed project. Information in this section is primarily based on the following documentation, collectively referred to as the "*Geotechnical Documentation*" (refer to Appendix 13.9, *Geotechnical Documentation*) hereafter in this section of the EIR:

- *Geotechnical Investigation Report, 1001 North Todd Avenue, Azusa, California (*Geotechnical Investigation), prepared by TGR Geotechnical, Inc., dated May 16, 2013.

- *Geotechnical Peer Review of Report Entitled "Preliminary Geotechnical Investigation Report, 1001 North Todd Avenue, Azusa, California," prepared by TGR Geotechnical, Inc., dated May 16, 2013,* prepared by D. Scott Magorien, C.E.G., Principal Engineering Geologist, dated November 27, 2013.

- *Response to Geotechnical Peer Review of Report Entitled "Preliminary Geotechnical Investigation Report, 1001 North Todd Avenue, Azusa, California;* prepared by TGR Geotechnical, dated May 16, 22013, Project No. 12-4026.

- *Review of TGR Geotechnical' s "Response to Geotechnical Peer review (by D. Scott Magorien, C.E.G.) of Report Entitled Preliminary Geotechnical Investigation Report, 1001 North Todd Avenue, Azusa, California; prepared by TGR Geotechnical, dated May 16, 2013, Project No. 12-4026,"* prepared by D. Scott Magorien, C.E.G., Principal Engineering Geologist, dated January 3, 2014.

- *Second Response to Geotechnical Peer Review of Report Entitled "Preliminary Geotechnical Investigation Report, 1001 North Todd Avenue, Azusa, California; prepared by TGR Geotechnical, dated May 16, 2013, Project No. 12-4026,"* prepared by TGR Geotechnical, Inc., dated January 10, 2014.

- *Response to City of Azusa – Engineering Geology and Geotechnical Engineering Review, 1001 North Todd Avenue, Azusa, California; prepared by Willdan Geotechnical, dated January 30, 2014, Willdan Geotechnical Project No. 101875 – 1000,* prepared by TGR Geotechnical, Inc., dated March 20, 2014.

5.9.1 EXISTING SETTING

GEOLOGIC SETTING

The project site is situated within the City of Azusa, California, in the Los Angeles Basin, along the foothills of the San Gabriel Mountains. The area is dominated by broad alluviated basins, which are mostly aggrading surfaces, receiving non-marine continental deposits from the adjacent upland areas. The project site is underlain by alluvial deposits composed of gravel and sand of stream channels and alluvial fan outwash from major canyons. Geology conditions in and around Azusa are reflected in the nature of the steep mountains, low foothills, and relatively flat valleys that make up the area. In the north and northwest mountainous areas of the City, the land is generally too steep and bedrock is too unstable for most construction. Construction is possible in selected areas of the mountains. However, many precautions must be taken to avoid land sliding, severe erosion, and earthquake shaking hazards. Azusa's foothills just northeast and east of the central City are less

steep and more stable than the mountains. While there is greater potential for safe development in these areas, some slope stability, erosion and mudflow potential remains in certain areas. Flatter valley areas make up most of the City (including the project site).

The major fault zones in the vicinity of the City are found along the boundary of the San Gabriel Mountains generally trend in a northwest-southeast direction. These zones include the Sierra Madre, Raymond, Puente Hills Blind Thrust, Clamshell-Sawpit, and San Andreas Faults. In addition to these major zones, there are numerous other fault zones in the area surrounding the City; refer to Exhibit 5.9-1, *Regional Fault Map*. These potential earthquake fault hazards must be considered carefully for safe future growth of educational, health care, commercial, industrial, and residential development.[1] Potential movement on some earthquake faults provides challenges for certain types of construction.

Locally, the site is situated to the north of the Vulcan Materials Quarry and Southern Pacific Railroad (SPRR), to the west of North Todd Avenue, to the east of the San Gabriel River Trail and Southern California Laborers School, and to the south of the Colorama Nursery. The foothills of the San Gabriel Mountains are located to the north.

EXISTING ON-SITE CONDITIONS

Geologic Soils and Fill Materials

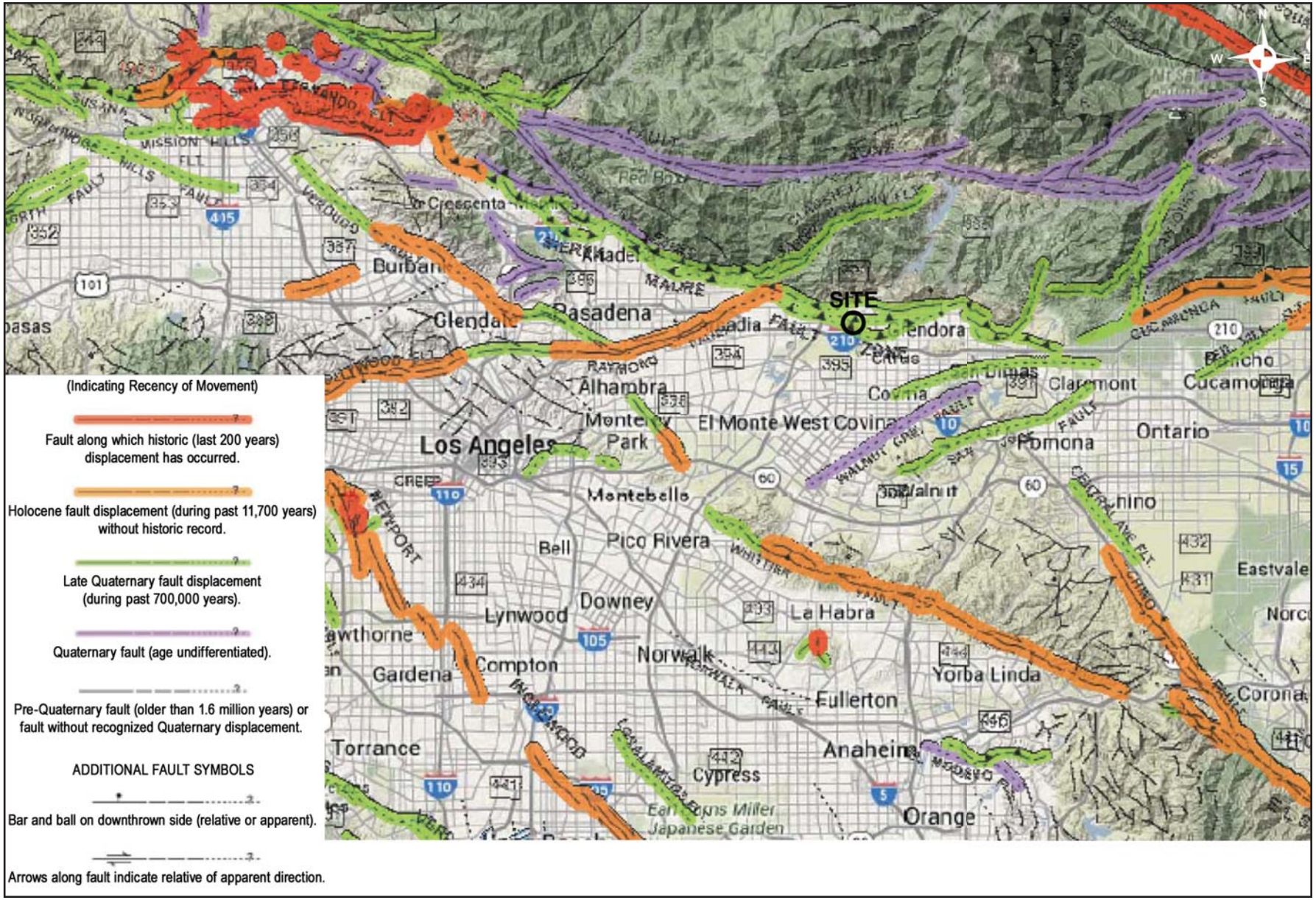
Topography on the project site is relatively flat with a slight gradient to the north/northeast. Based on the *Geotechnical Documentation*, the majority of the project site is underlain by Quaternary age alluvial deposits. Generally, the alluvial deposits consist of gravels, cobbles, and boulders in a brown silty sand matrix measured at a depth of three to nine feet below ground surface (bgs). According to the *Geotechnical Documentation*, the alluvial deposits continue to at least 190 feet bgs. The upper silty sand stratum generally is medium dense to dense and slightly moist. Oversized alluvial materials (i.e., particles greater than 12 inches requiring special handling for disposal) are located in various locations on the project site.

The project site is also underlain by fill material (generally consisting of brown, dry to slightly moist silty sand), and ash associated with the prior industrial uses. Based on the *Geotechnical Documentation*, ash is associated with previous removals of ask laden soil from the San Gabriel River drainage to the west after periods of fires in the San Gabriel Mountains to the north and subsequent washing of the ask down the river.

Groundwater

Based on the *Geotechnical Documentation* for the project site, groundwater is experienced at depths of 90 to 175 feet bgs. The Vulcan Materials Quarry, located adjacent to the south of the project site, is approximately 200 feet deep with no indications of seepage from its bottom or sidewalls. Generally, the groundwater at the Vulcan Materials Quarry site and in the vicinity of the project site is deep and poses no adverse effect to the proposed project.[2]

1 City of Azusa, *Azusa General Plan Geologic Hazards Element*, April 2004.
2 TGR Geotechnical, *Geotechnical Investigation Report for 1001 North Todd Avenue, Azusa, California,* May 16, 2013.



Source: TGR.

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ENVIRONMENTAL IMPACT REPORT
TENTH STREET CENTER INDUSTRIAL PARK

Regional Fault Map

Exhibit 5.9-1

GEOLOGIC HAZARDS

Faulting and Seismicity

According to the California Geological Survey (CGS) a fault is defined as a fracture in the crust of the earth along which rocks on one side have moved relative to those on the other side. Most faults are the result of repeated displacements over a long period of time. An inactive fault is a fault that has not experienced earthquake activity within the last three million years. In comparison, an active fault is one that has experienced earthquake activity in the past 11,000 years. A fault that has moved within the last two to three million years, but has not been proven by direct evidence to have moved within the last 11,000 years, is considered potentially active.

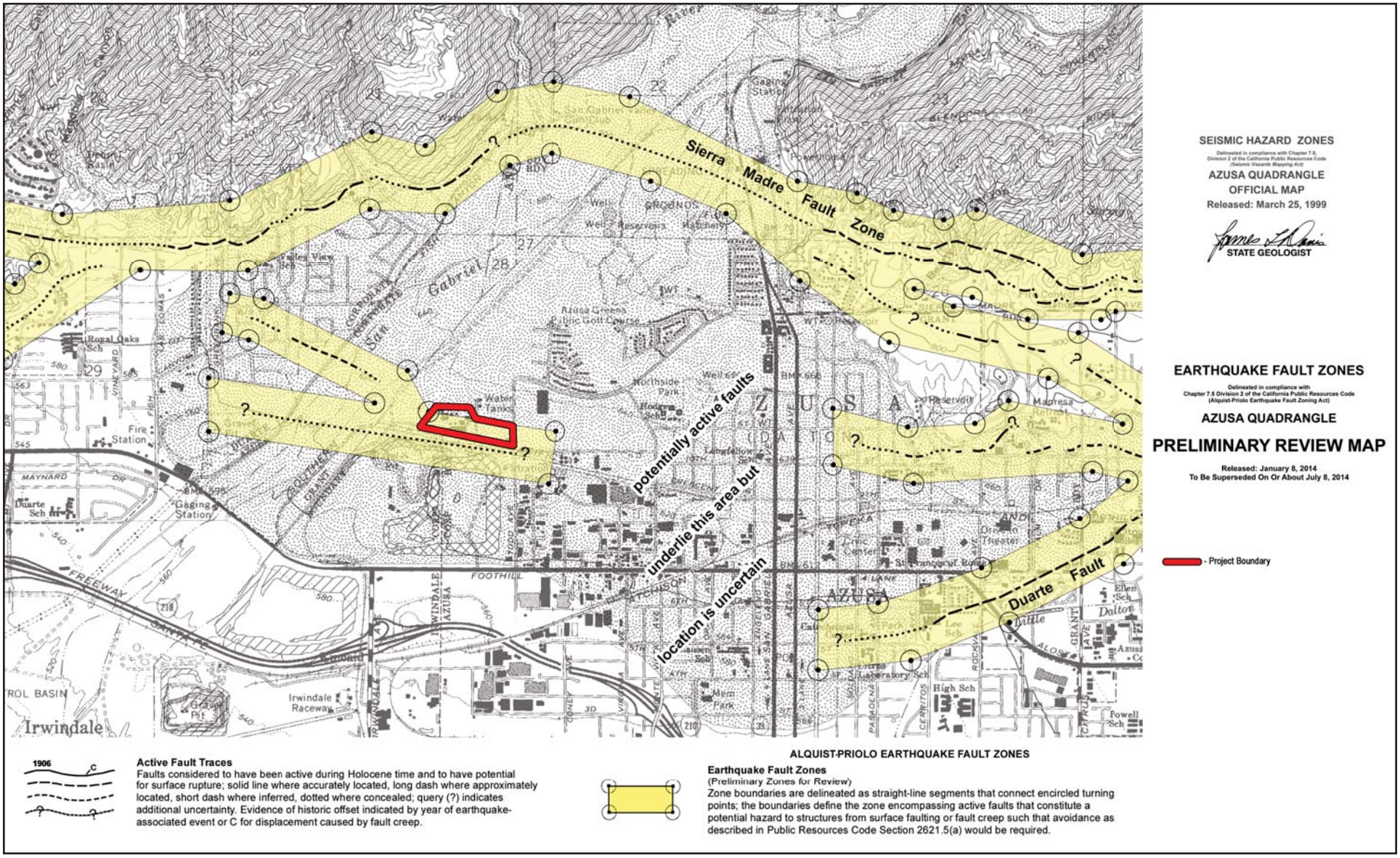
The Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code Sections 2621-2624, Division 2, Chapter 7.5 regulates development near active faults in order to mitigate the hazard of surface fault-rupture. Under the Act, the State Geologist is required to delineate "special study zones" along known active faults in California. The Act also requires that, prior to approval of a project, a geologic study be conducted to define and delineate any hazards from surface rupture. A geologist registered by the State of California, within or retained by the lead agency for the project, must prepare this geologic report. A 50-foot setback from any known trace of an active fault is required.

According to *Geotechnical Documentation* prepared for the project, the Duarte Fault trace running in an east-west direction is located near the southern boundary of the project site, to the north of the Vulcan Materials Quarry. In addition, according to a *Preliminary Review Map for Earthquake Zones of Required Investigation* for the Azusa quadrangle published by the CGS on January 8, 2014, a portion of the project site is located in an "Alquist-Priolo Earthquake Fault Zone Subject to Review"; refer to Exhibit 5.9-2, *Preliminary Alquist-Priolo Earthquake Fault Zone Map*. The CGS defines an Earthquake Fault Zone as "…an area encompassing active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as described in Public Resources Code Section 2693(a) would be required." The nearest major known active fault is the Sierra Madre Fault, located approximately 0.71-mile north of the project site with a probable magnitude of M_w6.0 to 7.0.[3] Given the proximity of the project site to these and numerous other active and potentially active faults, the project site would likely be subject to earthquake ground motions in the future.

Seismic-Induced Landslides

The project site is not located within an area mapped as having the potential for seismic-induced landsliding, as shown in Seismic Hazard Zone Map for the Azusa Quadrangle. In addition, based on the distance between the project site and the gradient of slopes associated with the Vulcan Materials Quarry operations to the south, the potential for landslide induced hazard at the project site is negligible. It should be noted that the Vulcan Materials Quarry is required per their conditional use permit (CUP) to implement geostability safety regulations to prevent slope instability and landslides.

[3] Southern California Earthquake Data Center, *Sierra Madre Fault Zone*, accessed April 2, 2014 at http://www.data.scec.org/significant/sierramadre.html



Source: State of California, California Geological Survey, 2014.

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ENVIRONMENTAL IMPACT REPORT
TENTH STREET CENTER INDUSTRIAL PARK

Preliminary Alquist-Priolo Earthquake Fault Zone Map

Exhibit 5.9-2

Liquefaction and Lateral Spreading

Seismic ground shaking of relatively loose, granular soils that are saturated or submerged can cause the soils to liquefy and temporarily behave as a dense fluid. Liquefaction is caused by a sudden temporary increase in pore water pressure due to seismic densification or other displacement of submerged granular soils. Liquefaction more often occurs in earthquake-prone areas underlain by young (i.e., Holocene age) alluvium where the groundwater table is higher than 50 feet below ground surface. The project site is designated as being within a zone having the potential for earthquake-induced liquefaction. However, as determined by the *Geotechnical Documentation* prepared for the project, the potential for liquefaction at the project site is low based on groundwater depths (approximately 90 to 175 feet bgs).

Due to the relatively flat topography and distance from any slopes, low potential for liquefaction, and the dense nature of the site soils, the potential for lateral spreading at the project site is also considered low.

Static Settlement/Compressibility

In general, the upper portions of the subgrade soils within the project site are medium dense to dense granular sand materials and slightly moist. The *Geotechnical Documentation* prepared for the project indicates that the upper granular soils have low to moderately compressible and collapsible alluvial soils to approximate depths of two feet bgs.

Shrinkage and Subsidence

Shrinkage of the on-site materials as a result of grading operations is expected to be in the five percent range. However, if crushing of the oversized on-site alluvial materials is performed and those materials are used as fill, some bulking of those materials is anticipated. The bulking is estimated to be in the five percent range. The project site is not within or near an area of known subsidence. The existing artificial fill soils and upper portions of the native alluvial soils are susceptible to moderate soil settlement with wetting.

Soil Expansion

Expansive soils are clay-rich soils that can undergo a significant increase in volume with increased water content and a significant decrease in volume with a decrease in water content. Significant changes in moisture content within moderately to highly expansive soil can produce cracking differential heave, and other adverse impacts to structures constructed on these soils. According to the *Geotechnical Documentation* prepared for the project, the project site subsurface materials consist of sandy and gravelly soils having negligible expansion potential.

Soil Erosion

Soil erosion is most prevalent in unconsolidated alluvium and surficial soils, which are prone to downcutting, sheetflow, and slumping and bank failure during and after heavy rainstorms. Strong wind forces can also produce varying amounts of soil erosion of unconsolidated surficial soils. The project site is relatively flat and does not possess site conditions conducive to substantial soil erosion.

5.9.2 REGULATORY FRAMEWORK

FEDERAL

Federal Soil Protection Act

The purpose of the Federal Soil Protection Act is to protect or restore the functions of the soil on a permanent sustainable basis. Protection and restoration activities include prevention of harmful soil changes, rehabilitation of the soil of contaminated sites and of water contaminated by such sites, and precautions against negative soil impacts. If impacts are made on the soil, disruptions of its natural functions as an archive of natural and cultural history should be avoided, as far as practicable. In addition, the requirements of the Federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]) through the National Pollution Discharge Elimination System (NPDES) provide guidance for protection of geologic and soil resources.

STATE

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures used for human occupancy. The main purpose of the Act is to prevent the construction of buildings used for human occupancy on top of the traces of active faults. Although the Act addresses the hazards associated with surface fault rupture, it does not address other earthquake-related hazards, such as seismically induced ground shaking or landslides.

The law requires the State Geologist to establish regulatory zones (known as Earthquake Fault Zones or Alquist-Priolo Zones) around the surface traces of active faults, and to publish appropriate maps that depict these zones. The maps are then distributed to all affected cities, counties, and State agencies for their use in planning and controlling development.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act, passed in 1990, addresses earthquake hazards other than surface fault rupture, including liquefaction and seismically induced landslides. Seismic hazard zones are mapped by the State Geologist to assist local governments in land use planning. The California Geological Survey (CGS) prepares and provides local governments with seismic hazard zones maps that identify areas susceptible to amplified shaking, liquefaction, earthquake-induced landslides, and other ground failures. The seismic hazards zones are referred to as "zones of required investigation" because site-specific geological investigations are required for construction projects located within these areas. Before a project can be permitted, a geologic investigation, evaluation, and written report must be prepared by a licensed geologist to demonstrate that proposed buildings will not be constructed across active faults. If an active fault is found, a structure for human occupancy must be set back from the fault (generally 50 feet). In addition, sellers (and their agents) of real property within a mapped Seismic Hazard Zone must disclose that the property lies within such a zone at the time of sale.

Uniform Building Code

Development standards require projects to comply with appropriate seismic design criteria in the Uniform Building Code (UBC), adequate drainage facility design, and preconstruction soils and grading studies. The UBC also includes regulations regarding building near fills containing rubbish or other decomposable material.

California Building Code

California building standards are published in the California Code of Regulations, Title 24, known as the California Building Code (CBC). The 2013 CBC applies to all applications for building permits. The 2013 CBC contains administrative regulations for the California Building Standards Commission and for all State agencies that implement or enforce building standards. Local agencies must ensure that development complies with the guidelines contained in the 2013 CBC. Cities and counties have the ability to adopt additional building standards beyond the 2013 CBC

LOCAL

Building Code

Chapter 14, Article II of the City's Municipal Code contains the City's Building Codes. Division 2 of Article II includes Uniform Building Code amendments and modifications. Section 14-54 includes regulations pertaining to building on fills containing decomposable material. This section states the following:

a. *Permits shall not be issued for buildings or structures regulated by this Code within 1,000 feet of fills containing rubbish or other decomposable material unless the fill is isolated by approved natural or man-made protective systems or unless designed according to the recommendation contained in a report prepared by a licensed civil engineer. Such report shall contain a description of the investigation, study and recommendation to minimize the possible intrusion and to prevent the accumulation of explosive concentrations of decomposition gases within or under enclosed portions of such building or structure. At the time of the final inspection, the civil engineer shall furnish a signed statement attesting that the building or structure has been constructed in accordance with his recommendations as to decomposition gases required in this subsection.*

b. *Buildings or structures regulated by this Code shall not be constructed on fills containing rubbish or other decomposable material unless provision is made to prevent damage to the structure, floors, underground piping and utilities due to uneven settlement of the fill. One-story light-frame accessory structures not exceeding 400 feet in area nor 12 feet in height may be constructed without special provision for foundation stability.*

Azusa General Plan Geologic Hazards Element

The Geologic Hazards Element addresses natural hazards in the City. Potential risks to residents and the local environment associated with hazards such as liquefaction, soil failure, earthquakes, and flooding, are considered. The Geologic Hazards Element provides background information related to each issue, and identifies goals and policies regarding hazardous structures, flooding and drainage,

emergency preparedness and education, and post-disaster reconstruction. The following policies are those related to seismic issues. Refer to Section 5.8, *Hydrology and Water Quality* for drainage issues.

- Require that earthquake survival and efficient post-disaster functioning are primary concerns in the siting, design and construction standards of essential facilities. (Geo 1.1)

- Require that proposed essential facilities apply the most current professional standards for seismic design and be subject to seismic review, including detailed site investigations for faulting, liquefaction, ground motion characteristics, and slope stability. (Geo 1.2)

5.9.3 IMPACT THRESHOLDS AND SIGNIFICANCE CRITERIA

CEQA SIGNIFICANCE CRITERIA

The environmental analysis in this section is patterned after the Initial Study Checklist recommended by Appendix G of the *CEQA Guidelines*, as amended, and used by the City of Azusa in its environmental review process, and is contained in Appendix 13.1 of this EIR. The Initial Study Checklist includes questions relating to geology and seismic hazards. The issues presented in the Initial Study Checklist have been utilized as thresholds of significance in this section. Accordingly, a project may create a significant environmental impact if it would:

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

    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42 (refer to Impact Statement GEO-1).

    - Strong seismic ground shaking (refer to Impact Statement GEO-2).

    - Seismic-related ground failure, including liquefaction (refer to Impact Statement GEO-3).

    - Landslides (refer to Section 10.0, *Effects Found Not To Be Significant*).

- Result in substantial soil erosion or the loss of topsoil (refer to Impact Statement GEO-4).

- 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 (refer to Impact Statement GEO-5).

- Be located on expansive soil, as defined in Table 18-1-B of the California Building Code (2004), creating substantial risks to life or property (refer to Impact Statement GEO-5).

- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water (refer to Section 10.0, *Effects Found Not To Be Significant*).

Based on these standards, the effects of the proposed project have been categorized as either a "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a significant unavoidable impact.

5.9.4 IMPACTS AND MITIGATION MEASURES

RUPTURE OF A KNOWN EARTHQUAKE FAULT

GEO-1 THE PROJECT WOULD NOT EXPOSE PEOPLE OR STRUCTURES TO POTENTIAL SUBSTANTIAL ADVERSE EFFECTS INVOLVING THE RUPTURE OF A KNOWN EARTHQUAKE FAULT.

Impact Analysis: The project consists of the construction of a 342,629 square-foot industrial/warehousing development. As noted above, the City of Azusa is located within a geologically active area, and is subject to infrequent earthquakes from nearby faults, including the Sierra Madre Fault, Raymond Fault, Puente Hills Blind Thrust, Clamshell-Sawpit Canyon Fault, and San Andreas Fault. The nearest known active fault is the Sierra Madre Fault, located approximately 0.71-mile north of the project site with a probable magnitude of M_w6.0 to 7.0.[4] A moderate to large magnitude earthquake on a regional fault could cause moderate to severe seismic shaking in the City, thus exposing people or structures on the project site to potential substantial adverse effects, including the risk of loss, injury, or death. The possibility of moderate to high ground acceleration in the City may be considered as approximately similar to the entire Southern California region as a whole.

In addition to the major faults mentioned above, there are numerous other fault zones in the area including the Duarte Fault. As shown on Exhibit 5.9-2, a portion of the project site is located in an "Alquist-Priolo Earthquake Fault Zone Subject to Review". As such, rupture of a known earthquake fault (i.e., the Duarte Fault trace to the south) could expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death. Given the potential for fault rupture to occur on the project site, a detailed investigation of potential indicators of faulting was conducted; refer to Appendix 13.9, *Geotechnical Documentation*. The investigation included the drilling, sampling, and logging of multiple deep borings in numerous areas of the project site to gather bedrock and groundwater data that more accurately determines the location of the fault in relation to proposed on-site structures. Based on the detailed investigation, it was determined that the project would accommodate a required 50-foot setback from the Duarte Fault Trace. Upon implementation Mitigation Measure GEO-1, impacts related to fault rupture would be less than significant.

[4] Southern California Earthquake Data Center, *Sierra Madre Fault Zone*, accessed April 2, 2014 at http://www.data.scec.org/significant/sierramadre.html.

Mitigation Measures:

GEO-1 Prior to Building Permit issuance, the City Engineer and/or City Building Official shall ensure that the Grading and Building Plans demonstrate compliance with the required 50-foot building setback from the Duarte Fault trace, per the recommendations of the *Geotechnical Documentation* prepared for the proposed project.

Level of Significance: Less Than Significant Impact With Mitigation Incorporated.

STRONG SEISMIC GROUND SHAKING

GEO-2 THE PROJECT WOULD NOT EXPOSE PEOPLE OR STRUCTURES TO POTENTIAL SUBSTANTIAL ADVERSE EFFECTS INVOLVING STRONG SEISMIC GROUND SHAKING.

Impact Analysis: As noted above, the project site is located within a geologically active area, and is in close proximity to known active earthquake faults (e.g., the Sierra Madre Fault is located approximately 0.71-mile to the north). Further, the Duarte Fault trace is located adjacent to the south of the project site, and a portion of the project site is located within a preliminary Earthquake Fault Zone; refer to Exhibit 5.9-2. According to the *Geotechnical Documentation* prepared for the project, the site is likely to be subjected to moderate to severe ground shaking due to the proximity of these known active and potentially active faults. The intensity of ground shaking on the project site would depend upon the magnitude of the earthquake, distance to the epicenter, and the geology of the area between the epicenter and the project site.

Given the proximity to major active faults, severe ground motion can be expected at the project site. In general, the City regulates development (and reduces potential seismic and geologic impacts) under the requirements of the CBC, Azusa Municipal Code, the California Department of Conservation, California Geologic Survey (CGS) Special Publications 117, and project-specific mitigation measures. The proposed industrial/warehousing buildings would be designed to withstand the "design-level" earthquake, as set forth in the latest edition of the CBC. The potential adverse effects to people and new structures from strong, seismically-induced, vibratory ground motion would be sufficiently mitigated through proper seismic design and conformance with the City's Building Code. Additionally, Mitigation Measure GEO-2 requires compliance with the design recommendations set forth in the *Geotechnical Documentation* prepared for the project. The exposure of people and new structures to potential adverse impacts involving strong, seismically-induced, vibratory ground motion would be reduced to less than significant through compliance with the CBC, Azusa Municipal Code, and Mitigation Measure GEO-2.

Mitigation Measures:

GEO-2 Prior to Grading or Building Permit issuance, the Grading and Building Plan, construction contracts, and specifications shall demonstrate compliance with the recommendations set forth in the *Geotechnical Documentation* prepared for the project that pertain to seismic ground shaking. These recommendations pertain to seismic design parameters, foundation design recommendations, lateral earth pressures, cement type and corrosion, slab-on-grade design, site development recommendations, and preliminary pavement design. The *Geotechnical Documentation* is included in Appendix 13.9, *Geotechnical Documentation* of this EIR and is incorporated by reference into this mitigation measure.

Level of Significance: Less Than Significant Impact With Mitigation Incorporated.

LIQUEFACTION

GEO-3 THE PROPOSED PROJECT WOULD NOT EXPOSE PEOPLE OR STRUCTURES TO POTENTIAL SUBSTANTIAL ADVERSE EFFECTS ASSOCIATED WITH SEISMICALLY INDUCED LIQUEFACTION.

Impact Analysis: As discussed in the "Existing Setting" discussion above, the project site is located within a zone mapped as having the potential for earthquake-induced liquefaction. Liquefaction typically occurs in areas where the soils below the water table are composed of poorly consolidated, fine to medium grained, primarily sandy soil. In addition to the requisite soil conditions, the ground acceleration and duration of the earthquake must also be of a sufficient level to induce liquefaction.

According to the *Geotechnical Documentation* for the project site, groundwater has been observed at depths of approximately 90 to 175 feet bgs. The soils underlying the project site consist of gravels, cobbles, and boulders in a brown silty sand matrix measured at a depth of three to nine feet bgs. These alluvial deposits are expected to continue to at least 190 feet bgs. The upper silty sand stratum at the project site generally is medium dense to dense and slightly moist. In addition, the project site is also underlain by fill material (generally consisting of brown, dry to slightly moist silty sand), and ash associated with the prior industrial uses. Analysis conducted as part of the *Geotechnical Investigation* documentation indicates that due to the groundwater depths in the vicinity of the project site (90 to 175 bgs), the potential for liquefaction is low. Therefore, a less than significant impact would occur.

Mitigation Measures: No mitigation measures are required

Level of Significance: Less Than Significant Impact.

LOSS OF TOPSOIL

GEO-4 THE PROPOSED PROJECT WOULD NOT RESULT IN SUBSTANTIAL EROSION AND LOSS OF TOPSOIL.

Impact Analysis: According to the *Geotechnical Investigation* documentation, the project site is characterized by alluvial deposits consisting of granular soils. The project site is also underlain by fill material (generally consisting of brown, dry to slightly moist silty sand), and ash associated with the prior industrial uses. Project construction would involve grading activities over the entire project site. As such, there is a potential for erosion to occur during the grading process during periods of heavy rainfall. Runoff at the site would be expected to increase during development as portions of the site are graded and paved.

During short-term construction, the project is subject to compliance with the National Pollutant Discharge Elimination System (NPDES) permitting process, which would require preparation of a Stormwater Pollution Prevention Plan (SWPPP) in order to control common pollutants such as suspended soil in stormwater runoff from leaving the project site. The project's NPDES/SWPPP requirements are discussed in detail in Section 5.8, *Hydrology and Water Quality*. Following compliance

with the established regulatory requirements (i.e., NPDES), project implementation would result in a less than significant impact involving soil erosion or the loss of topsoil during the construction process.

As also noted in Section 5.8, long-term operational water quality impacts (including loss of topsoil) would be minimized through the implementation of Best Management Practices (BMPs) identified within the Standard Urban Stormwater Mitigation Plan (SUSMP) prepared for the proposed project. The proposed site design BMPs would include: three retention basins (approximately 72,643 square feet); the use of "conservation design" landscaping (drought tolerant plant species); the incorporation of underground storage facilities, via a series of 48-inch perforated pipes with rock backfill and wrapped in filter fabric to allow infiltration; rooftops with drainage into adjacent landscaping prior to discharging to storm drains; and drainage of impervious surfaces (sidewalks, walkways, etc.) into adjacent landscaping. In addition, a number of source control BMPs (i.e., non-structural and structural), and treatment control BMPs would be implemented for the proposed project, as required in the SUSMP. Mitigation Measure HWQ-1 requires the Applicant to submit detailed plans displaying all BMPs required by the SUSMP to be implemented on-site, prior to issuance of a Grading Permit. Compliance with Mitigation Measure HWQ-1 would result in a less than significant impact in regards to the loss of topsoil.

Mitigation Measures: Refer to Mitigation Measure HWQ-1.

Level of Significance: Less Than Significant Impact With Mitigation Incorporated.

UNSTABLE GEOLOGIC UNITS

GEO-5 THE PROPOSED PROJECT WOULD NOT RESULT IN SIGNIFICANT IMPACTS RELATED TO UNSTABLE GEOLOGIC CONDITIONS, INCLUDING LANDSLIDE, LATERAL SPREADING, SUBSIDENCE, LIQUEFACTION, COLLAPSE, AND EXPANSIVE SOILS.

Impact Analysis:

Lateral Spreading, Liquefaction, and Landslides

Seismically induced lateral spreading primarily involves movement of earth materials due to earth shaking. Lateral spreading is demonstrated by near-vertical cracks with predominantly horizontal movement of the soil mass involved. According to the *Geotechnical Documentation* prepared for the project, due to the relatively flat topography and distance from any slopes, low potential for liquefaction (discussed in Impact Statement GEO-3 above), and the dense nature of the site soils, the potential for lateral spreading at the project site is considered low. In addition, as noted above, the project site is not located within an area mapped as having the potential for seismically-induced landsliding, as shown in Seismic Hazard Zone Map for the Azusa Quadrangle. Further, due to the distance between the project site and the gradient of slopes associated with the Vulcan Materials Quarry operations to the south, the potential for landslide induced hazard at the project site is negligible. It should be noted that the Vulcan Materials Quarry is required per their conditional use permit (CUP) to implement geostability safety regulations to prevent slope instability and landslides. As such, impacts in this regard are considered less than significant.

Soil Shrinkage and Subsidence

Based on the *Geotechnical Documentation* prepared for the project, shrinkage of the on-site soil materials as a result of grading activities associated with the proposed project would be expected to be in the five percent range. The project site is not within or near an area of known subsidence. However, as noted in the *Geotechnical Documentation*, the project site is underlain with low to moderately compressible and collapsible alluvial soils to approximate depths of two feet bgs. In addition, moderate soil settlement associated with wetting of the on-site site soils is anticipated. Construction activities could expose the on-site soils to wetting during demolition, grading, paving, and building construction. Therefore, it is possible that minor shrinking and subsidence to the on-site soils could occur during construction activities, and to the proposed on-site buildings during operations. However, the project would implement Mitigation Measure GEO-3, which requires the implementation of the site design/construction recommendations provided in the *Geotechnical Documentation*; see Appendix 13.9. Implementation of Mitigation Measure GEO-3 would reduce impacts from shrinking and subsidence to a less than significant level.

Expansive Soils

According to the *Geotechnical Documentation* prepared for the project, the project site subsurface soil consists of sandy and gravelly soils having negligible expansion potential. However, import backfill materials used during construction activities on the project site could have high expansion potential. Therefore, a potentially impact would occur with relation to expansive soils. However, as noted in the *Geotechnical Documentation*, any imported backfill would be required to be granular, non-expansive select fill with a minimum sand equivalent of 30 to minimize impacts in this regard. Thus, upon compliance with Mitigation Measure GEO-3, impacts from expansive soils would be less than significant levels.

Mitigation Measures:

GEO-3 Prior to Grading or Building Permit issuance, the Grading and Building Plan, construction contracts, and specifications shall demonstrate compliance with the recommendations set forth in the *Geotechnical Documentation* prepared for the project that pertain to unstable geologic units. These recommendations pertain to expansion potential, slab-on-grade design, site development recommendations (including grading, fill placement, and compaction), trenching, drainage, utility trench backfill, and preliminary pavement design. The *Geotechnical Documentation* is included in Appendix 13.9, *Geotechnical Documentation* of this EIR and is incorporated by reference into this mitigation measure.

Level of Significance: Less Than Significant Impact With Mitigation Incorporated.

5.9.5 CUMULATIVE IMPACTS

- **THE PROPOSED PROJECT, IN COMBINATION WITH OTHER RELATED CUMULATIVE PROJECTS, WOULD NOT RESULT IN CUMULATIVELY CONSIDERABLE GEOLOGICAL IMPACTS.**

Impact Analysis:

Rupture of a Known Earthquake Fault, and Strong Seismic Ground Shaking

Due to the location and proximity of the project and identified cumulative projects, it is anticipated that the project site and cumulative projects would generally experience similar ground shaking associated with seismic activity and similar fault rupture potential. Based on the site-specific nature of seismic activity and hazards, the project and identified cumulative development would have a limited potential for interaction in this regard and any potential for a combined cumulative effect would be negligible. Development of the proposed project and cumulative projects would be required to comply with the CBC in order to reduce potential impacts associated with strong seismic ground shaking and/or fault rupture to a less than significant level. Therefore, the project would not contribute to cumulative impacts and impacts in this regard are not cumulatively considerable.

Mitigation Measures: Refer to Mitigation Measures GEO-1 and GEO-2.

Level of Significance: Less Than Significant Impact.

Soil Erosion/Loss of Topsoil

Portions of the City and surrounding areas contain soils that have erosion potential. Construction of planned and future cumulative projects would facilitate soil erosion and loss of topsoil. Grading activities leave soils exposed to rainfall and wind conditions that results in erosion. The geotechnical characteristics of each cumulative project site would be evaluated on a project-by-project basis, and appropriate mitigation measures would be required, as necessary, in addition to Federal and State requirements for mitigating erosion. Therefore, assuming cumulative projects implement project specific mitigation measures and comply with existing Federal and State water quality standards (i.e., NPDES regulations), cumulative soil erosion and loss of topsoil impacts would be less than significant.

Project construction would involve grading activities over the entire project site. According to the *Geotechnical Documentation* prepared for the project, there is a potential for erosion to occur during the grading process of the proposed project during periods of heavy rainfall. Grading and excavation operations may result in substantial soil erosion or the loss of topsoil in the absence of mitigation. The project would be required to comply with all requirements set forth in the NPDES permit for construction activities, as enforced by the Los Angeles RWQCB. Therefore, upon compliance with State and Federal NPDES requirements regarding erosion (refer to Section 5.8, *Hydrology and Water Quality*) and implementation of Mitigation Measure HWQ-1, the proposed project's cumulative contribution to soil erosion and loss of topsoil would be less than significant.

Mitigation Measures: Refer to Mitigation Measure HWQ-1.

Level of Significance: Less Than Significant Impact With Mitigation Incorporated.

Unstable Geologic Conditions

Based on the site-specific nature of geologic conditions and potential for unstable conditions, the project and identified cumulative development would have a limited potential for interaction in this

regard and any potential for a combined cumulative effect would be negligible. Although the project site would be susceptible to low to moderate soil settlement, shrinking, and subsidence due to the soil components at the project site, the project would conform to applicable City criteria, adhere to standard engineering practices, incorporate standard practices of the CBC, and would be required to implement the recommendations of the *Geotechnical Documentation* (see Mitigation Measure GEO-3). As such, impacts related to unstable geologic conditions would be reduced to a less than significant level. Therefore, the project would not contribute to cumulative impacts and impacts in this regard are not cumulatively considerable.

Mitigation Measures: Refer to Mitigation Measure GEO-3.

Level of Significance: Less Than Significant Impact With Mitigation Incorporated.

5.9.6 SIGNIFICANT UNAVOIDABLE IMPACTS

No unavoidable significant impacts related to geology and soils have been identified following implementation of mitigation measures referenced in this section.