# IV.F GEOLOGY AND SOILS

## 1. Introduction

This section of the EIR describes the current geologic and soil conditions underlying the project site and provides an analysis of potential impacts associated with geological hazards related to seismic impacts and subsurface conditions. This analysis is based on a Feasibility Level Geotechnical Investigation prepared by GeoSoils, Inc., and two Due Diligence Geotechnical Investigations prepared by Petra and LGC Inland. The geotechnical reports are included as Appendix F.

## 2. Environmental Setting

### a) Regulatory Environment

#### 1) State of California Alquist-Priolo Earthquake Fault Zones

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 established the Alquist-Priolo Earthquake Fault Zones in order to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Act (Public Resources Code [PRC] Section 2621) was passed in response to the 1971 San Fernando Earthquake, which caused extensive surface fault ruptures that damaged homes, commercial buildings, and other structures. The primary purpose of the Alquist-Priolo Earthquake Fault Zoning Act is to prevent the construction of buildings for human occupancy on the surface trace of active faults, to provide the citizens with increased safety, and to minimize the loss of life during and immediately following earthquakes by facilitating seismic retrofitting to strengthen buildings against ground shaking (PRC Section 2621.5). Under the Alquist-Priolo Act, the state geologist is required to establish regulatory zones, known as Earthquake Fault Zones, around the surface traces of active faults and to issue appropriate maps to assist cities and counties in planning, zoning, and building regulation functions. Maps are distributed to all affected cities and counties for the controlling of new or renewed construction and are required to sufficiently define potential surface rupture or fault creep. The state geologist is also required to continually review new geologic and seismic data, revise existing zones, and delineate additional earthquake fault zones when warranted by new information. Local agencies are required to enforce the Alquist-Priolo Act in the development permit process, where applicable, and may be more restrictive than State law requirements. In addition, according to the Alquist-Priolo Act, prior to the approval of projects, cities, and counties are required to conduct a geologic investigation of the project site by a licensed geologist, demonstrating that buildings will not be constructed across active faults. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back. A minimum 50-foot setback is required although setback distances may vary.

The Alquist-Priolo Act and its regulations are presented in California Division of Mines and Geology (CDMG) Special Publication (SP) 42.

In addition, State law allows local jurisdictions to identify active faults and to impose appropriate building restrictions, consistent with the objectives of the Alquist-Priolo Act.

#### 2) State of California Seismic Hazards Mapping Act

The State of California Seismic Hazards Mapping Act of 1990 (PRC Section 2690-2699) addresses the effects of strong ground shaking, liquefaction, landslides, and other ground failures due to seismic events. Under this Act, the state geologist is required to delineate "seismic hazard zones." Cities and counties need to regulate certain development projects within the zones until the geologic and soil conditions of the project site are investigated and appropriate mitigation measures, if any, are incorporated into development plans. Additional regulations and policies, provided by the State Mining and Geology Board, assist municipalities in preparing the Safety Element of their General Plan and encourage land use management policies and regulations to reduce and mitigate those hazards to protect public health and safety. Under PRC Section 2697, cities and counties shall require a geotechnical report defining and delineating any seismic hazard prior to the approval of a project located in a seismic hazard zone. Each city or county shall submit one copy of each geotechnical report, including mitigation measures, to the State Geologist within 30 days of its approval. In addition, under PRC Section 2698, cities and counties are not prohibited from establishing policies and criteria, which are more stringent than those established by the Mines and Geology Board.

State publications supporting the requirements of the Seismic Hazards Mapping Act include the CDMG SP 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California and CDMG SP 118, and Recommended Criteria for Delineating Seismic Hazard Zones in California. SP 117 objectives include the evaluation and mitigation of earthquake-related hazards for projects within designated zones of required investigations and to promote uniform and effective Statewide implementation of the evaluation and mitigation elements of the Seismic Hazards Mapping Act. SP 118 implements the requirements of the Seismic Hazards Mapping Act in the production of Probabilistic Seismic Hazard Maps for the State and establishes criteria for the determination of landslide hazard zones and liquefaction hazard zones. Seismic evaluation and hazard maps have been prepared for the Newport-Inglewood Fault system, Oak Ridge system, Palos Verdes Fault, Raymond Fault, Santa Monica Fault system, Sierra Madre Fault system (San Fernando Fault), and the Los Angeles Blind Thrust Faults, including the Compton, Elysian Park, Northridge, and Puente Hills Faults.

#### 3) The Ontario Plan

The following policies contained in the Safety Element (Seismic and Geologic Hazards Section) within the Policy Plan of The Ontario Plan (TOP) are relevant to the proposed project and geology, soils, and seismic conditions:

- S1-1 Implementation of Regulations and Standards. We require that all new habitable structures be designed in accordance with the most recent California Building Code adopted by the City, including provisions regarding lateral forces and grading.
- S1-2 Entitlement and Permitting Process. We follow state guidelines and the California Building Code to determine when development proposals must conduct geotechnical and geological investigations.
- S1-3 Continual Update of Technical Information. We maintain up-to-date California Geological Survey seismic hazard maps.
- S1-4 Seismically Vulnerable Structures. We conform to state law regarding unreinforced masonry structures.

### b) Physical Environment

#### 1) Geologic Setting

On a regional setting, the project site is located within the Perris Block, which is part of a prominent natural geomorphic province known as the Peninsular Ranges. The Peninsular Range is characterized by steep, elongated ranges and valleys that trend in a northwestern direction and consists of plutonic and metamorphic rocks (bedrock) which makes up the majority of the mountain masses, with relatively thin volcanic and sedimentary deposits discontinuously overlying the bedrock, and with Plio/Pleistocene-aged to older Quarternary-aged alluvial fan deposits filling in the valleys and younger alluvium filling in the incised drainages. The alluvial deposits are derived from the waterborne deposition of the products of weathering and erosion of the bedrock.

The localized surficial deposits that underlain the project site consists of Pleistocene and Holocene (recent) alluvial deposits including a surficial layering of undocumented artificial fill including manure that is underlain by young eolian (wind-blown) deposits and by Quaternary-age alluvial fan deposits. No bedrock is exposed in the project site and the bedrock depth within the project vicinity is 400 to 1,500 feet deep. The alluvial fan deposits within the project site are generally flat lying, undeformed, and regionally distinguished from Holocene deposits by the presence of pedogenic soils that regionally have a poorly to well-developed textural B horizon.

The southern portion of the project site is underlain by medium-grained Holocene alluvium. The eastern portion of the project site consists of Delhi Fine Sand (Class III Soil) and sections of the western portion of the project site are underlain with Hilmar Loamy Fine Sand (Class II Soil). Additionally, the project site is located in an area that has the potential for expansive and compressible clay deposits. The project site is relatively flat and has a general one to two percent slope to the southwest.

### c) Subsurface Soils

#### 1) Undocumented Artificial Fill

Undocumented artificial fill overlies the entire project site and generally consists of loose to medium dense, fine to medium-grained sand, silty sand, stockpiled manure, and organic matter. The fill extends to variable depths range from approximately one to two feet in thickness. Localized areas of deeper fill may also exist throughout other areas of the project site. Fill located in portions of the project site which contain cattle pens and dairy uses commonly consists of pure manure as thick as 24 inches. Stockpiled manure was also noted in various locations throughout the project site, including several three to six feet high stockpiles within the cattle pens and a five to 15-feet high manure stockpile on the southern portion of the project site, south of the dairy use and adjacent to Eucalyptus Avenue. Organic-rich soils were also encountered in areas beyond the cattle pens where manure have been previously blended with onsite soil to an average depth of six to 12 inches. Due to the potentially loose and highly compressible nature of the soil and organic materials, the surficial materials may be unsuitable for engineering purposes such as foundation support and back fill. However, clean fill materials may be reused for compacted fills once the organic materials have been removed from the site and the site area is approved by the geotechnical engineer prior to placement.

### d) Colluvium/Topsoil

Colluvium/Topsoil was observed layering the eolian deposits and Quarternary fan deposits. The colluvium/topsoil is characterized as non-uniform, dry, porous, and loose brown silty sand and was measured to be approximately two feet in thickness. The topsoil has a very-low to low expansion potential, though clayey factions observed have a medium expansion potential. Due to the potentially loose and compressible nature of these soils, they are considered unsuitable for structure support and/or improvements in their existing state. During excavation and development, these soils would be required to be removed and recompacted.

### e) Young Eolian Deposits/Quaternary Eolian Sand

The eolian deposits are located throughout the majority of the project site albeit the southwestern portion of the project site. Native eolian deposits, which are wind-deposited, consist of sand and silty sand with subordinate interclass of sandy silt and silt. These materials were generally fine-grained, slightly porous to porous, and loose to medium dense and extended to variable depths of three to seven feet and characterized as grayish brown to yellowish brown. Throughout the project site, the thickness of the deposits was observed between three to seven feet. The combined existing fill and eolian deposits are generally lower in density and more porous as compared to the deeper alluvial fan materials and are considered unsuitable for support of additional fill, residential structures, or other improvements.

#### f) Medium-Grained Holocene Alluvium

A medium-grained Holocene alluvium is present in the southwestern portion of the project site. These deposits of fine-to-coarse-grained sand are moderately to highly permeable and subject to erosion. The alluvium is relatively porous, compressible, and subject to consolidation under structural loads. Erosion potential of the alluvium is moderate to high.

#### g) Alluvial Fan Deposits (Quaternary Fan Deposits)

Quaternary-age alluvial fan deposits were encountered underlying the artificial fill, colluvial, and eolian deposits. The alluvial fan materials generally consist of silty sands, sandy silts, sandy clays, and fine-to coarse-grained sands, and are characterized in various shades of gray, orange (oxidized) brown, and red brown. The fan deposits contain Stage II carbonates near the stratigraphic top of the formation. The sediment deposits generally varied from dry to wet, to locally saturated, and generally ranged from medium dense/medium stiff to very dense/very stiff with depth. Below a general depth of approximately five to eight feet, the native alluvial fan materials transition to a stiff condition with only occasional slight porosity. The fan deposits have a very low expansion potential. However, low to medium expansive soils may not be precluded from occurring onsite. Due to potential soil settlement, surface weathered fan deposits should be removed and processed prior to compacted fill placement.

#### h) Groundwater

The project site is located within the Chino Groundwater Basin, which is part of an extensive groundwater aquifer managed by the Chino Basin Watermaster. According to the year 2000 water level map prepared by the Chino Basin Watermaster, the regional groundwater level is currently at an elevation of about 580 feet above mean sea level, which is approximately 120 feet below ground surface (bgs) at the project site. The south-central Chino Basin area has a relatively shallow water table due to the large drainage area feeding the Santa Ana River, and the natural restriction at Corona and the Santa Ana Canyon. The groundwater resources within the City of Ontario (City) are considered to be good to excellent; however, water quality problems currently exist throughout the Chino Groundwater Basin as groundwater underlying the agricultural preserve has been deteriorating from increased levels of total dissolved solids (TSD) and nitrates due to the manure stockpiles.

Furthermore, the Chino Basin Watermaster recently implemented a Hydraulic Control Monitoring Program (HCMP) that includes installation of desalter well fields within the Basin. One of the main objectives of the HCMP is to maintain groundwater levels at their current elevations. With the implementation and continuation of HCMP, and current demands on groundwater, groundwater levels beneath the project site are expected to maintain near current levels or may continue to drop slowly with the passage of time.

### 1) Fault Lines and Seismicity

#### *Faulting*

No known active or potentially active faults pass through the project site. In addition, the project site is not located within the boundaries of an Alquist-Priolo Earthquake Fault Zone as defined by the State of California in the Alquist-Priolo Earthquake Fault Zoning Act (Geosoils, Inc. 2003). Furthermore, no evidence of lineaments or other geomorphic features that would suggest the presence of active or potentially active faults were discovered on to the project site. However, the Chino-Central Avenue (Elsinore) Fault Zone is located six miles from the project site and is considered active and included within the Alquist-Priolo Earthquake Fault Zone. This fault zone would present a seismic hazard to the project site and is further discussed below.

#### *Seismic Exposure*

The project site is located in the seismically active area of southern California and is likely to be subjected to moderate to severe ground shaking. The project site is located six miles from the Chino-Central Avenue (Elsinore) Fault Zone and 12 miles from the Cucamonga Fault. The Chino-Central Avenue Fault is considered active and included within the Alquist-Priolo Earthquake Fault Zone. The Chino-Central Avenue Fault is located approximately six miles southwest of the project site and would generate the most severe site ground motions with an anticipated maximum moment magnitude (Mw) of 6.7 and an anticipated slip rate of 1.0 mm per year. Furthermore, this fault is officially classified by the State of California as an active fault which means that surface rupture has occurred along the fault within the last 11,000 years.

### 2) Liquefaction Susceptibility

Liquefaction is a phenomenon in which loose, saturated, granular soils temporarily behave similarly to a fluid when subjected to high intensity ground shaking. Liquefaction occurs when three general conditions exist: (1) shallow groundwater, (2) low-density silty or fine sandy soils, and (3) high intensity ground motion. Generally, liquefaction has a relatively low potential at depths greater than 45 feet and is virtually unknown below a depth of 60 feet. No evidence of features commonly caused by seismically induced liquefaction, including mottled soils which indicate a historical absence of high groundwater levels, have been observed on the project site. In addition, as the entire site is underlain at depth by relatively dense Pleistocene-age alluvial fan deposits, no liquefaction potential was observed. No seismically related liquefaction or landslide hazard zones have been delineated by the California Geological Survey in the project area of Corona North Quadrangle. Furthermore, according to the San Bernardino County Hazard Overlays Map for the Corona North Quadrangle, a majority of the project site is not located within a zone of potential liquefaction; and liquefaction and associated dynamic settlement resulting from the effects of strong ground shaking would not occur as the depth of the groundwater at approximately 120 feet bgs and the relatively dense nature of the underlying soil would not result in liquefaction.

#### 3) Subsidence and Collapse

Areal subsidence occurs at the transition between materials of substantially different engineering properties such as basement bedrock and Quaternary fan deposits. Causes of subsidence include tunnels, wells, covered quarries, and caves beneath a surface. On the project site, bedrock underlies the Quaternary fan deposits at a great depth. Thus, the potential for subsidence is considered low. Furthermore, features associated with areal subsidence such as ground fissures, excessive groundwater withdrawal and associated subsidence, or active faulting were observed. As such, the potential for areal subsidence or ground fissures is considered low.

#### 4) Flooding Hazards

According to the San Bernardino County Hazard Overlays Map for the Corona North Quadrangle, the project site is not located within a dam inundation area. However, the western portion of the project site is located within a 500-year flood zone as determined by the Federal Emergency Management Agency (FEMA). As the project site is approximately 700 feet above sea level and approximately 40 miles from the Pacific Ocean, seismically induced flooding from seiches or tsunamis would not occur.

## 3. Environmental Impacts

### a) Methodology

A geotechnical investigation was conducted on site which included field exploration, exploratory soil borings, obtaining representative samples, laboratory testing, engineering analysis, and the review of pertinent geological literature. The laboratory testing determines the characteristics of the geology and soils that underlie the project site. These subsurface conditions were then analyzed to identify potential significant impacts resulting from project construction and operation in relation to geology and soils.

### b) Thresholds of Significance

Appendix G of the CEQA Guidelines provides a checklist of questions to assist in determining whether a proposed project would have a significant impact related to various environmental issues including geology and soils. Based on the following issue areas identified in Appendix G of the CEQA Guidelines, a significant impact from geologic conditions would occur if the proposed project would:

Would the project:

- 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.

  - Strong seismic ground shaking?
  - Seismic-related ground failure, including liquefaction?
  - Landslides?

- Result in substantial soil erosion or the loss of topsoil?
- 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?
- 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?
- 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?

The Initial Study concluded that potential impacts related to seismic-related ground failure, including liquefaction, landslides, and 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 were less than significant. Refer to Appendix A-2 for a discussion of these thresholds.

### 1) Project Design Features

During project construction, standard cut-and-fill grading techniques would be implemented to establish design grades within the site. The finished grades for the residential portion of the project site would be higher than the recreational portion of the project site. It is estimated that a maximum of proposed cuts and fills would be five feet or less except for areas within the retention basin where thicker fills would be implemented.

Currently, the existing specific plan area generally slopes to the south at approximately 1.0 percent and 2.0 percent. Where slope conditions are present, dwelling units and structures adjacent to the slope areas would be sited to: use the natural ridge as backdrop for structures, use landscape plant materials as a backdrop, and to use structure to maximize concealment of cut slope. In areas where retaining walls are required, exposed walls and fences facing roadways shall be no greater than three feet retaining in height (nine-foot total wall), except as necessary for acoustical purposes to satisfy the intent of the noise ordinance. Where retaining walls or fences face roadways, they shall be built of decorative materials consistent with the wall theme of the neighborhood.

The Conceptual Grading Plan, illustrated in the Grand Park Specific Plan, would be reviewed and approved by the City Building, Planning, and Engineering Departments prior to the issuance of grading permits. In addition, all grading plans and activities would adhere to the City's grading ordinance and dust and erosion control requirements.

### 2) Consistency with Applicable Regulations

***State of California Alquist-Priolo Earthquake Fault Zones***

As previously discussed above, the project site is not located within the Alquist-Priolo Earthquake Fault Zone and no known active or potentially active faults pass through the project site. Therefore, the project is not subject to special setbacks or studies established by the Alquist-Priolo Earthquake Fault Zoning Act.

***State of California Seismic Hazards Mapping Act***

The project would comply with the State of California Seismic Hazards Mapping Act of 1990 as the geologic and soil conditions of the project site have been investigated.

***City of Ontario***

Policy S1-2 has been implemented as a geotechnical report was prepared for the project site indicating the presence of subsurface soils, potential for liquefaction, groundwater levels, possibility of subsidence, presence of active faults, and the possibility of seismic exposure.

Policies S5-2 and S5-3 of TOP require the project to adhere to Soil Erosion Control Area or City-mandated dust control programs and to provide provisions regarding wind blown sand. The design guidelines of the specific plan would adhere to UBC/CBC requirements and applicable recommendations as presented in the geotechnical studies to mitigate the effects of wind on-site. Furthermore, prior to construction, all grading plans and activities would adhere to the City's grading ordinance and dust and erosion control requirements.

The Specific Plan would provide the necessary geotechnical information to potential developers prior to development within the project area. Furthermore, the project would adhere to all applicable UBC/CBC regulations and to the Soil Erosion Control Area of City-mandated dust control program as required by the City.

The project would adhere to these policies as the Specific Plan would provide all necessary information to developers prior to development with the Specific Plan project area. Furthermore, as stated in this geotechnical section, the determination of possible contamination problems due to the manure stockpiles would be addressed in addition to additional geotechnical evaluations that would be required for further development within the project area.

### 3) Analysis of Project Impacts

***Fault Lines and Seismicity***

*Faulting*

As stated above, the project site would not be exposed to any major faults within the vicinity as the project site is not located within the boundaries of an Alquist-Priolo Earthquake Fault Zone. Also, no evidence of lineaments or other geomorphic features show that the presence of active or potentially active faults exist on or adjacent to the project site. Thus, the project would not be affected by any major earthquake faults and impacts would be less than significant.

### *Seismic-Related Ground Shaking*

As the project site is located in the seismically active area of southern California, the project would likely be subjected to moderate to severe ground shaking, which could result in serious damage to structures; personal injuries, including loss of life; damage to property; and economic and social dislocations. As previously stated, the Chino-Central Avenue Fault is located six miles southwest of the project site and approximately 12 miles from the Cucamonga Fault. The project would result in the construction and occupancy of residential uses, commercial uses, an elementary school, and other public facilities. As such, the project would have the inherent potential to expose persons to ground shaking-related hazards. However, the project would be required to comply with the Uniform Building Code (UBC) standards, which include design requirements to reduce the potential for significant damage to structures resulting from strong seismic ground shaking, and the City standards and procedures. Compliance with the UBC and applicable City standards and procedures would reduce potential impacts related to seismic shaking to less than significant levels.

### *Liquefaction Susceptibility*

As stated above, no seismically related liquefaction or landslide hazard zones have been delineated by the California Geological Survey in the project area of Corona North Quadrangle. Although the majority of the project site is not located within a zone of potential liquefaction, the northeastern portion of the project site has a moderate potential of liquefaction according to the Ontario Sphere of Influence General Plan. However, as stated above, no evidence of liquefaction has been observed on the project site and no seismically related liquefaction or landslide hazard zones have been delineated by the California Geological Survey. According to the Petra study, the review of the San Bernardino County Hazard Overlays Map for the Corona North Quadrangle shows the site is not located in a zone of potential liquefaction. Furthermore, the Petra study concluded that liquefaction and dynamic settlement from seismic events were negligible considering the depth to groundwater and therefore less than significant. For the portion of the project site located in an area outside the liquefaction hazard zone, no liquefaction and associated dynamic settlement would occur as the groundwater levels are approximately 120 feet bgs, and the potential of liquefaction would be less than significant. As such, the possibility of liquefaction to occur in the project site is considered low, thus project-related liquefaction impacts would be less than significant.

### *Subsidence and Collapse*

Subsidence occurs when a void is located or created underneath a surface causing the surface to collapse. Causes of subsidence include tunnels, wells, covered quarries, and caves beneath a surface. As discussed above, the project site does not present features associated with subsidence, therefore the potential for subsidence would be considered low and impacts would be considered less than significant.

As previously discussed, the on-site soils are characterized by high manure and organics content, and therefore may exhibit substantial compressibility and potential for settlement when structures are placed on these materials. Given this condition, structures constructed on-site could be subjected to damage from ground settlement or collapse, which would be considered a potentially significant impact. However, removal of organic content, off-site disposal of these materials, and recompaction of residual soils, included as Mitigation Measure GEO-1, would serve to reduce the risks associated with compressible soils to an acceptable level. With removal of organics and recompaction of on-site soils, impacts would be less than significant.

#### 4) Seismic-Related Flooding Hazards

As stated above, the project site is not located within a dam inundation area, though the western portion of the project site is located within a 500-year flood zone based on FEMA. In addition, the project would not be susceptible to seismically-induced flooding from seiches or tsunamis as the project is located approximately 40 miles from the Pacific Ocean and approximately 700 feet above sea level. Impacts, therefore, would be less than significant and no mitigation measures are required.

### 4. Cumulative Impacts

Geologic impacts are generally associated with a specific project site or localized area. As such, a cumulative impact analysis of geologic impacts resulting from project build-out would not occur. However, cumulative development in the area would increase the overall potential of exposure to seismic hazards by potentially increasing the number of people within exposed to seismic hazards. In addition, all projects are required to comply with state and local regulations regarding seismic hazards. Therefore, compliance with the applicable building regulations and standard engineering practices would ensure that cumulative impacts would be less than significant.

### 5. Mitigation Measures

In order to ensure that impact levels related to geology and soils remain less than significant for the entire project site, recommendations provided by the three project geotechnical reports identified in the Introduction Section are included as mitigation measures below.

**GEO-1** Future development of urban uses on-site shall implement all applicable recommendations contained in the geotechnical reports related to design, grading, and construction to the satisfaction of the City Building Department, including the following:

- During construction activities, the developer shall be required to perform removal and recompaction of compressible surficial soils for surficial materials with depths of five to eight feet below the existing ground surface in order to mitigate excessive materials settlement. Deeper removals shall be necessary in areas located between boreholes and test pits. Ultimate removal depths shall be determined based on observation and testing by the geotechnical consultant during grading operations.

- Prior to grading activities, the developer shall remove all manure and organic-rich soil and dispose of it off-site. Also, additional testing of organic-rich soils shall be performed following removal of the manure to more accurately determine the actual depth and extent of excessive organic-rich soil that my also require removal from the remainder of the project site. Removals shall be monitored by the geotechnical consultant of record.

- Prior to grading operations, the developer shall export existing manure and organic-rich topsoil, as well as vegetation, off the property. For any remaining soils, exhibiting any organic content greater than one percent shall be thoroughly mixed with other soils during remedial grading.

- During grading activities, contingencies shall be made for balancing earthwork quantities based on actual shrinkage and subsidence.

- Design and construct structures according to Chapter 16 of the 2010 California Building Code.

- Rocks exceeding 12 inches in diameter shall be reduced in size or removed from the project site.

- Reinforced steel in contact with soil shall use Type II Modified Portland Cement in combination with a 3-inch concrete cover.

## 6. Level of Significance After Mitigation

All impacts related to geology and soils can be reduced to less than significant with implementation of applicable mitigation measures.