12.0
GEOLOGY, SOILS, AND SEISMICITY

12.0 GEOLOGY, SOILS, AND SEISMICITY

This section of the Draft Environmental Impact Report ("Draft EIR"; "DEIR") describes potential impacts due to geologic conditions, seismic activity, and soil conditions resulting from the proposed Project. For impacts related to the creation and exposure of the public to health hazards, airport hazards, and wildland fires, see Section 15.0, Hazardous Materials and Hazards. This section is based on review of available literature and maps, including geologic hazard maps created by the California Geological Survey, the Granite Bay Community Plan (Placer County, 2004), the Geotechnical Engineering Report for Amazing Facts Property, prepared by Holdrege and Kull (2009) (**Appendix 12.0-1**), and the Engineering Geologic Evaluation Proposed Residential Subdivision Granite Bay, California (Kleinfelder, 2003) (**Appendix 12.0-2**). Information regarding soils at the Project site is taken from the geotechnical report, dated April 15, 2009. The study is inclusive of the entire Project site and is sufficient to provide adequate geology and soils information for analysis in this DEIR. The Project applicant has also prepared a preliminary grading plan, which shows locations of proposed cuts and fills and retaining walls included as a part of the Project.

12.1 EXISTING SETTING

12.1.1 Regional Setting

Geology and Soils

The 74.2-acre Project site is located in the Granite Bay Community Plan area in southwestern Placer County on the easterly side of the Sacramento Valley close to the intersection of the Great Valley and the Sierra Nevada geomorphic provinces. The Sierra Nevada is a large fault block composed of granitic and metamorphic rocks tilted gently from the summit near Donner Lake to the west, where the block dips under the sedimentary and alluvial units of the valley. Most of the Granite Bay area is underlain by granitic rocks ranging from 125 to 136 million years old. The granitic rocks were intruded in molten form at great depth into layered sedimentary and volcanic rocks, which were folded, faulted, crushed, and uplifted. In the process, these layered rocks were metamorphosed into amphibolite, greenstone, slates, and phyllites. This band of metamorphic rocks trends slightly west of north and has been called the "Mother Lode" because of the gold-rich quartz veins that were intruded along steep faults in the metamorphic rocks. Stream erosion during the episodic uplifts of the Sierra Nevada, combined with varied volcanic activity, has produced the variety of sedimentary rock units present in the Granite Bay Community Plan area. During the last million years, erosion and sedimentation have led to the formation of alluvial deposits. Weathering has produced the present-day landscape. Rounded hills of decomposed granite, scattered outcrops of more resistant rocks, and steep bluffs supported by the Mehrten Conglomerate or Volcanics are the dominant elements of the plan area (Placer County, 2004).

The Granite Bay Community Plan indicates that the predominant soil type in the area is the San Andreas series. Andregg coarse sandy loam dominates the northeast part of the Project area. In the southern portion of the Project area are the Caperton gravelly coarse sandy loam, the Cometa-Fiddyment complex, the Redding and Corning gravelly loams, and the Andregg coarse sandy loams. Small amounts of other types of soil are also found in the area; however, only the dominant types are identified in this discussion (Placer County, 2004).

Potential Soils Hazards

The principal soils hazards in the region are erosion, slope stability, and settlement. These hazards are discussed further below.

Slope Stability

Many areas of Placer County include steep slopes. As a general rule, on slopes of more than 30 percent, it is difficult to build structures and roads of any width without substantial grading. Slopes in the Granite Bay Community Plan area are generally gentle; few areas have more than a 10 percent slope (Placer County, 2004).

Erosion

Various soils in Placer County have characteristics which are prone to erosion. Erosion is typically a site-specific issue which is dealt with on a project-by-project basis. Naturally occurring erosion is a hazard only on a small scale. The Placer County Land Development Manual requires that erosion control measures be developed for all projects. Erosion control measures must be delineated on improvement plans and reviewed by the Placer County Public Works Department (Placer County, 2004).

Settlement

Settlement can be caused by soils with a high shrink-swell potential. Differential settlement can occur when soils expand and contract and can result in damage to structures located on such soils. The potential for settlement to occur within Placer County is dependent on the soil type. Issues relative to settlement are typically addressed on a site-specific basis.

Expansive Soils

Expansive soils are soils that shrink or swell depending on the level of moisture they absorb. These swelling soils typically contain clay minerals. As they get wet, the clay minerals absorb water molecules and expand; conversely, as they dry they shrink, leaving large voids in the soil. Expansive soils are typical of Mehrten volcanics which are known to be present throughout Placer County.

Naturally Occurring Asbestos

Naturally occurring asbestos (NOA) has been identified in portions of Placer County as shown on the Placer County Naturally Occurring Asbestos Map (Placer County, 2008). NOA can be hazardous when asbestos fibers are disrupted and become airborne. NOA generally occur within mafic or ultramafic metamorphic rock units. The nearest mapped occurrence of the metamorphic rock units is the foothills Metamorphic Belt along the western Sierra Nevada foothills and located a minimum of 25 kilometers (15.53 miles) south and east of the site. At this distance, NOAs are not expected to influence site development (Kleinfelder, 2003).

Seismicity

Some faulting exists within Placer County. Faults are fractures in the earth's crust across which there has been relative displacement. When the earth moves along a fault, large amounts of energy are released in all directions from the fault, known as an earthquake. Earthshaking occurs in areas near the fault, varying according to distance, magnitude of the earthquake, and the type of intervening geologic material. The Granite Bay Community Plan states that three faults have been identified in the Community Plan area (see **Figure 12-1**). The faults have not been active historically and there is no evidence that there has been fault activity within the area for the last 6 to 8 million years.

The Project site is located in the Foothill Fault Zone, which approximately extends from Oroville in the north to east of Fresno in the south and is a complex series of northwest-trending faults that are related to the Sierra Nevada uplift. The activity of this fault zone is not well understood. This fault zone was the source of Oroville's 1975 earthquake (and an earlier event in the 1940s). Future earthquakes in the Placer County area have the potential to originate on nearby fault segments in the Foothill Fault Zone and result in ground shaking (Placer County, 2004). The possible effects of ground shaking on the Project site may include damage to structures and infrastructure, as well as slope instability.

Mineral Resources

Mineral deposits are widespread throughout Placer County; known mineral resources in the county include sand, gravel, clay, gold, quartz, decomposed granite, and crushed quarry rock. Clay, stone, gold, and sand and gravel for construction aggregate are currently extracted in various parts of the county (Placer County, 2004).

12.1.2 Local Setting

Geology and Soils

The Geologic Map of the Sacramento Quadrangle, prepared by the California Division of Mines and Geology in 1987, indicates that early Pliocene-late Miocene age andesitic conglomerate and mudflow breccia (lahar) of the Mehrten Formation underlie the site. The andesitic lava flows that underlie the site contain subrounded to subangular boulders of andesite and other rock types that were entrained by the lava as it flowed downslope and solidified. The Miocene and Pliocene epochs are considered to have occurred between 22 to 5 million years and 5 to 2 million years before present, respectively.

The Engineering Geologic Evaluation prepared by Kleinfelder in 2003 indicates that the Project site is located in an area containing the Exchequer very stony loam soil series (**Figure 12-2**). Both Exchequer and Inks soils are located in the upper part of the Project site. These two units most likely correspond to the typical occurrence of hard Mehrten caprock in the extreme north underlain by the conglomeratic unit of the Mehrten forming the steeper upper portions of slopes.

Exchequer soil is shallow, somewhat excessively drained, very stony soil underlain by hard andesitic breccia. Typically, the surface soil consists of brown, very stony loam and cobbly loam, which extends to an approximate depth of 11 inches below the ground surface (bgs). The brown loam is typically underlain by hard andesitic breccia. The shallow soil depth and the presence of resistant shallow rock are noted as potential limitations to development on this soil type (Holdrege & Kull, 2009). Similar to Exchequer, the Inks soil series is described as stony soils developed on underlying hard, andesitic breccia.

The central portion of the site is mapped Andregg series. This soil is well drained and typically develops over weathered granitic bedrock. The lower, southern part of the site is mapped as Xerofluvents soils series consisting of sandy and stony soils associated with recent alluvium in or adjacent to drainage channels (Kleinfelder, 2003).

Seismicity

The Project site is situated in the eastern portion of the greater Sacramento metropolitan area where historic seismicity is relatively moderate when compared to other regions of California. This reduced seismic activity is largely due to the absence of nearby active or major sources that generate large earthquakes (Kleinfelder, 2003).

Holdrege and Kull reviewed the California Geological Survey Open File Report 96-08, Probabilistic Seismic Hazard Assessment for the State of California, and the 2002 update entitled California Fault Parameters. The documents indicate the Project site is located within the Foothills Fault System, which is designated as a Type C fault zone, with low seismicity and a low rate of recurrence. The 1997 edition of California Geological Survey Special Publication 43, Fault Rupture Hazard Zones in California, describes active faults and fault zones (activity within 11,000 years), as part of the Alquist-Priolo Earthquake Fault Zoning Act. The map and document indicate the site is not located within an Alquist-Priolo active fault zone (Holdrege & Kull, 2009)

Mineral Resources

The Granite Bay Community Plan states that no active quarries or mining sites were identified in the plan area during a field visit conducted on June 17, 1993 (Placer County, 2004). Two inactive mining sites (for extraction of decomposed granite and crushed quarry rock) exist in the northwestern portion of the Granite Bay Community Plan area along Interstate 80; no additional potential mineral resource areas have been identified in the plan area (Placer County, 2004). Therefore, this issue will not be discussed further.

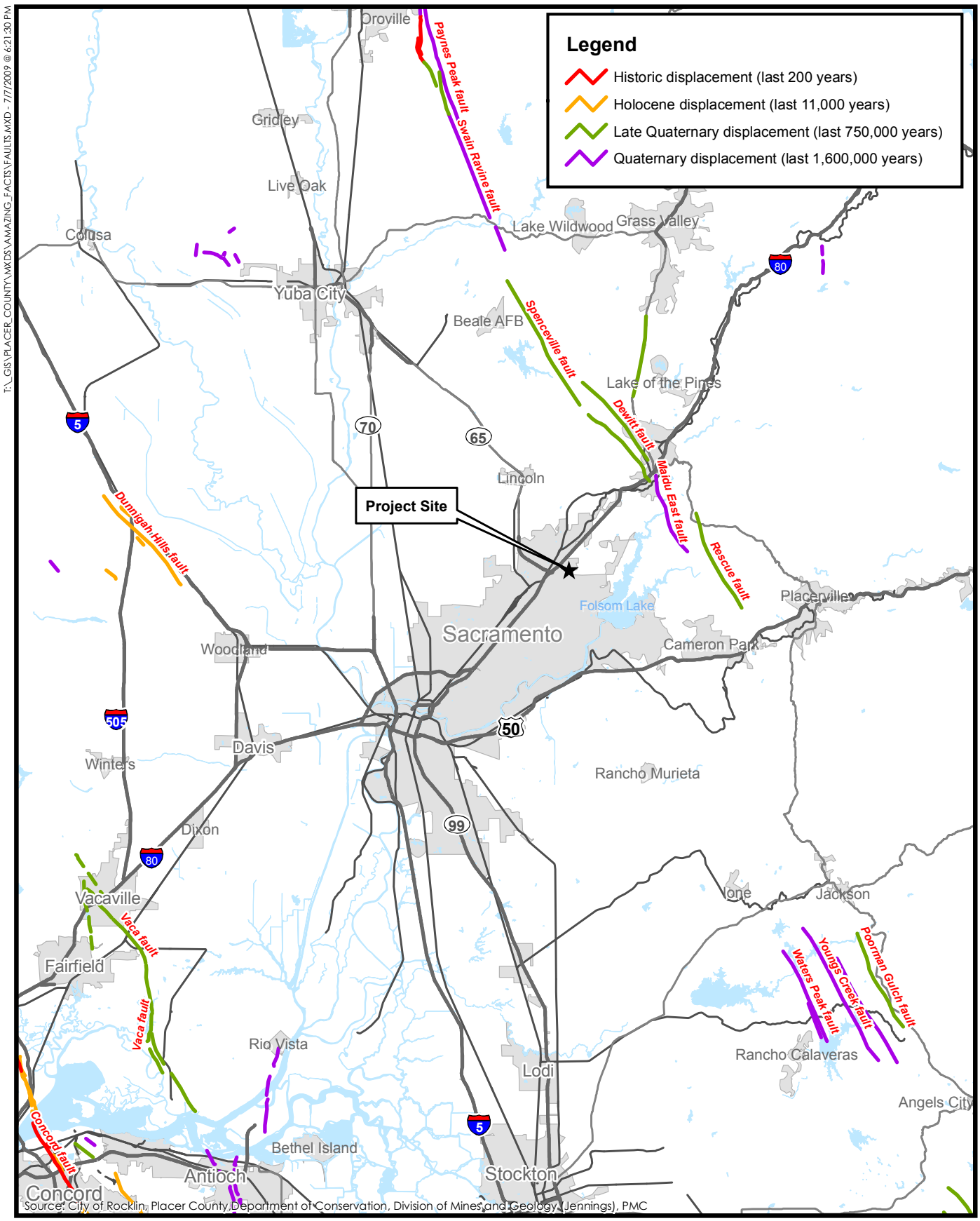

Figure 12-1
Fault Map

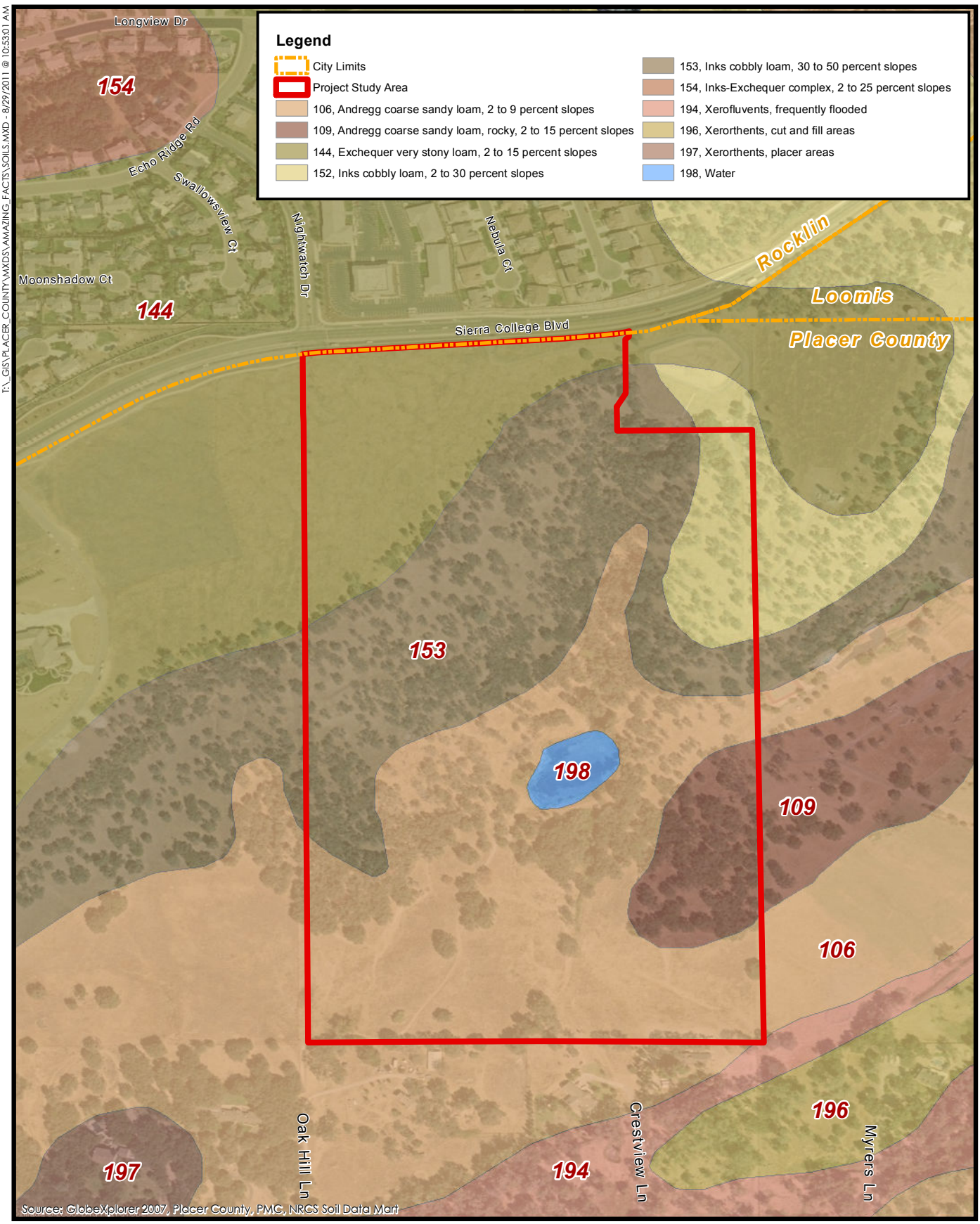

Figure 12-2
Soils Map

12.2 REGULATORY FRAMEWORK

Regulations and standards related to geology, soils, and seismicity are included in state regulations, local ordinances, and general and specific plans adopted to protect public safety and to conserve open space. The following is a brief summary of the regulatory context under which soils and geologic hazards are managed at the federal, state, and local level. Agencies with responsibility for protecting people and property from damage associated with soil conditions and geologic hazards in the Project area are described below.

12.2.1 Federal

There are no federal standards and regulations applicable to the Project site.

12.2.2 State

National Pollutant Discharge Elimination System Permit Program

As authorized by the federal Clean Water Act (CWA), the National Pollutant Discharge Elimination System (NPDES) Permit Program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. It is the responsibility of Regional Water Quality Control Boards to preserve and enhance the quality of the state's waters through the development of water quality control plans and the issuance of waste discharge requirements (WDRs). WDRs for discharges to surface waters also serve as NPDES permits (SWRCB, 2009). Under Phase II NPDES permit requirements, dischargers in any location whose projects disturb one or more acres of soil or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres are required to obtain coverage under the statewide General Permit for Discharges of Storm Water Associated with Construction Activity (Order No. 2009-009-DWQ and Order No. 2010-0014-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a risk assessment and stormwater pollution prevention plan (SWPPP). The SWPPP should contain a site map(s) which shows the construction site perimeter, existing and proposed buildings, lots, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project site. The SWPPP must list best management practices (BMPs) the discharger will use to protect stormwater runoff and the placement of those BMPs. The SWPPP must also include a proposed schedule for the implementation and maintenance of erosion control measures and a description of the erosion control practices, including appropriate design details and a time schedule. Consideration must be given to the full range of erosion control BMPs, and the discharger is required to consider any additional site-specific and seasonal conditions when selecting and implementing appropriate BMPs. The SWPPP is also required to include a description of BMPs to reduce wind erosion at all times for the areas of active construction, with particular attention paid to stockpiled materials (SWRCB, 2009).

The Preliminary Grading and BMP Plan (King Engineering, 2008) indicate that the proposed Project will comply with the design standards required by the NPDES General Permit by containing and detaining stormwater runoff and removing pollutants by soil contact, soil absorption, oxidation, root zone uptake, and bacterial breakdown.

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 for human occupancy. A direct result of the 1971 San Fernando earthquake and the extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures, the Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Seismic Hazards Mapping Act (discussed below) addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.

The law requires the State Geologist to establish regulatory zones (known as Earthquake Fault Zones) around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. The law requires that before a project can be permitted, cities and counties must require a geologic investigation to demonstrate that proposed buildings will not be constructed across active faults. An evaluation and written report of a specific site must be prepared by a licensed geologist. 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 from the fault (generally 50 feet) (DOC, 2009).

The Project site is not located within an Alquist-Priolo active fault zone, earthquake hazard zone, or Seismic Hazard Zone (California Division of Mines and Geology, 2009b).

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (SHMA) of 1990 (Public Resources Code, Chapter 7.8, Section 2690–2699.6), passed by the legislature following the 1989 Loma Prieta earthquake, directs the Department of Conservation, California Geological Survey to identify and map areas prone to liquefaction, earthquake-induced landslides, and amplified ground shaking. The purpose of the SHMA is to minimize loss of life and property through the identification, evaluation, and mitigation of seismic hazards.

Staff geologists in the Seismic Hazard Zonation Program gather existing geological, geophysical, and geotechnical data from numerous sources to produce the Seismic Hazard Zone Maps. They integrate and interpret these data regionally in order to evaluate the severity of the seismic hazards and designate as Zones of Required Investigation those areas prone to liquefaction and earthquake-induced landslides. Cities and counties are then required to use the Seismic Hazard Zone Maps in their land use planning and building permit processes. The Seismic Hazards Mapping Act requires site-specific geotechnical investigations to be conducted within the Zones of Required Investigation to identify and evaluate seismic hazards and formulate mitigation measures prior to permitting most developments designed for human occupancy (DOC, 2009).

California Building Code

The State of California provides minimum standards for structural design and site development through the California Building Standards Code (California Code of Regulations (CCR), Title 24). The California Building Code (CBC) is based on the Uniform Building Code (UBC), used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis), and has been modified for California conditions with numerous more detailed and/or more stringent regulations. Where no other building codes apply, Chapter 18 of the CBC regulates excavation, foundations, and retaining walls, and Appendix Chapter A33 regulates grading activities, including drainage and erosion control, and construction on expansive soils. Placer

County has adopted the 2001 California Building Code, which is based on the 1997 Uniform Building Code. In addition, the County Code contains provisions related to building construction. The County Code has been amended for revisions, consolidations, and reinstatement/ clarification of various construction requirements, including revision of administrative requirements and procedures.

The state earthquake protection law (California Health and Safety Code 19100 et seq.) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. Specific minimum seismic safety requirements are set forth in Chapter 16 of the CBC. The CBC identifies seismic factors that must be considered in structural design. It also divides California into two "seismic zones," Zone 3 and Zone 4, each of which has its own seismic design and construction standards. Zone 4 standards are more stringent than Zone 3 standards, but seismic standards in both zones are more stringent than those generally applied elsewhere in the United States. The Project site is located in Seismic Zone 3.

12.2.3 Local

Placer County General Plan

The Placer County General Plan includes policies that call for the County to ensure that planning of land uses and new development are compatible with the local geologic and soil resources. See **Table 12-1** below for applicable policies and an evaluation of the consistency of the proposed Project with those policies. While this DEIR analyzes the Project's consistency with the Placer County General Plan pursuant to CEQA Section 15125(d), the Placer County Board of Supervisors will ultimately make the determination of the Project's consistency with the General Plan. Environmental impacts associated with any inconsistency with General Plan policies are addressed under the impact discussions of this EIR.

TABLE 12-1
GENERAL PLAN CONSISTENCY ANAYSIS – GEOLOGY, SOILS, AND SEISMICITY

General Plan Policies	Consistency Determination	Analysis
Policy 1.K.4: The County shall require that new development incorporates sound soil conservation practices and minimizes land alterations. Land alterations should comply with the following guidelines: a. Limit cuts and fills; b. Limit grading to the smallest practical area of land; c. Limit land exposure to the shortest practical amount of time; d. Replant graded areas to ensure establishment of plant cover before the next rainy season; and e. Create grading contours that blend with the natural contours on site or look like contours that would naturally occur.	Consistent, with Mitigation	The Project proposes cut and fill as part of site engineering. Mitigation measures (**MM 12-3a** through **MM 12-3h**) are provided to address exposure of soils and to reduce erosion.
Policy 8.A.2: The County shall require submission of a preliminary soils report, prepared by a registered civil engineer and based upon adequate test borings, for every major subdivision and for each individual lot where critically expansive soils have been identified or are expected to exist.	Consistent	Holdrege and Kull (2009) prepared a Geotechnical Engineering Report on behalf of the Project applicant. This report included laboratory tests on select soil samples obtained during a subsurface investigation to determine their engineering material properties.

General Plan Policies	Consistency Determination	Analysis
Policy 8.A.3: The County shall prohibit the placement of habitable structures or individual sewage disposal systems on or in critically expansive soils unless suitable mitigation measures are incorporated to prevent the potential risks of these conditions.	Consistent, with Mitigation	The Geotechnical Engineering Report identified recommendations for engineering the Project site to support the proposed Project. Recommendations are identified which shall be followed as part of Project construction. Mitigation measure **12-5** addresses potential impacts associated with expansive soils.

Granite Bay Community Plan

Table 12-2 analyzes the Project's consistency with the Granite Bay Community Plan policies pertaining to geology and soil resources. While this Draft EIR analyzes the Project's consistency with the Granite Bay Community Plan pursuant to State CEQA Guidelines Section 15125(d), the determination of the Project's consistency with this Community Plan rests with the Placer County Board of Supervisors. Environmental impacts associated with inconsistency with Community Plan policies are addressed under the impact discussions of this Draft EIR.

TABLE 12-2
COMMUNITY PLAN CONSISTENCY ANALYSIS – GEOLOGY, SOILS, AND SEISMICITY

Community Plan Policies	Consistency Determination	Analysis
General Community Policy 2: Population densities within the planning area should be guided by considerations of topography, geology, vegetative cover, preservation of natural terrain and resources, and access to transportation and service facilities.	Consistent	Topography, geology, vegetative cover, preservation of natural terrain and resources, and access to transportation and service facilities are all discussed in this DEIR in this section, Section 6.0, Biological Resources, and Section 9.0, Traffic and Circulation.
Safety Policy 1.1: Maintain strict enforcement of seismic safety standards for new construction contained in the Uniform Building Code.	Consistent	The plans for proposed Project will be subject to County approval, which includes ensuring compliance with the Uniform Building Code.
Safety Policy 1.2: Review future developments using all available seismic data and considering recommendations from the Health and Safety Chapter of the Countywide General Plan Policy Document.	Consistent	See Table 12-1 above for a discussion of the Project's compliance with policies in the Placer County General Plan.
Safety Policy 1.3: Require soils or geologic reports for construction or extensive grading in potential seismic problem areas.	Consistent	A geotechnical report was prepared for the proposed Project by Holdrege and Kull on April 15, 2009.
Safety Policy 1.4: Implement fully the provisions of the Grading Ordinance which applies to the Granite Bay area.	Consistent, with Mitigation	Mitigation measure **MM 12-3f**, described below, requires the Project to comply with specific provisions of the County Grading Ordinance.

Placer County Grading Ordinance – Article 15.48

The grading ordinance was codified in Article 15.48 of the Placer County Municipal Code to regulate grading on property to ensure public safety; to avoid pollution of watercourses with hazardous materials, nutrients, and sediments caused by surface runoff on or across the permit area; and to ensure that the intended use of a graded site is consistent with the County General

Plan, any adopted specific plans, and applicable Placer County ordinances including the zoning ordinance, flood damage prevention ordinance (Article 15.52), environmental review ordinance (Chapter 18 Placer County Code), and applicable chapters of the California Building Code.

The grading ordinance requires a grading permit for projects with grading and/or other construction with ground disturbance of one acre or more. Grading permit conditions are detailed in the ordinance and include such items as mitigation measures, requirements for dust, erosion, sediment, and noise control, hours of operation, and haul routes. Furthermore, no grading activity shall be in violation of provisions of any applicable NPDES stormwater discharge permit.

12.3 IMPACTS

12.3.1 Standards of Significance

Based on Appendix G of the CEQA Guidelines, a geology, soils, or mineral resources impact is considered significant if project implementation would result in any of the following:

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

   a. 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.

   b. Strong seismic ground shaking.

   c. Seismic-related ground failure, including liquefaction.

   d. Landslides.

2) Result in substantial soil erosion or the loss of topsoil.

3) 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.

4) 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.

5) 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.

Since the proposed Project will be served with municipal wastewater service, no septic systems are proposed as part of the Project. Therefore, item 5, above, will not be discussed further in the DEIR.

12.3.2 Methodology

Information to establish geological baseline conditions was compiled from published information and site visits by the preparer of this Draft EIR. Technical reports and information published by the California Geological Survey, the Placer County General Plan, the Granite Bay Community Plan, the Holdrege and Kull Geotechnical Engineering Report for the proposed Project, the

Project's Preliminary Grading Plans (**Figures 3-10a** and **3-10b**), and other relevant environmental documents were used to describe existing conditions. The analysis of geologic and soils impacts is qualitative and evaluates the extent to which development activities could affect, or be affected by, known geologic and soils conditions. The significance of impacts is based on the thresholds of significance presented in the following section.

The information obtained from the aforementioned sources was reviewed and summarized to establish existing conditions and to identify potential environmental effects.

12.3.3 Project-Level Impacts and Mitigation Measures

IMPACT 12.1: Exposure to Strong Seismic Shaking

The Geotechnical Engineering Report (Holdrege & Kull, 2009) included a review of the California Geological Survey Open File Report 96-08, Probabilistic Seismic Hazard Assessment for the State of California, and the 2002 update entitled California Fault Parameters. These documents indicate the Project site is located within the Foothills Fault System. The Foothills Fault System is designated as a Type C fault zone, with low seismicity and a low rate of recurrence. The 1997 edition of California Geological Survey Special Publication 43, Fault Rupture Hazard Zones in California, describes active faults and fault zones (activity within 11,000 years), as part of the Alquist-Priolo Earthquake Fault Zoning Act. The map and document indicate the Project site is not located within an Alquist-Priolo active fault zone. As a result, potential for ground rupture is unlikely.

The site is located within Seismic Zone 3 and ground shaking will occur during seismic events on nearby active faults. The Project will be required to be designed in accordance with the California Building Code. The Geotechnical Engineering Report identifies seismic design parameters for the Project which were developed based on Section 1613 of the 2007 California Building Code (CBC) and the United States Geological Survey (USGS), Java Ground Motion Parameter Calculator, Earthquake Ground Motion Tools, Version 5.0.8. Construction of the Project in compliance with the current edition of the California Building Code would reduce the likelihood of severe damage due to ground shaking to minimal levels. Therefore, impacts associated with strong seismic ground shaking are considered **less than significant**. No mitigation is required.

IMPACT 12.2: Seismic-Related Impacts

As mentioned above, the Project site is located in an area classified as a low seismic activity zone under the Alquist-Priolo Act. The Project site is not near any Alquist-Priolo Earthquake Fault Zone, and Placer County is not on the state's Alquist-Priolo Fault Zone Listing. Furthermore, the Project site is not located in a designated Seismic Hazard Zone, indicating that liquefaction and landslide hazards would be insignificant (California Division of Mines and Geology, 2009a). In the Geotechnical Engineering Report, Holdrege and Kull indicated that the risk of seismically induced hazards such as liquefaction is remote at the Project site. This conclusion is based on site observations, the geology of the region, and prior experience in the area (Holdrege & Kull, 2009).

In addition, there is no known landsliding or slope instability related to the Project site. The proposed Project avoids the majority of the steep (>30 percent) slopes located in the southeastern portion of the site. Further, materials underlying the site such as granite and volcanic bedrock are considered to be unlikely to be susceptible to compressibility or collapse (Holdrege & Kull, 2009). Therefore, seismically induced impacts such as liquefaction and landslides are considered **less than significant**. No mitigation beyond compliance with the requirements of the Geotechnical Engineering Report prepared by Holdrege and Kull (2009) is required.

IMPACT 12.3: Erosion and Loss of Topsoil

The proposed Project will disturb approximately 17 acres of the property to accommodate construction of a total combined building square footage of 208,020 square feet, a parking lot, and associated on- and off-site roadway improvements. Although the site has been previously disturbed, the disruption of soils associated with Project construction will increase the potential for erosion and contamination of stormwater runoff. Clearing, grading, and excavation activities would remove vegetative cover from the soils and expose soils to the effects of wind, rain, and surface flow as a result of construction activities. Substantial earthwork would be necessary to prepare the site. Estimated fill depths of up to 30 feet and cuts of 5 to 15 feet are proposed as part of site engineering (Holdrege & Kull, 2009). The transport of on-site material (approximately 101,000 cubic yards) is also proposed (Placer County, 2008). Thus, the construction phase will create significant potential for erosion as disturbed soil may come in contact with wind or precipitation that could transport sediment to the air and/or adjacent waterways. This includes improvements to the detention pond.

Discharge of concentrated runoff after the Project is completed could also contribute to erosion potential in the long term. Erosion potential and water quality impacts are always present and occur when protective vegetative cover is removed and soils are disturbed. It is primarily the shaping of building pads, grading for roadways, and trenching for utilities that are responsible for accelerating erosion and degrading water quality. This disruption of soils on the site has the potential to result in significant increases in erosion of soils both on and off the site. While the Project has prepared a Preliminary Grading and BMP Plan (King Engineering, 2008), additional mitigation measures are needed to address potential erosion impacts. Therefore, this impact is considered **potentially significant**.

Mitigation Measure 12-3 Erosion Mitigation Measures

MM 12-3a Water quality best management practices (BMPs) shall be designed according to the California Stormwater Quality Association Stormwater Best Management Practice Handbooks for Construction, for New Development/Redevelopment, and/or for Industrial and Commercial, and/or other similar source as approved by the County Engineering and Surveying Department (ESD).

Construction (temporary) BMPs for the Project include, but are not limited to, a stabilized construction entrance, straw wattles, silt fences, water bars/berms, flow spreaders, gravel bags, straw mulch, inlet filters, sediment traps, and revegetation of disturbed areas.

Storm drainage from on- and off-site impervious surfaces (including roads) shall be collected and routed through specially designed catch basins, vegetated swales, vaults, infiltration basins, water quality basins, filters, etc., for entrapment of sediment, debris, and oils/greases or other identified pollutants, as approved by the ESD. BMPs shall be designed at a minimum in accordance with the Placer County Guidance Document for Volume and Flow-Based Sizing of Permanent Post-Construction Best Management Practices for Stormwater Quality Protection.

Post-development (permanent) BMPs for the Project include, but are not limited to, clarifying basins, erosion mat/rock lines/seeded ditches and swales, rock flow spreaders, and detention basins. No water quality facility construction shall be permitted within any identified wetlands area, floodplain, or right-of-way, except as authorized by Project approvals.

All BMPs shall be maintained as required to ensure effectiveness. The applicant shall provide for the establishment of vegetation, where specified, by means of proper irrigation. Proof of ongoing maintenance, such as contractual evidence, shall be provided to the ESD upon request. Maintenance of these facilities shall be provided by the Project owners/permittees unless, and until, a County Service Area is created and said facilities are accepted by the County for maintenance. Contractual evidence of a monthly parking lot sweeping/vacuuming and catch basin cleaning program shall be provided to the ESD upon request. Failure to do so will be grounds for discretionary permit revocation. Prior to Improvement Plan or Final Map approval, easements shall be created and offered for dedication to the County for maintenance and access to these facilities in anticipation of possible County maintenance.

MM 12-3b This Project's ground disturbance exceeds one acre and is subject to the construction stormwater quality permit requirements of the National Pollutant Discharge Elimination System (NPDES) program. The applicant shall obtain such permit from the State Regional Water Quality Control Board and shall provide to the Engineering and Surveying Department evidence of a state-issued WDID number or filing of a Notice of Intent and fees prior to start of construction.

MM 12-3c This Project is located within the area covered by Placer County's municipal stormwater quality permit, pursuant to the National Pollutant Discharge Elimination System (NPDES) Phase II program. Project-related stormwater discharges are subject to all applicable requirements of this NPDES permit. BMPs shall be designed to mitigate (minimize, infiltrate, filter, or treat) stormwater runoff in accordance with "Attachment 4" of Placer County's NPDES Municipal Stormwater Permit (State Water Resources Control Board NPDES General Permit No. CAS000004).

MM 12-3d Graded portions of the site shall be seeded as soon as possible to allow vegetation to become established prior to and during the rainy season. In addition, since grading will result in more than one acre of soil disturbance, the applicant shall prepare a site-specific stormwater pollution prevention plan. At a minimum, the following controls shall be installed prior to and during grading to reduce erosion.

- Prior to commencement of site work, fiber rolls shall be installed downslope of the proposed area of disturbance to reduce migration of sediment from the site. Fiber rolls on slopes are intended to reduce sediment discharge from disturbed areas, reduce the velocity of water flow, and aid in the overall revegetation of slopes. The fiber rolls shall remain in place until construction activity is complete and vegetation becomes established.

- Soil exposed in permanent slope faces shall be hydroseeded or hand seeded/strawed with an appropriate seed mixture compatible with the soil and climate conditions of the site as recommended by the local Resource Conservation District.

- Following seeding, jute netting or erosion control blankets shall be placed and secured over the slopes steeper than 2:1, horizontal to vertical.

- Surface water drainage ditches shall be established as necessary to intercept and redirect concentrated surface water away from cut and fill slope faces. The intercepted water shall be discharged into natural drainage courses or into other collection and disposal structures.

MM 12-3e The applicant shall prepare and submit Improvement Plans, specifications, and cost estimates (per the requirements of Section II of the Land Development Manual [LDM] that are in effect at the time of submittal) to the Engineering and Surveying Department (ESD) for review and approval of each Project phase. The plans shall show all conditions for the Project as well as pertinent topographical features both on- and off-site. All existing and proposed utilities and easements, on-site and adjacent to the Project that may be affected by planned construction shall be shown on the plans. All landscaping and irrigation facilities within the public right-of-way (or public easements), or landscaping within sight distance areas at intersections, shall be included in the Improvement Plans.

The applicant shall pay plan check and inspection fees. Prior to plan approval, all applicable recording and reproduction costs shall be paid. The cost of the above-noted landscape and irrigation facilities shall be included in the estimates used to determine these fees. It is the applicant's responsibility to obtain all required agency signatures on the plans and to secure department approvals. If the design/site review process and/or Placer County Development Review Committee (DRC) review is required as a condition of approval for the Project, said review process shall be completed prior to submittal of Improvement Plans. Record drawings shall be prepared and signed by a California Registered Civil Engineer at the applicant's expense and shall be submitted to the ESD in both electronic and hard copy format prior to acceptance by the County of site improvements. Conceptual landscape plans submitted prior to Project approval may require modification during the Improvement Plan process to resolve issues of drainage and traffic safety.

MM 12-3f All proposed grading, drainage improvements, vegetation, tree impacts, and tree removal shall be shown on the Improvement Plans, and all work shall conform to provisions of the County Grading Ordinance (Section 15.48, Placer County Code) and the Placer County Flood Control District's Stormwater Management Manual. The applicant shall pay plan check fees and inspection fees. No grading, clearing, or tree disturbance shall occur until Improvement Plans, or a separate grading permit, are approved and any required temporary construction fencing has been installed and inspected by a member of the Placer County Development Review Committee (DRC). All cut/fill slopes shall be at 2:1 (horizontal to vertical) unless a soils report supports a steeper slope and the Engineering and Surveying Department (ESD) concurs with said recommendation.

All facilities and/or easements dedicated or offered for dedication to Placer County or to other public agencies which encroach on the Project site or within any area to be disturbed by the Project construction shall be accurately located on the Improvement Plans. The intent of this requirement is to allow review by concerned agencies of any work that may affect their facilities.

The applicant shall revegetate all disturbed areas. Revegetation undertaken from April 1 to October 1 shall include regular watering to ensure adequate growth. A winterization plan shall be provided with Project Improvement Plans. It is the applicant's responsibility to assure proper installation and maintenance of erosion control/winterization during Project construction. Erosion control will be provided where roadside drainage is off of the pavement, to the satisfaction of the ESD.

Submit to the ESD a letter of credit or cash deposit in the amount of 110 percent of an approved engineer's estimate for winterization and permanent erosion control work prior to Improvement Plan approval to guarantee protection against erosion and improper grading practices. Upon the County's acceptance of improvements and satisfactory completion of a one-year maintenance period, unused portions of said deposit shall be refunded to the Project applicant or authorized agent.

If, at any time during construction, a field review by County personnel indicates a significant deviation from the proposed grading shown on the Improvement Plans, specifically with regard to slope heights, slope ratios, erosion control, winterization, tree disturbance, and/or pad elevations and configurations, the plans shall be reviewed by the DRC/ESD for a determination of substantial conformance to the Project approvals prior to any further work proceeding. Failure of the DRC/ESD to make a determination of substantial conformance may serve as grounds for the revocation/modification of the Project approval by the appropriate hearing body.

Any work affecting facilities maintained by, or easements dedicated or offered for dedication to, Placer County or other public agency may require the submittal and review of appropriate Improvement Plans or a separate grading permit by the ESD or the other public agency.

MM 12-3g Staging Areas: Stockpiling and/or vehicle staging areas shall be identified on the Improvement Plans and located as far as practical from existing dwellings and protected resources in the area.

MM 12-3h If blasting is required for the installation of site improvements, the Project applicant will comply with applicable County ordinances that relate to blasting and use only contractors licensed by the State of California to conduct these operations.

SIGNIFICANCE AFTER MITIGATION

With implementation of mitigation measures **MM 12-3a** through **MM 12-3h**, as well as mitigation measure **10-1b** in Section 10.0, Air Quality, of this Draft EIR, impacts associated with soil erosion would be reduced to **less than significant**.

IMPACT 12.4: Unstable Geologic Unit

Geology underlying the site includes early Pliocene-late Miocene age andesitic conglomerate and mudflow breccia (lahar) of the Mehrten Formation. The andesitic lava flows that underlie the site contain subrounded to subangular boulders of andesite and other rock types that were entrained by the lava as it flowed downslope and solidified. Because the site is generally underlain by resistant rock at relatively shallow depths, the likelihood of deep-seated failure is considered very low (Holdrege & Kull, 2009). Overall, the site is generally considered to be geologically stable for development, provided that the geotechnical engineering recommendations and design criteria presented in the Geotechnical Engineering Report are incorporated into the Project plans.

According to soil sampling, soil types, densities, and subsurface conditions are adequate to support planned construction, and there are no outstanding issues identified in the geotechnical analysis which would indicate the need for mitigation. Therefore, impacts associated with an unstable geologic unit are considered **less than significant**. No mitigation beyond compliance with the provisions of the Geotechnical Engineering Report prepared by Holdrege and Kull (2009) is required.

IMPACT 12.5: Expansive Soils

According to the preliminary geotechnical report dated May 23, 2003, by Kleinfelder and a letter from Holdrege and Kull dated June 26, 2007, the site is underlain by the Mehrten Formation (Placer County, 2008). Expansive soils are typical of Mehrten volcanics. Therefore, there is a possibility that highly expansive soils will create substantial risks to life or property. Laboratory testing by Holdrege and Kull (2009) on trench excavations determined that the site consists mainly of soil classified as silty gravel with sand. Expansion index test results indicated that this soil exhibited very low expansion potential, as classified by UBC guidelines. However, the potential exists for fine-grained, potentially expansive soil to be encountered during site preparation. If clayey, potentially expansive soil is observed, expansion index and/or Atterberg limits testing will be performed to evaluate the expansion potential of the soil. Such soils could present problems with regard to supporting building foundations.

Fine grained, potentially expansive soil, as determined by the Project's geotechnical engineer, that is encountered during grading shall be mixed with granular soil or overexcavated and stockpiled for removal from the Project site or for later use in landscape areas. A typical mixing ratio for granular to expansive soil is 4 to 1. The actual mixing ratio shall be determined by the Project's geotechnical engineer.

Soil used for fill shall consist of uncontaminated, predominantly granular, non-expansive native soil or approved import soil. Rock used in fill shall be broken into pieces no larger than 8 inches in diameter. Rocks larger than 8 inches are considered oversized material and shall be stockpiled for off-haul or later use in landscape areas and drainage channels.

Cohesive, predominantly fine-grained, or potentially expansive soil encountered during grading shall be stockpiled for removal, mixed as directed by the Project engineer, or used in landscape areas.

As an option, cohesive fine-grained or potentially expansive soil can often be placed in the deeper portions of proposed fill (e.g., depths greater than 3 feet below subgrade in building footprints). However, this option would have to be evaluated on a case-by-case basis with consideration of the fill depth and proposed loading.

Footings for single-story structures shall be a minimum of 12 inches wide and trenched through any loose surface material, potentially expansive soil, or untested fill, and a minimum of 12 inches into competent native soil, weathered rock, or compacted fill. Footings for two-story structures shall be a minimum of 15 inches wide and trenched a minimum of 18 inches into competent native soil, weathered rock, or compacted fill. If clay is encountered at the base of footing excavations, the footing shall be deepened through the clay lens into underlying granular material or weathered rock, as determined in the field by the Project engineer.

Prior to placing the vapor retarder and concrete, slab subgrade soil must be moisture conditioned to between 75 and 90 percent saturation to a depth of 24 inches. Moisture conditioning shall be performed for a minimum of 24 hours prior to concrete placement. Clayey soil may take up to 72 hours to reach this required degree of saturation. If the soil is not moisture conditioned prior to

placing concrete, moisture will be wicked out of the concrete, possibly contributing to shrinkage cracks. Additionally, moisture conditioning the soil prior to placing concrete will reduce the likelihood of soil swell or heave following construction at locations where fine-grained, potentially expansive soil is encountered. To facilitate slab-on-grade construction, the Project geotechnical engineer recommends that the slab subgrade soil be moisture conditioned following rock placement. Following moisture conditioning, the vapor retarder shall be placed.

Mitigation Measure 12-5 Expansive Soils Mitigation Measures

Submit to the Engineering and Surveying Department (ESD), for review and approval, a geotechnical engineering report produced by a California Registered Civil Engineer or Geotechnical Engineer. The report shall address and make recommendations on the following:

a) Road, pavement, and parking area design

b) Structural foundations, including retaining wall design (if applicable)

c) Grading practices

d) Erosion/winterization

e) Special problems discovered on-site, (i.e., groundwater, expansive/ unstable soils, etc.)

f) Slope stability

Once approved by the ESD, two copies of the final report shall be provided to the ESD and one copy to the Building Department for their use. It is the responsibility of the Project applicant to provide for engineering inspection and certification that earthwork has been performed in conformity with recommendations contained in the report.

SIGNIFICANCE AFTER MITIGATION

Though this impact is considered **potentially significant,** implementation of mitigation measure **12-5** would reduce impacts associated with expansive soils to **less than significant**.