4.7 GEOLOGY, SOILS, AND SEISMICITY

4.7.1 INTRODUCTION

This chapter addresses potential effects related to onsite geologic and soil conditions within the Creekview Specific Plan area. Site characteristics such as topography, regional and local geology, and soil types are described. This information is summarized from the following technical studies:

- Wallace Kuhl & Associates Inc., *Preliminary Geotechnical Engineering Report, Creekview Specific Plan,* January 5, 2007
- Existing reports on geologic conditions in the area (*West Roseville Specific Plan*, Feb. 2004)
- *West Roseville Specific Plan FEIR,* February 2004

The documents listed above are available for review during normal business hours at:

City of Roseville Permit Center
311 Vernon Street
Roseville, CA 95678

No comments on the NOP were submitted regarding geologic, soils and seismicity conditions in the project area. See Appendix A for the NOP.

As identified in the NOP, the project area is relatively flat and considered to have low seismic risk with respect to faulting, ground shaking, seismically-related ground failure, and liquefaction. The project would comply with the Uniform Building Code (UBC) and California Building Code (CBC) and such compliance, combined with the site's characteristics, would result in a less than significant risk of exposing people or structures to potential substantial adverse effects involving seismic shaking, ground failure, or landslides.

The project is not located in a sensitive geologic area or in an area that typically experiences subsidence. Soils on site are capable of supporting residential,

commercial and retail structures, industrial buildings and schools, provided that the near-surface soils are properly compacted and that engineered fill is placed and compacted during earthwork. The proposed project would comply with City of Roseville Design/Construction Standards and Improvement Standards to reduce impacts related to soil, including on or offsite landslides, lateral spreading, subsidence, liquefaction, collapse, or expansive soils.

Wastewater associated with the proposed project would be conveyed to the Pleasant Grove Wastewater Treatment Plant, therefore the project would not require septic tanks for alternative waste disposal systems. Therefore, this issue is not evaluated further in this EIR.

4.7.2 ENVIRONMENTAL SETTING

Topography

Regional Setting

The 501-acre project area is located within western Placer County, in the Sacramento Valley. The major topographic feature in the Sacramento Valley is a volcanic remnant, the Sutter Buttes, rising approximately 1,980 feet above the surrounding valley floor. The Sutter Buttes are located approximately 42 miles northwest of Roseville. Other significant features are the Sierra Nevada mountain range to the east, and the coast mountain range to the west.

Existing Site Conditions

The project site consists of gently rolling terrain with surface elevations ranging from approximately 75 feet to 125 feet above mean sea level. Pleasant Grove Creek flows southeast to northwest across the southeast portion of the property and another unnamed drainage flows west-southwest from east to west across the project area.

Geology

Regional Setting

The proposed Creekview Specific Plan area is situated within the Great Valley and Sierra Nevada geomorphic provinces of California. The geologic formations on the east side of the Sacramento Valley are typified by alluvial (water deposited) sediments derived from erosion of the Sierra Nevada. The geology in the vicinity of the project area consists of transitional formations between the alluvial deposits of the Great Valley and the granite material characteristic of the Sierra Nevada. The Great Valley geomorphic province is an elongated sedimentary trough filled with a sequence of Jurassic to Holocene continental and marine sediments. The Sierra Nevada province is generalized as a belt of metamorphic, volcanic, and igneous rocks sheared, deformed, and intruded during tectonic and volcanic activity.

Existing Site Conditions

According to the U.S. Department of Agriculture, Soil Conservation Services (SCS) maps, the project site contains eight different surface and near-surface soils. Figure 4.7-1 (Soil Types) shows the location of these soils and the following list describes these soils.

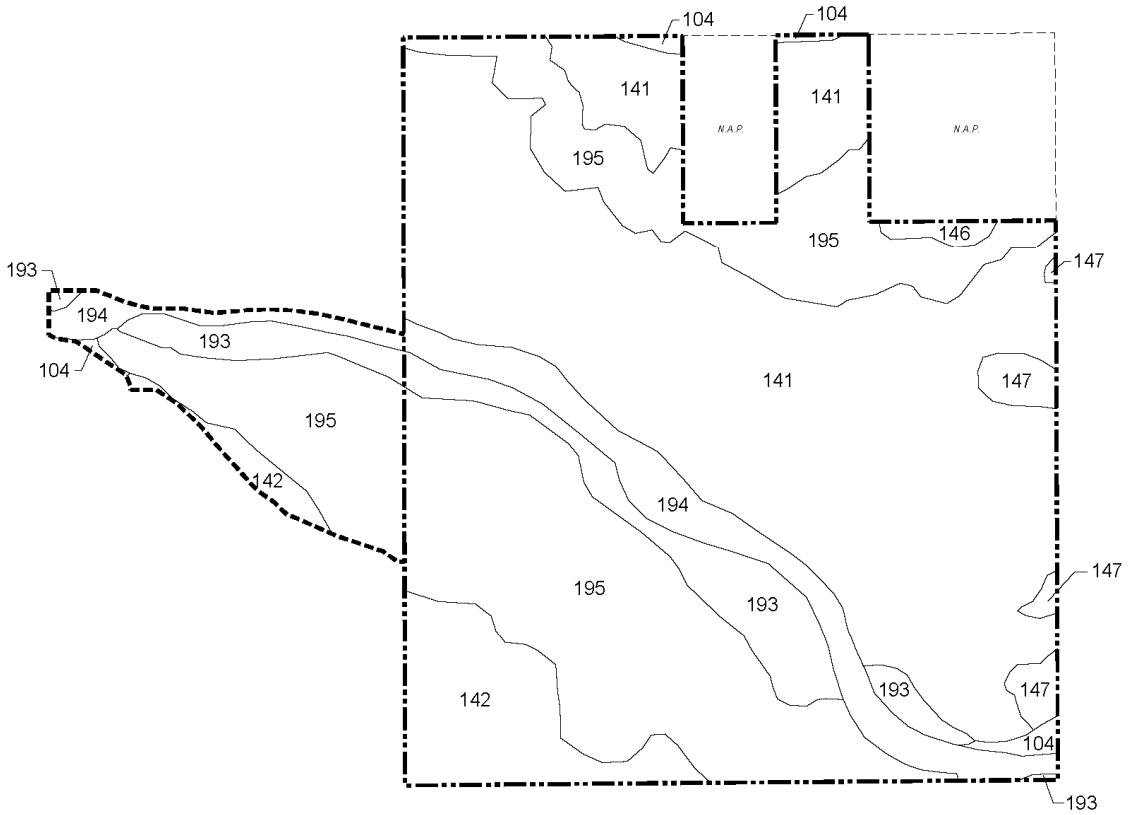
Alamo-Fiddyment Complex (No. 104)

This map unit consists of approximately 50 percent Alamo soil, 30 percent Fiddyment soil, with the remaining 20 percent composed of a mixture of San Joaquin sandy loam, Comenta sandy loam, and Kaseberg loam. The Alamo soil is poorly drained clay at a moderate depth over a hardpan. Please see below for description of Fiddyment soil.

Cometa-Fiddyment Complex (No. 141)

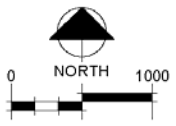
This map unit consists of approximately 35 percent Cometa soil and 35 percent Fiddyment soil with the remaining 30 percent composed of San Joaquin sand

FIGURE 4.7-1
SOILS



SOIL TYPES			
		On-Site	Off-Site
104	Alamo-Fiddyment complex	± 3.3 ac	± 0.5 ac
141	Cometa-Fiddyment complex	± 247.5 ac	± 0.0 ac
142	Cometa-Ramona sandy loams	± 34.2 ac	± 5.0 ac
146	Fiddyment loam	± 2.5 ac	± 0.0 ac
147	Fiddyment-Kaseberg loams	± 8.7 ac	± 0.0 ac
193	Xerofluvents, occasionally flooded	± 28.0 ac	± 10.2 ac
194	Xerofluvents, frequently flooded	± 31.0 ac	± 7.6 ac
195	Xerofluvents, hardpan substratum	± 146.1 ac	± 35.3 ac

Note: All acreages, soil types and configurations shown have been approximated based on USDA Natural Resources Conservation Service (NRCS) soil maps.



404 PERMIT AREA SOILS

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loam, Kaseberg loam, Ramona sandy loam, and Alamo clay. The Cometa soil is a deep, well-drained claypan soil on low terraces and is formed as alluvium from predominantly granitic sources. The Fiddyment soil is discussed below.

Cometa – Ramona sandy loams (No. 142)

This map unit consists of about 50 percent Cometa soil and 30 percent Ramona soil with the remainder composed of San Joaquin sandy loam, Fiddyment loam, and Alamo clays. The Ramona soil is a very deep, well-drained soil forming in alluvium from predominantly granitic sources. The Cometa soil is discussed above.

Fiddyment loam (No. 146)

The Fiddyment soil is moderately deep silty and clayey loam over hardpan. The soils above the hardpan tend to be silts and clays to an approximate depth of 28 inches.

Fiddyment-Kaseberg loams (No. 147)

This map unit consists of approximately 50 percent Fiddyment soil and 30 percent Kaseberg soil. The Kaseberg soil is a well-drained soil that is shallow over hardpan. Fiddyment soil is discussed above.

Xerofluvents, occasionally flooded (No. 193)

The three Xerofluvent soil types occupy the relatively young stream terraces and floodplains adjacent to Pleasant Grove Creek and the intermittent stream at the northern end of the project site. They are moderately well drained to somewhat poorly drained xerofluvents. In some locations they are underlain by silica-cemented hardpan at depths ranging from 20 to 36 inches below the ground surface.

Xerofluvents, occasionally flooded (No 194)

Soils along the Pleasant Grove Creek corridor include moderate slow Permeability, slight erosion potential, slow runoff, slight erosion hazard.

Xerofluvents, hardpan substratum (No. 195)

This map unit consists of fairly poorly drained loamy alluvium in minor drainage ways and terraces. The Xerofluvents are located adjacent to drainages, south of Pleasant Grove Creek, and along the drainage on the north end of the project site

Geologic Constraints

Landslides and slope stability are unknown occurrences in the project area because of the flat topography and gently undulating terrain. The drainage channels that bisect the project area are not deeply incised.

Subsidence

Subsidence is the sinking of the ground surface usually due to groundwater withdrawal or other subsurface collapse or extraction. The Roseville area is not known to have experienced significant subsidence or subsequent constraints to development due to subsidence.[1]

Seismicity

Regional Faults

The project area is located between the seismically active Coast Range and the historically seismic Foothills fault zone in the Sierra Nevada. There are mapped faults within 50-miles of the project area. Regional faults to the west include the Hayward Fault (80 miles), and to the east, the Bear Mountains (19 miles)

[1] City of Roseville General Plan, Safety Element, 2010.

and Melones faults (33 miles) in the Foothill fault zone. The Willows fault (7 miles) and Stockton fault (63 miles) are also in the vicinity, but are considered inactive.

Local Faults

Although faults have been identified within the Sacramento area, no active faults are known to exist within Placer County. The project site is not located within an Alquist-Priolo Earthquake fault zone. Placer County is classified as a low-severity earthquake zone. The probable maximum expected earthquake intensity that can be anticipated in the zone would be VI or VII on the modified Mercalli Scale and a 5.0-5.9 in magnitude on the Richter Scale. The last geologic activity recorded in the area with an intensity of 4 or greater measured on the Richter Scale occurred in 1908. The epicenter of this event was located on a north/south line between Folsom and Auburn and on an east/west line between Placerville and Roseville. There have been several lesser evens since 1908, but no significant activity has been recorded in the vicinity.

Active faults are those that have experienced displacement in historic time, while inactive faults have not. However, there is the potential for inactive faults to reactivate or experience displacement along a branch of the zone sometime in the future. An example of a fault zone that is considered to have reactivated is the Foothills fault zone. The zone was considered inactive until evidence of an earthquake (approximately 1.6 million years ago) was found near Spenceville, California. In 1975 an earthquake occurred near the City of Oroville (now known as the Cleveland Hills Fault). Due to the potential for fault movement, even though the likelihood of the occurrence is low, the following discussion about inactive faults is included in this section.

There are no mapped active faults within Placer County; however, three inactive faults have been identified within 10 miles of the project area. These are the

Volcano Hill fault, the Linda Creek fault, and an unnamed fault alignment which extends east/west between Folsom Lake and the City of Rocklin.

The Volcano Hill fault is located in Granite Bay and extends northwesterly from Volcano Hill for a distance of approximately one mile, terminating near Eureka Road. There has been no recorded activity along the fault; therefore, it is generally considered inactive.

In 1973 the CGS identified the "Linda Creek fault", along a segment of the creek from Roseville to Sacramento County, east of the project area. There is no record of recent activity.

The unnamed fault extends east to west between Folsom Lake and the City of Rocklin. Segments of this fault are concealed, and consequently, unmapped. However, there is a potential that this fault could connect to the Bear Mountain fault, branches of which are located beneath Folsom Lake. The Bear Mountain fault is identified as one of the faults that could be undergoing reactivation as a result of continental tectonic activity. However, there is no evidence that the fault has reactivated to date along the unnamed fault.

Secondary Seismic Hazards

Liquefaction

Liquefaction is defined as the loss of soil strength due to seismic forces acting on water-saturated granular soils, which leads to quicksand conditions that generate various types of ground failure. The potential for liquefaction must take into account soil type, soil density, depth to the groundwater table, and the duration and intensity of ground shaking. Liquefaction is most likely to occur in low-lying areas of poorly consolidated to unconsolidated water-saturated sediments or similar deposits. The City of Roseville's geographic location, soil characteristics and topography, combined, minimize the risk of liquefaction. However, a site-specific geotechnical study would be needed to characterize

liquefaction potential. The geo-technical study would be required as part of the building permit process and would be prepared prior to site development to ensure buildings, roadways, and utility infrastructure are appropriately designed.

Soil Characteristics

Soils in the project vicinity are generally characterized as erosional deposits of the Sierra Nevada to the east. Soil limitations can include slow or very slow permeability, limited ability to support a load, high shrink-swell potential, moderate depth to hardpan, and low depth to rock. The NRCS has identified and mapped soils in Placer County. Each identified soil has characteristics that affect soil behavior. Characteristics of relevance to the project area include the following:

- *Permeability*: The ability of a soil to transmit water or air. Permeability is considered in the design and construction of soil drainage systems, where the rate of water movement under saturated conditions affects the behavior of water movement through the soil.
- *Shrink-Swell Potential*: The potential for volume change in a soil due to a loss or gain in moisture. If the shrink-swell potential is rated moderate to high, damage to buildings, roads, and other structures can occur.
- *Runoff*: The volume of rainwater directly leaving an area in surface drainage, as opposed to the volume that seeps out as groundwater.
- *Erosion*: the susceptibility of a soil to water (rainfall) or wind transport.

Soil characteristics and engineering properties that could constrain development in the project area were identified by the NRCS in the Soil Survey Placer County, California, Western Part (1980), and have been used for the purposes of impact analysis in this EIR. These characteristics are described in Table 4.7-1. The table indicates the nature of the constraint (wetness or tendency to flood, high shrink-swell or expansion potential, etc.) and summarizes the level of constraint (slight, moderate, high, severe) for four types of construction activities expected to occur in the project area. These activities are excavation and support for

structures with shallow foundations; excavation and foundation support for dwellings without basements and small commercial buildings; construction of local roads and streets; and the construction of grassed waterways.

TABLE 4.7-1

SITE SOIL CHARACTERISTICS

Soil Name and map Symbol	Physical Properties	Shallow Excavations	Dwellings, Small commercial Buildings	Local Roads and Streets	Grassed Waterways (protects against erosion)
104 Alamo-Fiddyment Complex	Very slow permeability, high shrink-swell potential slow runoff, slight erosion hazard.	Severe to moderate (wetness, shallow depth to rock, clayey, cemented pan)	Severe (wetness, shrink-swell)	Severe (wetness, shrink-swell, low strength)	Wetness, cemented pan, slow percolation, erodes easily, depth to rock
141 Cometa-Fiddyment Complex	Very slow permeability, low to high shrink-swell potential slow runoff, slight erosion hazard.	Moderate to severe (depth to rock, shrink-swell, clayey)	Severe (low strength, shrink-swell)	Severe (shrink-swell, low strength)	Slow percolation, erodes easily, depth to rock
142 Cometa-Ramona Sandy Loams	Very slow to moderate permeability, low to high shrink-swell potential slow to medium runoff, slight erosion hazard.	Severe (clayey)	Severe (shrink-swell, low strength)	Severe (shrink-swell, low strength)	Slow percolation, erodes easily
146 Fiddyment Loams	Very slow permeability, low to high shrink-swell	Moderate (depth to rock, clayey,	Severe (shrink-swell)	Severe (shrink-swell, low strength)	Erodes easily, depth to rock

Soil Name and map Symbol	Physical Properties	Shallow Excavations	Dwellings, Small commercial Buildings	Local Roads and Streets	Grassed Waterways (protects against erosion)
	potential slow to medium runoff, slight to moderate erosion hazard.	cemented pan)			
147 Fiddyment-Kaseberg Loams	Very slow to moderate permeability, low to high shrink-swell potential slow to medium runoff, slight to moderate erosion hazard.	Moderate to severe (depth to rock, clayey, cemented pan)	Severe (shrink-swell, depth to rock)	Severe (shrink-swell, low strength, cemented pan, depth to rock)	Erodes easily, depth to rock
193, 194 and 195 Xerofluvents-Hardpan substratum	Moderate slow Permeability, slight erosion potential, slow runoff, slight erosion hazard.	Severe (floods, wetness)	Severe (floods, wetness)	Moderate (wetness, floods)	Cemented pan

Soil Constraints

Runoff and Drainage

All of the surface soils identified in the project area, with the exception of areas along stream channels, exhibit slow to very slow permeability. These soils transmit water and/or air very slowly and can cause ponding and soil drainage problems.

Erosion

As shown in Table 4.7-1, most of the soils throughout the project area exhibit slight erosion hazards. Only areas along drainages have a moderate erosion potential.

Expansive Soils

Expansive soils like clay or silt are those that greatly increase in volume when they absorb water (swell) and shrink when they dry out. Expansion can cause damage to building foundations, concrete slabs, hardscape, pavement, underground utility lines, and other surface or near-surface improvements. Soils with clay or silt which have moderate to high expansion potential are located throughout the project area.

Corrosive Soils

Corrosive areas are defined where the soil and/or water contains more than 500 parts per million (ppm) of chlorides, more than 200 ppm of sulfates, or has a pH of less than 5.5. Laboratory test results indicated the near-surface soils at locations tested are not unusually corrosive to exposed buried metal or reinforced concrete. However, of concern is the comparatively low pH for the soil samples test. Based on the test results and review of the *Corrosion Guidelines* (California Department of Transportation Division of Engineering Services, September 2003), soil or water with a pH of 5.5 or less can react with the lime in concrete to form soluble reactions that can leach concrete and result in more porous, weaker concrete.

Agricultural soils

Soils are also categorized by their potential use as agricultural land. Soil that is of high quality, supports the growing of crops, and has sufficient moisture to produce sustained high yields of crops is considered prime farmland. No soils within the project area are designated as prime farmland. Most of the soils are

Class II and IV, which have severe limitations for agricultural production. See Chapter 2.1, *Land Use and Agriculture* for a discussion of agricultural productivity on the site.

Top Soil

Most of the topsoil in the project area is characterized by the NRCS as "fair". These soils are loose, sandy soils or firm loamy or clay soils in which suitable material is only 8 to 16 inches thick and poorly drained.

Mineral Resources

The California Geology Survey classifies the project site as MRZ-4, "areas of no known mineral occurrence where geologic information does not rule out either the presence or absence of significant mineral resources".

4.7.3 REGULATORY SETTING

Federal and state regulations, city ordinances, and adopted plans contain regulations and standards related to geology, soils, and seismicity for Placer County.

Federal

Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act to reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards, reduction program. To accomplish this goal, the act established the National Earthquake Hazards Reduction Program (NEHRP). This program was substantially amended in November 1990 by the National Earthquake Hazards Reduction Program Act (NEHRPA), which refined the description of agency responsibilities, program goals, and objectives.

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

Uniform Building Code

The UBC contains minimum standards for design and construction and is used widely throughout the U.S. Compliance with UBC regulations would reduce impacts associated with exposure of people and structures to seismic hazards and ensure development of structures on expansive soils remain less than significant. Through compliance with the code, the proposed project would meet specific minimum seismic safety and structural design criteria, excavation of foundations and retaining walls requirements, and would comply with grading activity regulations.

State Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) (Public Resources Code Sections 2621–2630) was passed in 1972 to mitigate the hazard of surface faulting to structures designed for human occupancy. The main purpose of the law is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Alquist-Priolo Act requires the State Geologist to establish regulatory zones known as Earthquake Fault Zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all

affected cities, counties, and state agencies for their use in planning efforts. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

Seismic Hazards Mapping Act

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

National Pollutant Discharge Elimination System Permit

In California, the State Water Resources Control Board (SWRCB) administers regulations promulgated by the U.S. Environmental Protection Agency (55 Code of Federal Regulations [CFR] 47990) requiring the permitting of stormwater-generated pollution under the National Pollutant Discharge Elimination System (NPDES). In turn, the SWRCB's jurisdiction is administered through nine regional water quality control boards. Under these federal regulations, an operator must obtain a general permit through the NPDES Stormwater Program for all construction activities with ground disturbance of 1 acre or more. The general permit requires the implementation of best management practices (BMPs) to reduce sedimentation into surface waters and to control erosion. One element of compliance with the NPDES permit is preparation of a storm water pollution prevention plan (SWPPP) that addresses control of water pollution, including

sediment, in runoff during construction. (See Chapter 4.13, "Hydrology and Water Quality," for more information about the NPDES and SWPPPs.)

California Building Standards Code

The California Building Standards Commission (BSC) is responsible for coordinating, managing, adopting, and approving building codes in California. In July 2007, the BSC adopted and published the 2006 International Building Code, as the 2007 California Building Standards Code (CBC). This new code became effective on January 1, 2008, and updated all the subsequent codes under Title 24 of the California Code of Regulations (Title 24). The City of Roseville has adopted the 2007 CBC. The State of California provides minimum standards for building design through the 2007 CBC. Where no other building codes apply, Chapter 29 of the 2007 CBC regulates excavation, foundations, and retaining walls. The CBC applies to building design and construction in the state, and is based on the federal Uniform Building Code (UBC) used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The CBC has been modified for California conditions with numerous more detailed or more stringent regulations.

The state earthquake protection law (California Health and Safety Code Section 19100 et seq.) requires that structures be designed to resist stresses produced by lateral forces caused by wind and earthquakes. The 2007 CBC replaces the previous "seismic zones" (assigned a number from 1 to 4, where 4 required the most earthquake-resistant design) with new Seismic Design Categories A through F (where F requires the most earthquake-resistant design) for structures based on the seismic characteristics of a particular project site. With the shift from seismic zones to seismic design, the CBC philosophy has shifted from "life safety design" to "collapse prevention," meaning that structures are designed for prevention of collapse for the maximum level of ground shaking that could reasonably be expected to occur at a site. Chapter 16 of the CBC specifies exactly how each seismic design category is to be determined on a site-specific

basis through the site-specific soil characteristics and proximity to potential seismic hazards.

Chapter 18 of the CBC regulates the excavation of foundations and retaining walls. This chapter regulates the preparation of a preliminary soil report, engineering geologic report, geotechnical report, and supplemental ground-response report. Chapter 18 also regulates analysis of expansive soils and the determination of the depth to groundwater table. For Seismic Design Category C, Chapter 18 requires analysis of slope instability, liquefaction, and surface rupture attributable to faulting or lateral spreading. For Seismic Design Categories D, E, and F, Chapter 18 requires these same analyses plus an evaluation of lateral pressures on basement and retaining walls, liquefaction and soil strength loss, and lateral movement or reduction in foundation soil-bearing capacity. It also requires addressing mitigation measures to be considered in structural design. Mitigation measures may include ground stabilization, selection of appropriate foundation type and depths, selection of appropriate structural systems to accommodate anticipated displacements, or any combination of these measures. The potential for liquefaction and soil strength loss must be evaluated for site-specific peak ground acceleration magnitudes and source characteristics consistent with the design earthquake ground motions. Peak ground acceleration must be determined from a site-specific study, the contents of which are specified in CBC Chapter 18.

Finally, Appendix Chapter J of the 2007 CBC regulates grading activities, including drainage and erosion control and construction on unstable soils, such as expansive soils and areas subject to liquefaction.

City of Roseville

The Roseville Municipal Code adopted the following codes to ensure that buildings are designed and sited to protect against seismic and unstable soil conditions:

- California Building Code (CBC), 2008,
- Uniform Plumbing Code, (2007)
- Uniform Housing Code, (2007)
- Health and Safety Code, (2007 and
- Uniform Mechanical Code, (2007).

The City's grading ordinance (Chapter 16.20) also regulates stockpiling and grading. A grading permit is required prior to beginning any grading activities greater than the movement of 50 cubic yards of material.

The Planning and Public Works Departments maintain policies and guidelines relating to grading, erosion control, inspection, and permitting. The City of Roseville Design and Construction Standards (adopted in March 2007) require development of a grading plan to reduce potential impacts associated with development of structures on expansive soils, topographic changes, soil erosion due to grading, slope instability, and increased erosion along stream channels.

Implementation of Section 111 of the City of Roseville Design and Construction Standards (adopted by Resolution March 2007) would ensure that exposure of people and structures to seismic hazards, development of structures on expansive soils, topographic changes and soil erosion due to grading, and slope instability and increased erosion along stream channels due to grading would be less than significant by requiring development of a Grading Plan to include a description of the site, an erosion and sedimentation control plan, and mitigation monitoring requirements. The City's authority for regulating grading is provided by Chapter 33 of the Uniform Building Code. The City's Design and Construction Standards require that a grading permit be obtained from the City prior to beginning any grading work. This is necessary to ensure that the proposed grading is compatible with adjacent property topography and is constructed in a safe manner.

The City of Roseville requires the preparation of site specific geotechnical studies as part of the building permit process. Per Section 111-3 of the Design and Construction Standards; All grading improvements shall be installed in accordance with provisions in Chapter 33 of the UBC, recommendations of site specific geotechnical reports and geotechnical engineer. The technical information that must be compiled for these studies, which address both seismic hazards and soil conditions, is specified in the UBC. Implementation of the recommendations within the site specific geotechnical evaluation would ensure that impacts associated with exposure of people and structures to seismic hazards, development of structures on expansive soils, grading activities increasing slope instability and increased erosion along stream channel, and soil recommendations to address potential slope and foundation instability, stream bank protection and slope evaluation, expansive soils, and differential settlement reduce impacts to a less than significant level.

Section 111-3 soil erosion control measures- Construction sites shall have required erosion and sediment control measures in place between October 1 and April 30. All projects adjacent to creeks, wetland, vernal pools, drainage ditches, and stormwater drain inlets shall have adequate sediment control measures in place prior to ground disturbance regardless of time of year. If construction is in progress, the Contractor shall ensure that the construction site is prepared prior to the onset of any storm.

Section 111-5 Soil Testing Procedures and Frequencies requires that field density testing for earthwork and backfill will be performed by either the owner's Independent Testing Laboratory (ITL) or the City's Geotechnical Engineering Consultant, at the discretion of the City Engineer as follows:

a. Private property building areas including 10' outside the exterior building lines shall be tested by the property owner's Geotechnical Engineer with proper written pad certifications submitted to City Building Official prior to foundation placement

b. Public Right-of-Way- all grading operations, which involve revision to existing contours for the purpose of accepting right-of-way improvements, shall require written and stamped certification from a licensed California Geotechnical Engineer.

c. Test method- In place nuclear density, ASTM D2922 to check conformance to requirements of Geotechnical Report, project plans, specifications and Section 71 of the standards. In addition to testing, the field technicians shall observe all backfill operations to ensure methods consistent with those that achieved minimum required compaction results are used throughout the backfill process. The field technician shall record these observations in their daily Field Reports (DFR's).

Minimum report requirements include the following:

1. Daily field Reports- all testing and observation shall be recorded in a DFR. The DFR shall include all field density testing; test tables, and/or plans shall show the field recorded dry density, moisture content, reference laboratory compaction test used and any moisture offset used based on supplemental laboratory testing.

As stated in the CBC (California Building Code) - No building or structure regulated by this code shall be erected, constructed, enlarged, altered, repaired, moved, improved, removed, converted or demolished unless a separate permit for each building or structure has first been obtained from the building official.

4.7.4 IMPACTS

Thresholds of Significance

For purposes of this analysis, the following thresholds of significance, as derived from Appendix G to the State CEQA Guidelines, have been used to determine

whether implementation of the proposed Project would result in significant geology, soils and seismicity impacts.

Based on Appendix G of the State CEQA Guidelines, an air quality impact is considered significant if implementation of the proposed project would do any of the following:

- Expose people or structures to substantial risk of loss, injury or death due to major geologic hazards, such as rupture of a known earthquake fault, seismic ground shaking, seismic-related ground failure including liquefaction, slope failure or landslides;
- Place structures on soils that are likely to collapse or subside, or be located on expansive soils that could damage foundations or structures creating substantial risks to life or property; or
- Result in substantial soil erosion or loss of topsoil.

IMPACT 4.7-1	**SOIL EROSION FROM GRADING ACTIVITIES**	
Applicable Policies and Regulations	Roseville Design and Construction Standards Roseville Grading Ordinance Uniform Building Code. 2007 California Building Standards Code	
	CSP	**Urban Reserve**
Significance with Policies and Regulations	Less Than Significant	Less Than Significant
Mitigation Measures:	None Required	None Required
Significance after Mitigation:	Less Than Significant	Less Than Significant

Erosion

Natural forces, both chemical and physical, are continually at work breaking down soils. Erosion poses two hazards: (1) it removes soils, thereby undermining roads and buildings and producing unstable slopes, and (2) it deposits eroded soil in reservoirs, lakes, drainage structures, and on roads. Natural erosion is frequently accelerated by human activities such as site preparation for construction and alteration of topographical features.

Future development within the project area would require grading and leveling of the site to accommodate new residences, commercial and other uses. Grading activities would be necessary to prepare the CSP area for proposed new structures and infrastructure. There would be a general leveling of the gently undulating topography that is present, particularly in the vicinity of the drainage channels and grading operations on-site and off-site for construction of the Pleasant Grove Creek bypass channel improvements. No unique topographic features would be removed, and the major drainage swales would remain in open space. Although development would permanently alter the topography of the project area through site preparation (grading and trenching) and by the construction of project features, the relatively flat topography of the project area development would preclude any substantial erosion. Any proposed development would be required to obtain a grading permit, which would identify how soil would be moved and stored at the site. The permit application and grading plan would be reviewed for compliance with construction standards designed to minimize erosion. Site-specific information from a geotechnical evaluation would be required to more fully identify and address other erosion hazards, if any. The grading permit and site-specific geotechnical study are required by the City of Roseville as a condition of project approval and issuance of building permits. Specifics of the grading plan could include, but not be limited to, sediment retention basins and energy dissipaters that would both reduce the power of erosion runoff entering stream channels, and retain the majority of suspended sediment.

CREEKVIEW SPECIFIC PLAN

It is estimated that 325 acres of the 501 acre CSP area would be mass-graded to accommodate new development as part of the proposed project. However, because of the relatively flat terrain, which is underlain by soils that exhibit low erosion hazard, it is anticipated there would be no geotechnical effects related to erosion. The project would be required to obtain a Grading Permit and meet the requirements of Section 111-3 of the Construction Standards for field testing and the recommendations of the Geotechnical Studies and Geotechnical Engineers. Implementation of the CSP would result in the development of structures, roadways and landscaping or re-vegetated areas that would eventually cover any soils exposed during construction. The potential for soil erosion is considered a less than significant impact.

URBAN RESERVE

Conditions on the Urban Reserve parcels are similar to the CSP development site. The topography of the program area is relatively flat, and would require implementation of recommendations of required geotechnical studies as well as grading permits at the time specific development is proposed. Any development in the Urban Reserve would be subject to the same performance standards and regulations as the CSP. Therefore, soil erosion impacts are considered **less than significant**.

IMPACT 4.7-2	DEVELOPMENT OF STRUCTURES ON EXPANSIVE SOILS OR ON SOILS WITH OTHER LIMITATIONS	
Applicable Policies and Regulations	Roseville Improvement Standards Roseville Zoning Ordinance 2007 California Building Standards Code	
	CSP	**Urban Reserve**
Significance with Policies and Regulations	Less Than Significant	Less Than Significant
Mitigation Measures:	None Required	None Required
Significance after Mitigation:	Less Than Significant	Less Than Significant

CREEKVIEW SPECIFIC PLAN

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), indicate that most of the soils within the project area have a high shrink-swell potential. The physical forces resulting from the shrink-swell processes of soils can exert pressure on foundations and infrastructure lines which, in turn could result in pipeline and foundation damage. Other soil constraints in the project area include low soil strength, slow permeability and wetness, and shallow depth to rock. Slow permeability can cause drainage problems. Shallow depth to rock could require special construction methods to prepare foundations.

In addition to shrink/swell potential, there is also the potential for corrosive soils due to pH of less than 5.5. One test excavation and soil sample on the site contained a pH level of 5.21. Despite the constraints, the soil conditions in the project area do not appear to pose significant deterrents to residential or commercial construction or infrastructure placement. The soil types are typical

of existing urban areas within the City of Roseville. Standard engineering practices and compliance with the UBC and Roseville Design and Construction Standards III-3 (Soil Testing and recommendations from geotechnical report) would ensure that the impacts are minimized. As indicated, site-specific geotechnical evaluation must be submitted by project developers, as part of the building permit process. The geotechnical evaluation routinely required by the City would identify locations where special construction and design methods would be needed and would include recommendations for alleviating constraints due to high shrink-swell, corrosion or other potential soils constraints. The developer would be required to comply with the recommendations set forth in the geotechnical evaluation, pursuant to the City's building permit process. Therefore, this is considered a **less than significant** impact.

URBAN RESERVE

The soil features in the Urban Reserve are the same as located within the CSP and are subject to shrink-swell potential and slow permeability. Despite these constraints, the soil conditions do not appear to pose any significant deterrents to residential or commercial construction or infrastructure placement. Compliance with the UBC and City of Roseville Improvement Standards, and site specific geotechnical evaluations required by the developers, would identify locations where special construction and design methods would be needed. The developer would be required to comply with recommendations for alleviating constraints due to high shrink-swell potential or other soil constraints. Therefore, this is considered a **less than significant** impact.

IMPACT 4.7-3	THE LOSS OF TOPSOIL DUE TO CONVERSION OF AGRICULTURAL LAND TO URBAN USES	
Applicable Policies and Regulations	None Available	
	CSP	**Urban Reserve**
Significance with Policies and Regulations	Less Than Significant	Less Than Significant
Mitigation Measures:	None Required	None Required
Significance after Mitigation:	Less Than Significant	Less Than Significant

Loss of Topsoil

Development of the project area would result in the conversion of approximately 325 acres of fallow agricultural land that has been used in the past for grazing activities, and limited strawberry production. The NRCS rates these soils as "fair." Areas along stream channels, which generally contain higher quality topsoil, would remain in open space and would not be substantially disturbed by project development, so there would be no loss of high quality topsoil. Refer to Chapter 4.1- *Land Use and Agriculture* for a discussion of loss of agricultural land. No area of the site contains soils that are considered prime for agricultural purposes. Therefore this impact is considered **less than significant**.

URBAN RESERVE

Development of the Urban Reserve would result in additional changes to topsoil. The physical characteristics and land use of the Urban Reserve area are similar to the CSP area. It also contains soils rated as "fair to poor" for topsoil and like the rest of the CSP area, there is no Prime Farmland in the Urban Reserve area.

The loss of these soils as a result of project development would be considered **less than significant**.

IMPACT 4.7-4	EXPOSURE TO PEOPLE AND STRUCTURES TO SEISMIC HAZARDS	
Applicable Policies and Regulations	Roseville Improvement Standards Uniform Building Code. 2007 California Building Standards Code	
	CSP	**Urban Reserve**
Significance with Policies and Regulations	Less Than Significant	Less Than Significant
Mitigation Measures:	None Required	None Required
Significance after Mitigation:	Less Than Significant	Less Than Significant

CREEKVIEW SPECIFIC PLAN

Placer County is classified as a low severity earthquake zone, and no active faults are known to exist within the county. To reduce to an acceptable level the risk of seismic-related safety hazards and structural damage to pipelines, roads, residential homes etc, from ground shaking, the City of Roseville standard conditions of approval require that at the time of tentative map approval, construction must be in accordance with the 2007 California Building Standards Code and local building standards, as administered by the City of Roseville's Building Department and the City's Design and Construction Standards (III-3 Geotechnical Engineer recommendations). Regular monitoring and enforcement of the UBC requirements regarding seismic and geologic safety by the City of Roseville through the building permit and plan check processes would ensure that new development and construction meet all seismic and geologic safety standards, ultimately protecting the public by reducing the risk of building damage or collapse. In addition, the City of Roseville Construction Standards

require grading permit, including an erosion and sedimentation control plan, and mitigation monitoring requirements, which further reduce the risk of exposure of people and structures to seismic hazards. Risk relative to seismic activity in the project area is considered **less than significant**.

URBAN RESERVE

Conditions in the Urban Reserve are similar to the CSP development area. Construction would be required to comply with the UBC requirements regarding seismic and geologic safety by the City of Roseville through the building permit and plan check processes. Risk due to seismic activity in the Urban Reserve is considered **less than significant**.

4.7.5 MITIGATION MEASURES

None Required