4.6 Geology and Soils

This section describes the geology, soils, mineral resources, seismicity, and seismic hazards of the Planning Area. Key issues include seismic hazards such as groundshaking and liquefaction, erosion, soil stability, and wastewater conflicts. Impacts of implementing the proposed General Plan Update relative to these issues are examined. In addition, potential impacts to residents resulting from geologic and seismic hazards are also addressed. General Plan policies and mitigation measures that would serve to reduce impacts are also identified. This section is based on a review of published information, surveys, and reports regarding regional geology and soils. Relevant state and local regulatory documents and programs pertaining to seismicity, geology, and soils are identified. Abbreviated citations for each information source are provided in the text, with full references provided at the end of this section.

4.6.1 EXISTING SETTING

TOPOGRAPHY AND LOCAL GEOLOGY

Planning Area Setting

The topography of the Planning Area varies from 150 to 525 feet above sea level, with terrain consisting of rolling foothills. Rocklin is located in the Loomis Basin, which is situated in the western foothills of the Sierra Nevada range. The regional geology of the Rocklin area has been influenced by mountain uplift and volcanic activity in the Sierra Nevada and erosion off the crest of the mountains. Throughout much of geologic time, the Sierra Nevada has experienced mountain uplift, deep erosion off the crest of the mountains, and sporadic volcanic activity from vents near the crest or in Nevada. Stream erosion during the periods of uplift has produced a variety of sedimentary rock units present in the Loomis Basin. Deepening erosion and sedimentation within the Loomis Basin within the past million years have resulted in alluvial deposits now present along former and existing stream channels.

GEOTECHNICAL CONDITIONS

Soils

Six major factors influence and control the characteristics of the soil for any given area: climate, relief/topography, organic content, parent material, time, and human activity.

Most soils have several layers. In areas where there has not been significant disturbance, there are usually three main layers. These layers are commonly referred to as the surface, the topsoil, and the subsoil. The characteristics of each layer vary with depth and type.

The Planning Area is part of the Loomis Basin. Soils in the Planning Area have resulted from stream erosion during the episodic uplifting of the Sierra Nevada. Soils are generally of poor quality and do not support commercial agricultural activities, with the exception of livestock grazing. In addition, several of the soil types found within the Planning Area require special review and consideration where construction of foundations, structures, roadways, and underground infrastructure are proposed, due to their stony and unconsolidated nature.

The United States Department of Agriculture Natural Resources Conservation Service (USDA-NRCS) completed a soil survey of western Placer County in 1980. The dominant soil types found within the City of Rocklin are described below.

Alamo-Fiddyment complex. This soil occurs at elevations of 50 to 500 feet. This soil is moderately deep and somewhat poorly drained on hill terraces. It has very slow permeability and slow surface runoff with a low to moderately high erosion hazard.

Alamo variant clay. This soil occurs at elevations of 100 to 200 feet. This soil is moderately deep, gently sloping, somewhat poorly drained clay on alluvial bottoms and rolling foot slopes in valleys between volcanic ridges. It has very slow permeability and slow to medium surface runoff with slight to moderate erosion hazard.

Andregg coarse sandy loam. This soil occurs at elevations of 200 to 1,000 feet. It is moderately deep, gently rolling, and well drained, underlain by weathered granitic bedrock. Permeability is moderately rapid and surface runoff is medium with a moderate erosion hazard.

Andregg-Shenandoah complex. This soil occurs at elevations of 200 to 1,800 feet. This soil is moderately deep, strongly sloping, and well drained. Permeability is moderately rapid and surface runoff is slow to rapid. The hazard of erosion is slight to moderate.

Caperton-Rock outcrop complex. This soil occurs at elevations of 200 to 1,500 feet. It is shallow, somewhat excessively drained soil with moderately rapid permeability. The hazard of erosion is moderate to high.

Cometa sandy loam. This soil occurs at elevations of 75 to 200 feet. This soil is deep and well drained on low hill terraces. Permeability is very slow and surface runoff is slow to medium. The hazard of erosion is slight.

Cometa-Fiddyment complex. This soil occurs at elevations of 75 to 200 feet. It is deep to moderately deep and well drained on low hill terraces. It has a slow permeability rate and slow surface runoff with a slight erosion hazard potential.

Cometa–Ramona sandy loams. This soil occurs at 75 to 200 feet. It is approximately 50 percent Cometa soil on short side slopes and bottoms, and 30 percent Ramona soil on fingerlike ridges and younger land surfaces. The Cometa soil is deep and well drained, with very slow permeability and slow surface runoff. The Ramona soil is very deep and well drained with moderately slow permeability and medium runoff. The hazard of erosion is slight.

Exchequer very stony loam. This is a shallow, somewhat excessively drained very stony soil underlain by hard andesitic breccia and occurring at 100 to 2,000 feet. It has moderate permeability, medium surface runoff, and a slight to moderate hazard of erosion.

Exchequer-Rock outcrop complex. Occurring at 100 to 1,000 feet, this soil is approximately 60 percent Exchequer soil and 15 percent andesitic breccia (lava cap). The Exchequer soil is shallow, somewhat excessively drained very stony soil with moderate permeability, medium to rapid surface runoff, and slight to high hazard of erosion. Rock outcrops consist of areas of hard andesitic breccia 50 to 500 square feet in size.

Fiddyment-Kaseberg loams. Occurring as undulating to gently rolling soils on low siltstone terraces at elevations of 75 to 135 feet, this soil is approximately 50 percent Fiddyment soil and 30 percent Kaseberg soil. The Fiddyment soil is moderately deep over hardpan and is well drained, with slow permeability, slow to medium surface runoff, and a slight to moderate hazard of erosion. The Kaseberg soil is shallow over hardpan and is well drained with moderate permeability, slow to medium surface runoff, and a slight to moderate hazard of erosion.

Inks cobbly loam. This soil occurs at elevations of 200 to 1,200 feet. This shallow soil is well drained and sloping. It is moderately permeable with medium to rapid runoff characteristics. The hazard of erosion is high.

Inks-Exchequer complex. This soil occurs at elevations of 200 to 1,200 feet and is approximately 40 percent Inks soil and 30 percent Exchequer soil. The Inks soil is shallow, well-drained cobbly soil that has moderate permeability, medium surface runoff, and a slight to moderate hazard of erosion. The Exchequer soil is shallow, somewhat excessively drained very stony soil with moderate permeability, medium to rapid surface runoff, and slight to high hazard of erosion.

Xerofluvents, occasionally flooded. This soil is found adjacent to stream channels and consists of small areas of moderately well drained loamy alluvium. Areas containing this soil type are occasionally flooded by stream overflow and therefore are not considered suited for urban uses because of their flood potential. This soil is very deep and possesses a slight hazard for erosion.

Xerofluvents, frequently flooded. This moderately deep soil is found adjacent to stream channels and consists of narrow stringers of somewhat poorly drained recent alluvium. Areas containing this soil type are subject to frequent flooding and channelization and therefore are not considered suited for urban uses due to their flood hazard. This soil is poorly drained and possesses a high hazard for erosion

Xerofluvents, cut and fill areas. This soil type consists of mechanically removed and mixed soil material used primarily for highways and urban development. Cut and fill areas are typically well drained with a very rapid surface runoff. These areas have a moderate erosion hazard.

Xerofluevents, placer areas. This soil type consists of stony, cobbly, and gravelly material and is found adjacent to streams that have been placer mined. The erosion potential of this soil type is variable.

Rubble land. Rubble land consists of areas where the majority of the surface is covered by stones or boulders. Rubble land typically is made up of cobbly and stony mine debris and tailings from dredge or hydraulic mining.

The soils within the Rocklin Planning Area are predominantly of the Exchequer units. These soils are undulating to steep, well-drained and somewhat excessively drained soils that are shallow and found over volcanic rocks. Soils of the Andregg-Caperton-Sierra and Cometa-Ramona units are also found in the Rocklin area. Andregg-Caperton-Sierra soils are undulating to steep, well-drained and somewhat excessively drained soils that are deep to shallow over granitic rock. Cometa-Ramona soils are undulating, deep and very deep, well-drained soils found on terraces. These soils are of poor quality and do not support agricultural uses, with the exception of cattle grazing.

Some soil types found in the Planning Area present low to moderate obstacles to development, including roads and highways, while others may require special review and consideration where construction of foundations, structures, roadways, and underground infrastructure are proposed. These soil types include Alamo variant clay (wetness, shrink-swell potential, and low strength), Exchequer very stony loam (depth to rock), Inks-Exchequer complex (slope, depth to rock), and Fiddyment-Kaseberg loams (depth to rock, cemented pan, shrink-swell potential, and strength).

A listing of soil physical constraints and hydrologic capacities is tabulated in **Table 4.6-1.**

TABLE 4.6-1
SOIL MAPPING UNITS

Map Unit Name	Soil Depth	Drainage	Erosion Potential
Alamo-Fiddyment complex	Moderately deep	Poorly drained	Moderately high
Alamo variant clay	Moderately deep	Somewhat poorly drained	Slight to moderate
Andregg coarse sandy loam	Moderately deep	Well drained	Moderate
Andregg-Shenandoah	Moderately deep	Somewhat poorly drained to well drained	Slight to moderate
Caperton-Rock outcrop complex	Shallow	Somewhat excessively drained	Moderate to high
Cometa sandy loam	Deep	Well drained	Slight
Cometa-Fiddyment complex	Deep to moderately deep	Well drained	Slight
Cometa-Ramona sandy loam	Deep to very deep	Well drained	Slight
Exchequer very stony loams	Shallow	Somewhat excessively drained	Slight to moderate
Exchequer-Rock outcrop complex	Shallow	Somewhat excessively drained	Slight to moderate
Fiddyment-Kaseberg loams	Shallow to moderately deep	Well drained	Slight to moderate
Inks cobbly loam	Shallow	Well drained	High
Inks-Exchequer complex	Shallow	Well drained to somewhat excessively drained	Slight to moderate
Xerofluvents, occasionally flooded	Very deep	Well drained	Slight
Xerofluvents, frequently flooded	Moderately deep	Somewhat poorly drained	High
Xerofluvents, cut and fill areas	N/A	Well drained	Moderate
Xerofluvents, placer areas	Variable	Variable	Variable
Rubble land	N/A	N/A	N/A

Source: USDA-NRCS, 2008

Mineral Resources

As described in the General Plan Open Space, Conservation and Recreation Element, Secret Ravine, in the vicinity of Newcastle and also to the south around Stewarts Flat, was the site of extensive placer mining in the 1850s and 1860s. Pine Grove, later named Pino, was the center of ravine diggings at that time. Pino is located at the modern location of the Town of Loomis. The Gold Rush affected the Rocklin area, but no major gold discoveries occurred in the vicinity. Starting in the 1860s, the granite business was a driving force behind early population growth in Rocklin. Granite quarries developed as the primary mining activity, and at one time over 60 quarries operated in the area. Rocklin became the principal granite-producing point in the Sacramento Valley. The Rocklin quarries were comparatively close together, occurring in an area less than a mile square on a gently rolling plain bordering the Union Pacific railroad. The

granite found in Rocklin is optimal because it is even-textured, very hard, and available in large blocks and takes a high polish. One commercial business, Big Gun Quarry, extracts granite from Rocklin at this time (City of Rocklin 2008a).

Historically, gravel was seldom commercially excavated in Rocklin due to the concern over the presence of mica. Mica weathers differentially and is sometimes detrimental to gravel aesthetics and durability (City of Rocklin 2008a).

Seismicity

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and causes the shaking that is felt during an earthquake.

The California Mining and Geology Board has defined active faults as those for which there is evidence of surface displacement within the Holocene epoch, that is, within about the last 11,000 years. Some faults are characterized as "active" based on surface displacements within historic time, or about the last 200 years, while others are characterized as active based on surface displacements in rocks or sediments that are less than 11,000 years old.

This definition of an active fault does not mean, however, that all faults for which there is no evidence of surface displacement during the Holocene are inactive. Some faults may have been active in this time period but did not result in identifiable surface displacements, while other faults may still be active although they have not been active during the Holocene. Many recent, damaging California earthquakes, including the 1975 Oroville earthquake, the 1983 Coalinga earthquake, and the 1987 Whittier Narrows earthquake, occurred on faults that were not previously recognized as active (USGS 2009b).

The Mining and Geology Board has defined "potentially active faults" as those for which there is evidence of surface displacement within the Quaternary period, that is, within about the last 1.6 million years. Faults classified as potentially active faults show no evidence of surface displacements within the past 11,000 years, but this period of time is short geologically and thus such faults are considered potentially active. Faults that do not meet these criteria for being classified as active or potentially active are not necessarily permanently inactive (California State Mining and Geology Board 2009).

Seismic risk is not limited to faults that have been currently identified. A significant fraction of small to moderately large earthquakes typically occurs on faults not previously recognized. Such earthquakes are characterized as "background seismicity" or "floating earthquakes," which indicate that the expected sources and locations of such earthquakes are unknown.

Earthquake magnitude is a measure of the total amount of energy released in an earthquake. With increasing magnitude, ground motions are stronger, last longer, and are felt over larger areas. Earthquake intensity is a measure of the effects of earthquake ground motions on people and buildings. Earthquake intensity is often more useful than magnitude when discussing the damaging effects of earthquakes. The most common intensity scale is the Modified Mercalli Intensity scale, which ranges from I to XII (USGS 2009c).

The Modified Mercalli Intensity Scale is used in the United States to evaluate earthquake movements. The Modified Mercalli Intensity Scale is composed of 12 increasing levels of intensity designated by Roman numerals. An earthquake's intensity is described through a series of certain key responses such as people awakening, movement of furniture, damage to chimneys,

and, finally, total destruction. The levels range from imperceptible shaking to catastrophic destruction. The Modified Mercalli Intensity Scale does not have a mathematical basis; instead, it is an arbitrary ranking based on observed effects. The lower numbers of the intensity scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the intensity scale are based on observed structural damage. **Table 4.6-2** describes the typical effects observed at locations near the epicenter of earthquakes of different magnitudes (USGS 2009c).

TABLE 4.6-2
MAGNITUDE AND INTENSITY COMPARISON

Magnitude	Intensity	Description
1.0 – 3.0	I	Not felt except by a very few under especially favorable conditions.
3.0 – 3.9	II – III	Felt only by a few persons at best, especially on upper floors of buildings. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0 – 4.9	IV – V	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0 – 5.9	VI – VII	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0 – 6.9	VIII – IX	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	VIII or higher	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: USGS 2009a

By comparison, an earthquake's magnitude is related to the amount of seismic energy released at the hypocenter of the earthquake. Magnitude is based on the amplitude of the earthquake waves recorded on instruments which have a common calibration. The magnitude or strength of earth movement associated with seismic activity is typically quantified using the Richter scale. This scale is a measure of the strength of an earthquake or strain energy released by it, as determined by seismographic observations. This is a logarithmic value originally defined by Charles Richter and Beno Gutenberg. An increase of one unit of magnitude (for example, from 4.6 to 5.6) represents a 10-fold increase in wave amplitude on a seismogram, or approximately a

30-fold increase in the energy released. In other words, a magnitude 6.7 earthquake releases over 900 times (30 times 30) the energy of a 4.7 earthquake.

The City of Rocklin is located in an area that has a relatively low risk of seismic activity (Placer County 2005, pg. 172). While the seismic risk may not be considered substantial, seismic activity may affect development in the Planning Area and cannot be completely discounted as a planning factor. Refer to **Figure 4.6-1** for the Level of Earthquake Hazard determination as identified by the California Emergency Management Agency and the United States Geological Survey.

Placer County lies between two seismically active regions in the western United States (Placer County 2005, pg. 79). Tectonic stresses associated with the North American-Pacific Plate boundary can generate damaging earthquakes along faults 30 to 100 miles to the west of the county. Placer County itself is traversed by a series of northwest-trending faults that are related to the Sierra Nevada uplift. Although portions of western and eastern Placer County are located in a seismically active region, no known faults actually go through the City of Rocklin (Placer County 2005, pg. 80). The distance to major regional faults and the general stability of the underlying geology of the Planning Area combine to minimize the potential localized impact of seismic events that may occur elsewhere. The Alquist-Priolo Earthquake Fault Zoning Act, enacted in 1972, provides for the identification of special study zones near active fault areas. According to the California Department of Conservation, no Alquist-Priolo zones have been established in Placer County (DOC 2009).

Ground Shaking

In populated areas, the greatest potential for loss of life and property damage is a result of ground shaking from a nearby earthquake. The degree of damage depends on many interrelated factors. Among these factors are the Richter magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surficial deposits or bedrock, degree of consolidation of surficial deposits, presence of high groundwater, topography, and design, type, and quality of building construction.

A critical factor affecting the intensity of ground shaking is the geologic material underneath a site. Deep, loose soils will amplify and prolong the shaking, such as the alluvial deposits now present along former and existing stream channels. The type of rock that least amplifies ground shaking is granite. Ground shaking can be several times greater on sites underlain by weak sediments, like alluvial deposits, than on bedrock. Losses from shaking can occur where tall structures are built on thick, soft sediments. Damage from shaking is also influenced by the structural integrity of buildings before an earthquake.

Rocklin may experience moderate to strong ground shaking from major earthquakes originating from distant faults to the west and east. For example, to the west, both the San Andreas fault (source of the estimated 8.0 Richter magnitude San Francisco earthquake that caused damage in Sacramento in 1906) and the closer Hayward fault have the potential for experiencing major to great events. To the east in Nevada, there are several faults associated with a series of earthquakes in 1954, especially the major (7.1 Richter magnitude) December 16, 1954, Fairview Peak event (about 100 miles east of Carson City). It is not clear if Rocklin experienced any damage from these events, though damage did occur in Sacramento. There are other fault zones in the Sierra Nevada foothills that could also produce seismic effects in the Planning Area. The nearest well-defined faults are the Dewitt fault and the Rescue fault (see **Figure 4.6-2**), which follow the eastern side of the Sacramento Valley through El Dorado, Placer, and Amador counties (Placer County 2005).

The closest recently active fault in the western Sierra Nevada foothills is the Cleveland Hills fault (shown in association with the Paynes Peak fault in **Figure 4.6-2**), which is situated approximately 40 miles north of Rocklin. This fault was the source of the 1975 Oroville earthquake (Richter magnitude: 5.7), which was felt strongly in Placer County and neighboring areas. However, the distance to major regional faults and general stability of the underlying geology of the Planning Area combine to minimize the potential localized impact of seismic events that may occur elsewhere (Placer County 2005).

Ground Failure

Ground failure is a secondary effect of ground shaking and can include landslides, liquefaction, lurching, and differential settlement. Buildings can tilt or sink, utility lines can rise to the surface, and levees can fail. If soils are poorly consolidated, the ground can subside.

Landslides

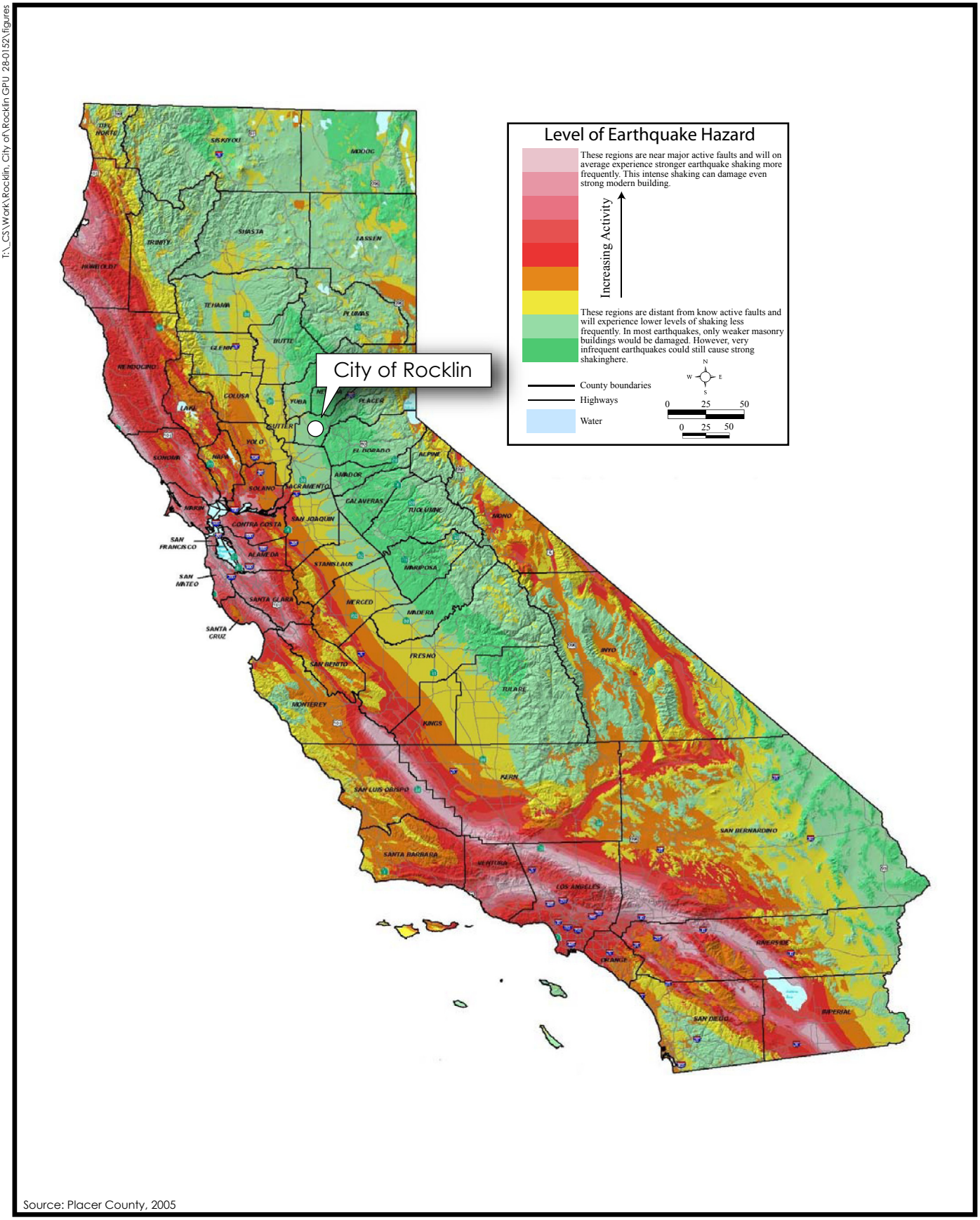
Landslides are an active part of the natural erosion process. The climate (with wet winters and dry summers), the mountainous terrain, areas of weak bedrock conditions, and commonly thick unconsolidated soil and rock all contribute to the development of landslides. Human activities that affect vegetation, slope gradients, and drainage processes can also contribute to slope instability and erosion.

The risk of slope instability is highest in the Coast Range of western California and coincides with climatic, topographic, and geologic environments that induce landslides. In general, the Coast Range is associated with a wet climate, steep terrain, and the Franciscan Geologic Formation, which is known to have poor slope stability characteristics. In contrast, the metamorphic and volcanic rocks of western Placer County exhibit much better slope stability characteristics but may contain localized areas where poor slope stability conditions are apparent (Placer County 2005).

Liquefaction

Liquefaction is the loss of soil strength due to seismic forces generating various types of ground failure. Liquefaction occurs when saturated and poorly consolidated granular material is shaken during an earthquake and is transformed into a fluid-like state. The potential for liquefaction must account for soil types and density, the groundwater table, and the duration and intensity of ground shaking. If soils are poorly consolidated, the ground can subside. According to the 1991 Rocklin General Plan, because Rocklin is located over a stable granite bedrock formation and much of the area is covered by volcanic mud, there are no major problems with unstable soil. In those areas of the Planning Area where clay deposits exist, there is a tendency for the clay to become unstable if saturated with water and subjected to ground shaking; however, it is not a serious problem. There are some localized stability problems as a result of clay deposits or springs, but they are nuisances, not a major danger (City of Rocklin 1991).

T:_CS\Work\Rocklin, City of\Rocklin GPU 28-0152\figures



Source: Placer County, 2005

NO SCALE

N

Figure 4.6-1
Level of Earthquake Hazard

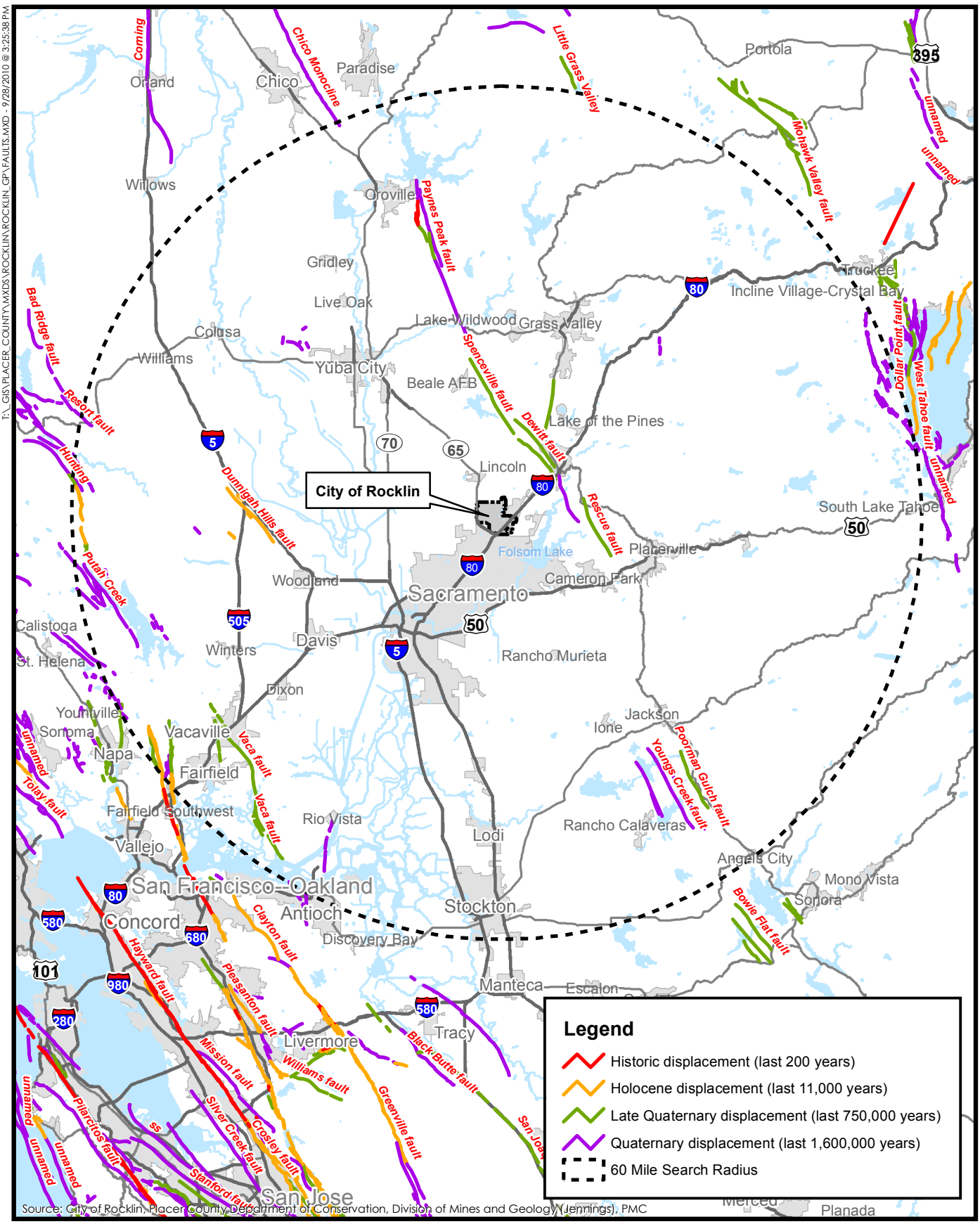


Figure 4.6-2
Faults Map

Subsidence

Land surface subsidence can be induced by both natural and human phenomena. Natural phenomena include subsidence resulting from tectonic deformations and seismically induced settlements; soil subsidence from consolidation, hydrocompaction, or rapid sedimentation; subsidence from oxidation or dewatering of organic-rich soils; and subsidence related to subsurface cavities. Subsidence related to human activity includes subsurface fluid or sediment withdrawal. Pumping of water for residential, commercial, and agricultural uses from subsurface water tables causes more than 80 percent of the identified subsidence in the United States. Lateral spreading is the horizontal movement or spreading of soil toward an open face, such as a streambank, the open side of fill embankments, or the sides of levees. The potential for failure from subsidence and lateral spreading is highest in areas where there is a high groundwater table, where there are relatively soft and recent alluvial deposits, and where creek banks are relatively high (Placer County 2005).

Expansive Soils

Expansive soils can shrink and swell with wetting and drying. Soils with high clay content tend to be the most affected. The shrink-swell potential of expansive soils can result in differential movement beneath foundations. Expansive soils are common in western and central California, particularly where clay-rich parent material is present or within seasonally wet basin areas. Near-surface expansive clays shrink and swell where subject to seasonal soil moisture variations. Expansive soils can be recognized by the appearance of soil cracks that open during the dry season and close during the rainy season. Structures, pavements, concrete slabs, and other improvements can experience significant damage from this seasonal shrinking and swelling process if not designed to address the presence of expansive soils. Expansive soils can also accelerate landslides and the process of soil creep on slopes.

Naturally Occurring Asbestos

Asbestos is the common name for a group of naturally occurring fibrous silicate minerals that can separate into thin but strong and durable fibers. Naturally occurring asbestos (NOA), which was identified as a toxic air contaminant (TAC) in 1986 by the California Air Resources Board (CARB), is located in many parts of California, including several foothill areas of Placer County, and is commonly associated with serpentine. For a complete discussion on asbestos and associated risks, the reader is referred to the ultramafic rock discussion in Section 4.7, Human Health/Hazards.

4.6.2 REGULATORY FRAMEWORK

STATE

The Alquist-Priolo Earthquake Zoning Act of 1972

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (prior to January 1, 1994, called the Alquist-Priolo Special Studies Zones Act – CCR, Title 14, Section 3600) sets forth the policies and criteria of the State Mining and Geology Board that governs the exercise of governments' responsibilities to prohibit the location of developments and structures for human occupancy across the trace of active faults. The policies and criteria are limited to potential hazards resulting from surface faulting or fault creep within Earthquake Fault Zones delineated on maps officially issued by the State Geologist. Working definitions include:

- Fault: A fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side.

- Fault Zone: A zone of related faults, which commonly are braided and subparallel but may be branching and divergent. A fault zone has a significant width (with respect to the scale at which the fault is being considered, portrayed, or investigated), ranging from a few feet to several miles.

- Sufficiently Active Fault: A fault that has evidence of Holocene surface displacement along one or more of its segments or branches (last 11,000 years).

- Well-Defined Fault: A fault whose trace is clearly detectable by a trained geologist as a physical feature at or just below the ground surface. The geologist should be able to locate the fault in the field with sufficient precision and confidence to indicate that the required site-specific investigations would meet with some success.

"Sufficiently Active" and "Well Defined" are the two criteria used by the state to determine if a fault should be zoned under the Alquist-Priolo Act.

The Surface Mining and Reclamation Act of 1975

The Surface Mining and Reclamation Act of 1975 (SMARA) provides a comprehensive surface mining and reclamation policy that permits and regulates the mining of minerals, as well as the protection and subsequent beneficial use of mined and reclaimed land. The purpose of the act is to ensure that adverse environmental effects are prevented or minimized and that mined lands are reclaimed to a usable condition and readily adaptable for alternative land uses.

SMARA requires that local governments address mineral recovery activities through direct regulation of mining operations (including reclamation) and through planning policies that harmonize the mineral resource needs of the state and region with the maintenance of local environmental quality. SMARA also contains strong policies for the conservation of known mineral deposits in the face of competing development so that they will be available for extraction and use.

SMARA establishes a two-step mineral lands inventory process called "classification-designation," intended to ensure that important mineral deposits are identified and protected for continued and further extraction.

LOCAL

City of Rocklin General Plan

Key policies in the current General Plan that relate to potential geologic hazards include Policy 1, which requires analysis of new development proposals in areas with possible soil instability, flooding, earthquake faults, or other hazards, and prohibits development in high danger areas. Policy 7 prohibits development along stream channels that would adversely reduce the stream capacity, increase erosion, or cause deterioration of the channel. Policy 11 limits development in areas with severe slopes (City of Rocklin 1991).

City of Rocklin, Municipal Code

Chapter 15.04 of the City of Rocklin Municipal Code adopts the 2007 California Building Code (CBC) and other related construction standards (e.g., Mechanical Code, Plumbing Code, Electrical Code, and Fire Code) that apply seismic requirements and control grading activities. The purpose of this code is to provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and structures within the jurisdiction and certain equipment specifically regulated therein. Standards also address foundation design and shear wall strength.

The CBC requires that structures be designed and constructed to withstand ground shaking related forces in areas prone to, or associated with, high ground shaking probabilities. Ground shaking can result in significant structural damage or structural failure in the absence of appropriate seismic design. All development projects associated with the General Plan are subject to CBC standards, which require a seismic evaluation and particular seismic design criteria to reduce ground-shaking effects.

Chapter 15.28 of the City of Rocklin Municipal Code, Grading and Erosion and Sedimentation Control, regulates grading on all property within the City of Rocklin to safeguard life, limb, health, property, and public welfare; to avoid pollution of watercourses with nutrients, sediments, or other earthen materials generated or caused by surface runoff on or across the permit area; to comply with the City's National Pollutant Discharge Elimination System permit issued by the California Regional Water Quality Control Board; and to ensure that the intended use of a graded site is consistent with the City of Rocklin General Plan, provisions of the CBC as adopted by the City relating to grading activities, City of Rocklin improvement standards, and any applicable specific plan or other land use entitlements. In addition, this chapter establishes rules and regulations to control grading and erosion control activities, including fills and embankments; establishes the administrative procedure for issuance of permits; and provides for approval of plans and inspection of grading activities and erosion control plans for all graded sites.

City of Rocklin Stormwater Management Program

Recognizing that urban stormwater runoff that drains through public storm drains and into creeks, streams, rivers, and other bodies of water is a significant source of water pollution, Congress amended the federal Clean Water Act to prohibit the discharge of pollutants from storm drains into these waters without a National Pollutant Discharge Elimination System (NPDES) permit. The United States Environmental Protection Agency (EPA) administers and enforces this law and has issued regulations requiring Municipal Separate Storm Sewer Systems (MS4s) to obtain stormwater permits. An "MS4" is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) that is designed or used for collecting or conveying stormwater. Phase I of these regulations covered medium and large MS4s (generally those with a population greater than 100,000). On December 8, 1999, the EPA promulgated the Phase II Regulations covering small MS4s. The City of Rocklin is automatically included as a small MS4, because it is located within an urbanized area.

The State Water Resources Control Board (SWRCB) administers the Phase II Regulations issued by the EPA within California. The federal regulations allow two permitting options for stormwater discharge: individual permits and general permits. The SWRCB has elected to adopt a statewide General Permit for small MS4s. This option allows the small MS4 to sign onto the General Permit in

lieu of developing a fully individualized program and allows the State to efficiently regulate numerous stormwater dischargers under a single permit.

The City of Rocklin has opted to comply with the Phase II Regulations through coverage under the State's General Permit. The General Permit contains four basic requirements: discharge prohibition, effluent limitations, stormwater management program requirements, and reporting requirements.

The General Permit effectively prohibits the discharge of materials other than stormwater that are not "authorized non-stormwater discharges" or authorized by a separate NPDES permit. The General Permit also incorporates discharge prohibitions contained in Statewide Water Quality Control Plans and Regional Water Quality Control Plans (Basin Plans). In addition, the General Permit prohibits discharges that cause or threaten to cause nuisance, discharges that contain a reportable quantity of specified hazardous substances, and any other discharge except as allowed under the NPDES permit.

The General Permit requires permittees to reduce pollutants in stormwater. To satisfy this requirement, the small MS4s must develop and implement a stormwater management program (SWMP) designed to reduce the discharge of pollutants through the storm drain to the maximum extent practicable (MEP) to protect water quality. A MS4 can satisfy this requirement through effective implementation of a SWMP. The MEP standard is a technology-based standard and is acceptable in lieu of numeric effluent limitations. It is also an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about control and urban runoff continues to evolve, so do the concepts which define MEP.

The City has prepared a Storm Water Management Program and updates it as necessary to satisfy the requirements of the General Permit. The Storm Water Management Program describes how pollutants in stormwater will be controlled by means of best management practices (BMPs) that address six minimum control measures specified in the General Permit. These six minimum control measures are as follows:

- Public education and outreach
- Public participation
- Illicit discharge detection and elimination
- Construction site stormwater runoff control
- Post-construction stormwater management
- Pollution prevention/good housekeeping for municipal operations

BMPs are commonsense methods for controlling, preventing, reducing, or removing pollutants in urban runoff. There are basically two types of BMPs. Source control BMPs are intended to prevent or minimize the introduction of pollutants into runoff. Street sweeping and dry cleanup of gas station fueling areas are examples of effective source control BMPs. The second type of BMP, treatment BMPs, is designed to remove the pollutants from stormwater runoff. A silt fence that effectively filters sediment from water is an example of a treatment BMP. The MEP generally emphasizes source control BMPs as the first line of defense against pollution, with treatment BMPs where appropriate serving as additional lines of defense. Also, the focus is on technical feasibility, but cost, effectiveness, and public acceptance are also important considerations in choosing and implementing BMPs. Considered together, the BMPs selected should form a comprehensive framework that reduces stormwater pollution to the maximum extent practicable.

Rocklin's Storm Water Management Program consists of BMPs selected to fit local conditions and water quality problems. It comprises a comprehensive program for managing runoff to protect and improve water quality in compliance with the National Pollutant Discharge Elimination System Phase II.

4.6.3 IMPACTS AND MITIGATION MEASURES

STANDARDS OF SIGNIFICANCE

This analysis evaluates the project's impacts on geology and soils based on the standards identified in the California Environmental Quality Act (CEQA) Guidelines Appendix G. The City has determined that a geology and soils impact is considered significant if implementation of the project would:

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

    i. 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 or other substantial evidence of a known fault. Refer to Division of Mines and Geology Special Publication 42.

    ii. Strong seismic ground shaking.

    iii. Seismic-related ground failure, including liquefaction.

    iv. 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; 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.

4. 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.

5. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

Loss of availability of a known mineral resource is not discussed in the analysis below because the City of Rocklin Planning Area has no mineral resources as classified by the State Geologist. The Planning Area has no known or suspected mineral resources that would be of value to the region and to residents of the state. Therefore, no impact would occur to mineral resources.

METHODOLOGY

The geology and soils analysis is based on a review of published information, surveys, and reports regarding regional geology and soils. Information was obtained from private and governmental

agencies and Internet websites, including the USDA Natural Resources Conservation Service, the California Geological Survey (formerly the California Department of Mines and Geology), and the United States Geological Survey. Local existing condition and regulatory information was gathered through review of the proposed City of Rocklin General Plan Update and the Placer County Multi-Hazard Mitigation Plan (2005). The City of Rocklin Municipal Code was also reviewed for applicable local regulations.

IMPACTS AND MITIGATION MEASURES

Seismic Hazards

Impact 4.6.1 Subsequent land use activities associated with implementation of the proposed project may result in the placement of structures and development in areas of seismic sensitivity, which would expose people or structures to potential substantial adverse effects related to seismic hazards. However, current CBC requirements and the proposed General Plan Update's mitigating policies and their associated action steps ensure the impact will be less than significant. Therefore, this is considered a **less than significant** impact.

Ground shaking can result in significant structural damage or structural failure in the absence of appropriate seismic design. However, as previously discussed, the Planning Area is not located within an Alquist-Priolo earthquake hazard zone. According to the Placer County Multi-Hazard Mitigation Plan, the City of Rocklin is located in an area that has a relatively low risk of seismic activity. The Planning Area, as with virtually all sites within the State of California, is, however, subject to minor ground shaking and potential secondary hazards (i.e., liquefaction and subsidence) as a result of earthquakes.

The potential for soil liquefaction due to earthquakes and ground shaking is considered minimal, because of the site-specific characteristics of the Planning Area and also because development would have to comply with the CBC. As discussed above, liquefaction is the process in which water is combined with unconsolidated soils as a result of seismic activities involving ground motions and pressure. The depth to groundwater in the North American subbasin, which underlies the Planning Area, is approximately 161 feet to 13 feet below ground surface (City of Rocklin 2003, pg. 63). Rocklin is located over a stable granite bedrock formation and much of the area is covered by volcanic mud; there are no major problems with soil liquefaction. In those areas of the Planning Area where clay deposits exist, there is a tendency for the clay to become unstable if saturated with water and subjected to ground shaking. There are some localized stability problems as a result of clay deposits or springs, but they are not recognized as a major danger.

The CBC requires stringent earthquake-resistant design parameters. Thus, while shaking impacts are potentially damaging, they also will tend to be reduced in their structural effects due to CBC criteria that recognize this potential. This includes provisions for buildings to structurally survive an earthquake without collapsing and includes such measures as anchoring to the foundation and structural frame design. The CBC recently adopted a fully integrated code based on the 2006 International Building Code. Implementation of the CBC for all development is intended to minimize damage from ground shaking during seismic events resulting from movement on any of the faults or fault systems discussed within this DEIR (City of Rocklin 2008b).

Based on the mid-range growth scenario projected in the proposed General Plan Update, the city may grow to a buildout population of 76,136 people and 29,283 households by the year

2030. This increase in population and development could expose people, structures, and development to ground shaking as a result of seismic activity.

Proposed General Plan Update Policies That Provide Mitigation

The following proposed General Plan policies would assist in avoiding or minimizing impacts associated with seismic hazards:

Policy S-1 *Require engineering analysis of new development proposals in areas with possible soil instability, flooding, earthquake faults, or other hazards, and to prohibit development that cannot mitigate the applicable hazard.*

Policy S-20 *Provide for seismic safety and structural integrity in residential, commercial, industrial and public facilities through Building Code enforcement.*

Policy S-21 *Require site-specific geotechnical studies of development proposals in areas subject to landslide potential, erosion, and/or slope instability.*

The proposed General Plan Update Policies S-20 and S-21, which require adherence to the CBC as well as a geotechnical investigation prior to site development, would reduce the effects of exposing people or structures to potential substantial adverse effects resulting from earthquakes, ground shaking, liquefaction, and other secondary hazards within the City of Rocklin General Plan Planning Area to a minimum. This impact is considered to be **less than significant.**

As part of the proposed project, the City plans to amend the Redevelopment Plan to increase tax increment limitations, increase the limit on the principal amount of bonded indebtedness secured by tax increment revenue, and extend the time limit for the commencement of eminent domain proceedings to acquire non-residential property. These amendments are intended to provide the City's Redevelopment Agency with the financial and administrative resources necessary to continue assisting projects that implement its program of blight elimination within the Redevelopment Project Area. While the extended time and financial limits authorized by the Sixth Amendment may foster and encourage new development that might not occur without the Sixth Amendment, or may occur faster than had the Sixth Amendment not been adopted, all development would be consistent with the City's General Plan and with the development assumptions analyzed throughout this DEIR. Therefore, the proposed Sixth Amendment to the Redevelopment Plan would not expose additional people and structures to seismic hazards beyond what is analyzed for the General Plan Update above. Furthermore, all development under Redevelopment Project Area would also be subject to the CBC and would be required to submit a geotechnical investigation prior to site development. Impacts would be **less than significant**.

In addition to the activities identified above, the project includes a Climate Action Plan (CAP) to address climate change and identify greenhouse gas (GHG) emission reduction measures. The City of Rocklin CAP augments the objectives, goals, policies, and actions of the City of Rocklin General Plan Update related to the reduction of GHG emissions; however, the CAP is intended to be updated on a more frequent basis than the General Plan, ensuring that implementation of City efforts to reduce GHG emissions is in compliance with current regulation. The CAP determines whether implementation of the proposed General Plan Update would be consistent with the state's ability to attain the goals identified in Assembly Bill (AB) 32, identifies GHG emission reduction measures, and provides monitoring of the effectiveness of GHG emission reduction measures. The CAP would not result in impacts associated with seismic hazards

beyond what is analyzed for the General Plan Update above. Impacts would be **less than significant**.

Mitigation Measures

None required.

Potential Increase of Erosion and Loss of Topsoil

Impact 4.6.2 Implementation of the proposed project could result in substantial soil erosion or the loss of topsoil as a result of construction and site preparation activities. However, existing City development standards in the Municipal Code and the proposed General Plan Update's mitigating policies and their associated action steps ensure the impact will be less than significant. Therefore, this is considered to be a **less than significant** impact.

Most soils in the Planning Area have moderate erosion potential. Implementation of the proposed General Plan Update would result in the potential construction of new roadways and of infrastructure (water and sanitary sewer facilities), improvements to existing roadways, and the potential for additional commercial, residential, and industrial development. The grading and site preparation activities associated with such development would remove topsoil, disturbing and potentially exposing the underlying soils to erosion from a variety of sources, including wind and water. In addition, construction activities may involve the use of water, which may further erode the topsoil as the water moves across the ground.

New development would involve paving and other site improvements, substantially increasing the amount of impervious surfaces (incapable of being penetrated by water). These impervious surfaces generate higher levels of runoff (i.e., erosion from site preparation, sediment deposition from stormwater runoff, and automobile fluids). The increased runoff has the potential to adversely affect surface water and groundwater quality in the area. If not properly managed, the runoff could greatly affect the quality of wetlands located in the General Plan Planning Area (i.e., Antelope Creek, Secret Ravine Creek, Sucker Creek, Pleasant Grove Creek, and Clover Valley Creek). The reader is referred to Section 4.9, Hydrology and Water Quality, for a further discussion regarding erosion and water quality.

Construction and the potential resulting erosion may affect water quality. However, any development involving clearing, grading, or excavation that causes soil disturbance of one or more acres, or any project involving less than one acre that is part of a larger development plan and includes clearing, grading, or excavation, is subject to National Pollutant Discharge Elimination System (NPDES) General Construction Storm Water Permit provisions. Any development of this size would be required to prepare and comply with an approved stormwater pollution prevention plan (SWPPP) that identifies best management practices (BMPs) to minimize pollutants from discharging from the construction site to off-site areas to the maximum extent practicable.

The City's Grading and Erosion and Sediment Control Ordinance (Chapter 15.28 of the City Municipal Code) was enacted for the purpose of regulating grading on all property in Rocklin to avoid pollution of watercourses with nutrients, sediments, or other earthen materials generated or caused by erosion. The ordinance was also enacted to ensure compliance with provisions of the CBC as adopted by the City relating to grading activities, City of Rocklin Improvement Standards, any applicable specific plans, or other land use entitlements.

Proposed General Plan Update Policies That Provide Mitigation

The following proposed General Plan policies would assist in avoiding or minimizing impacts associated with soil erosion:

Policy OCR-49 Minimize the degradation of water quality through use of erosion control plans and Best Management Practices.

Policy OCR-50 Maintain a grading ordinance that minimizes erosion and siltation of creeks and other watercourses.

Policy OCR-51 Evaluate development along stream channels to ensure that it does not create any of the following effects in a significant manner: reduced stream capacity, increased erosion or deterioration of the channel.

Through the required NPDES General Construction Storm Water Permit provisions, subsequent development projects are evaluated for potential soil erosion impacts on a project-specific, site-by-site basis. As impacts are dependent on the type of development, intensity of development, and amount of lot coverage of a particular project, impacts due to soil erosion and loss of topsoil can vary. However, compliance with adopted City erosion control standards and NPDES and SWPPP requirements, as well as implementation of the General Plan policies listed above, would ensure that soil erosion and loss of topsoil impacts of the proposed General Plan Update are **less than significant.**

In addition, as discussed in Section 3.0, Project Description, and under Impact 4.6.1 above, the project includes the Sixth Amendment to the Redevelopment Plan and the CAP, both of which would be consistent with the proposed General Plan Update and with the development assumptions analyzed throughout this DEIR. As these project components would not result in land use activities or growth beyond what is identified in the General Plan Update, they would not result in soil erosion and loss of topsoil impacts beyond what is analyzed for the General Plan Update above. Impacts would be **less than significant**.

Mitigation Measures

None required.

Potential Development on Unstable Soils

Impact 4.6.3 Implementation of the proposed project may allow for development 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 landslides, lateral spreading, liquefaction, or collapse. Development may be located on expansive soil, creating substantial risks to life and property. However, current City standards in the Municipal Code and the proposed General Plan Update's mitigating policies and their associated action steps ensure the impact will be less than significant. Therefore, this is considered a **less than significant** impact.

Portions of the Planning Area could contain layers of highly expansive soils, which could pose development constraints. Structures or improvements constructed on expansive soils may suffer damage from the expansion. A soil's potential to shrink and swell depends on the amount and types of clay in the soil. Certain clays expand when wet and disproportionately shrink when dry.

Soils with moderate to high shrink/swell potential tend to expand during wet seasons and shrink during dry seasons. In addition, soils with moderate to high shrink/swell potential generally have low plasticity levels that affect the expansion potential of soils. Highly expansive soils can cause structural damage to foundations and roads and are less suitable for development than non-expansive soils. However, as noted previously, while there are some localized stability problems as a result of clay deposits, they are not recognized as a major danger in the Planning Area. Several of the soil types found within the Planning Area require special review and consideration where construction of foundations, structures, roadways, and underground infrastructure are proposed, due to the stony and unconsolidated nature of the soils.

The City of Rocklin Municipal Code, the CBC, and other related construction standards apply seismic requirements and address certain grading activities. The CBC includes common engineering practices requiring special design and construction methods that reduce or eliminate potential expansive soil-related impacts. In addition, for subdivision projects requiring a final map, the Subdivision Map Act requires a preliminary geotechnical report. Such a report is a tool used by public agencies and developers to identify specific site conditions and to develop design and construction recommendations for infrastructure improvements and commercial and residential development projects. Geotechnical reports generally contain a summary of all subsurface exploration data including a subsurface soil profile, exploration logs, laboratory or on-site test results, and groundwater information. The reports also interpret and analyze the subsurface data, recommend specific engineering design elements, provide a discussion of conditions for the solution of anticipated problems, and recommend geotechnical special provisions. Compliance with CBC regulations ensures the adequate design and construction of building foundations to resist soil movement.

Proposed General Plan Update Policies That Provide Mitigation

The proposed General Plan Update policies listed under Impact 4.6.1 require the analysis and mitigation of soil and geotechnical stability issues through compliance with the City's Building Code as well as implementation of measures from geotechnical analyses.

The proposed General Plan Update Policies S-1, S-20, and S-21 require adherence to the CBC and require a geotechnical investigation prior to site development. This would reduce the effects resulting from developing on unstable geologic units and/or soils within the Planning Area to a minimum. This impact is considered to be **less than significant**.

In addition, as discussed in Section 3.0, Project Description, and under Impact 4.6.1 above, the project includes the Sixth Amendment to the Redevelopment Plan and the CAP, both of which would be consistent with the proposed General Plan Update and with the development assumptions analyzed throughout this DEIR. As these project components would not result in land use activities or growth beyond what is identified in the General Plan Update, they would not result in development on unstable geologic units and/or soils beyond what is analyzed for the General Plan Update above. Impacts would be **less than significant**.

Mitigation Measures

None required.

Potential Wastewater Conflicts

Impact 4.6.4 Subsequent land use activities associated with implementation of the proposed project may allow for development in areas where sewers are not

available for the disposal of wastewater or where soils are incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems. However, compliance with the Placer County Environmental Health Services Department's requirements for the approval and installation of septic systems would ensure that impacts related to soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems within the Planning Area are mitigated to less than significant. Therefore, this is considered a **less than significant** impact.

Although both Placer County (Placer County Environmental Health Services Department) and the South Placer Municipal Utility District (SPMUD) have regulations that can mandate a connection to a public sewer if a property is within a certain distance from a public sewer, there is a very limited possibility that some development under the proposed project may occur in areas where public sewer services are not available. Soil characteristics in areas where development proposes to use septic tank systems are not always conducive to adequately supporting the use of septic tanks and leach fields or alternative wastewater disposal systems. Although not a major issue in Rocklin, failing septic tank systems are potentially hazardous when the situation results in the contamination of domestic water wells.

A septic system site evaluation report and/or a geotechnical report are tools used by public agencies and developers to identify specific site conditions and to develop design and construction recommendations for infrastructure improvements and commercial and residential development projects. Geotechnical reports generally contain a summary of all subsurface exploration data, including a subsurface soil profile, exploration logs, laboratory or on-site test results, and groundwater information. The reports also interpret and analyze the subsurface data, recommend specific engineering design elements, provide a discussion of conditions for the solution of anticipated problems, and recommend special geotechnical provisions. Septic system site evaluation reports help to ensure that permits are not issued for any building or structure for which an individual sewage disposal system is required until a Placer County Environmental Health Official is satisfied that an adequate sewage disposal system exists or a septic permit is issued.

All newly installed septic systems are required to adhere to the latest version of the California Plumbing Code. These regulations are dictated by the geology of the area where the system is installed. The type of system parcels require depends primarily on where the parcel is located. The most frequently installed system is the standard pit system. This type of system is used in areas where it has been determined that the system would be less likely to degrade the water table and the soil conditions are such that effluent will be more readily absorbed into the pit area. If the parcel to be developed is in an area where the water table is high or soil conditions are poor, a leach field or deep trench may be required (Septic-System.com 2009).

In cases where it is not possible to install a standard pit system or a leach field system, an alternative system is required. The Placer County Environmental Health Services Department would have to approve any future proposed septic system (Placer County Environmental Health Services 2009).

Compliance with the Placer County Environmental Health Services Department's requirements for the approval and installation of septic systems would ensure that impacts related to soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems within the Planning Area are mitigated to **less than significant**.

In addition, as discussed in Section 3.0, Project Description, and under Impact 4.6.1 above, the project includes the Sixth Amendment to the Redevelopment Plan and the CAP, both of which would be consistent with the proposed General Plan Update and with the development assumptions analyzed throughout this DEIR. As these project components would not result in land use activities or growth beyond what is identified in the General Plan Update, they would not result in impacts related to soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems beyond what is analyzed for the General Plan Update above. Impacts would be **less than significant**.

Mitigation Measures

None required.

4.6.4 CUMULATIVE SETTING, IMPACTS, AND MITIGATION MEASURES

CUMULATIVE SETTING

Site-specific topography, soil conditions, and surrounding development determine geological and soil-related impacts, which generally are not considered cumulative in nature. However, surficial deposits, namely erosion and sediment deposition, can be cumulative in nature, depending on the type and amount of development proposed in a given geographical area.

The cumulative setting for soil erosion consists of existing, planned, proposed, and reasonably foreseeable land use conditions in the region (see **Table 4.0-1** and associated assumptions in Section 4.0 for a description of the cumulative setting). However, construction constraints are primarily based on specific sites within a proposed development and on the soil characteristics and topography of each site. As discussed throughout this section, all new development within the proposed Planning Area boundaries must comply with the California Building Code. Depending on a project's location, an individual development project may be required to submit a geotechnical report that contains construction and design guidelines and site-specific recommendations to reduce potential geologic and soil-related hazards.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Cumulative Seismic Hazards

Impact 4.6.5 Subsequent land use activities associated with implementation of the proposed project, in combination with existing, approved, proposed, and reasonably foreseeable development in the City of Rocklin and adjacent areas, may result in the exposure of people or structures to potential substantial adverse effects related to cumulative seismic hazards. However, current CBC requirements and the proposed General Plan Update's mitigating policies and their associated action steps ensure the impact will be less than significant. Therefore, this is considered a **less than cumulatively considerable** impact.

As described under Impact 4.6.1, under the proposed General Plan Update and its associated project components, the city may grow to a buildout population of 76,136 people and 29,283 households by the year 2030, which is an increase over existing conditions. This would add to other potential development activities throughout the adjacent areas of the region, depending on the timing and rate of development. Conversion of acreage from vacant to developed uses

could result in development that may occur in areas with seismic sensitivity subject to geologic hazards, including liquefaction. The Planning Area, as with virtually all sites within the State of California, is subject to minor ground shaking and potential secondary hazards (i.e., liquefaction and subsidence) as a result of earthquakes. Ground shaking can result in partial collapse of buildings and extensive damage in poorly built or substandard structures. The potential for soil liquefaction due to earthquakes and ground shaking is also considered a possibility. As discussed above, the potential for liquefaction does exist in the Planning Area, primarily in association with earthquake activity. However, the potential for liquefaction is considered minimal because of the site-specific characteristics of the Planning Area described under Impacts 4.6.1 and 4.6.3. Development would also have to comply with the California Building Code (CBC). The CBC requires stringent earthquake-resistant design parameters. This includes provisions for buildings to structurally survive an earthquake without collapsing and includes such measures as anchoring to the foundation and structural frame design as well as common engineering practices requiring special design and construction methods that reduce or eliminate potential seismic impacts.

Proposed General Plan Update Policies That Provide Mitigation

The proposed General Plan Update policies listed under Impact 4.6.1 would assist in avoiding or minimizing cumulative seismic hazard impacts.

As previously discussed, neither the Sixth Amendment to the Redevelopment Plan nor the CAP would result in impacts associated with geologic and seismic hazards beyond what is analyzed for the General Plan Update above.

As discussed above, implementation of the proposed General Plan Update policies as well as existing City standards would reduce cumulative impacts associated with geologic and seismic hazards to **less than cumulatively considerable**.

Mitigation Measures

None required.

Cumulative Increase of Erosion and Loss of Topsoil

Impact 4.6.6 Implementation of the proposed project may result in substantial construction and site preparation activities, which could result in substantial soil erosion or the loss of topsoil. However, existing development standards in the Municipal Code and the proposed General Plan Update's mitigating policies and their associated action steps ensure the impact will be less than significant. Therefore, this is considered to be a **less than cumulatively considerable** impact.

Implementation of the proposed project and its associated project components would result in the potential construction of new roadways and infrastructure (water and sanitary sewer facilities), improvements to existing roadways, and the potential for additional commercial, residential, and industrial development. The grading and site preparation activities associated with such development would remove topsoil, disturbing and potentially exposing the underlying soils to erosion from a variety of sources, including wind and water. In addition, construction activities may involve the use of water, which may further erode the topsoil as the water moves across the ground.

New development would involve paving and other site improvements, substantially increasing the amount of impervious surfaces (incapable of being penetrated by water). These impervious surfaces generate higher levels of runoff (i.e., erosion from site preparation, sediment deposition from stormwater runoff, and automobile fluids). The increased runoff has the potential to adversely affect surface water and groundwater quality. If not properly managed, the runoff could greatly affect the quality of wetlands located throughout the General Plan Planning Area. The reader is referred to Section 4.9, Hydrology and Water Quality, for a further discussion regarding erosion and water quality.

Evaluation of erosion impacts and loss of topsoil consider "downstream" impacts due to the general nature of erosion. Therefore, in the context of cumulative impacts, the City would need to consider if there is a larger area that would be subject to impacts caused by cumulative conditions and/or by the incremental effects of the project. Because construction and the resulting potential erosion may affect water quality, any development involving clearing, grading, or excavation that causes soil disturbance on one or more acres, or any project involving less than one acre that is part of a larger development plan and includes clearing, grading, or excavation, is subject to National Pollutant Discharge Elimination System General Construction Storm Water Permit provisions. Any development of this size would be required to prepare and comply with an approved stormwater pollution prevention plan. Furthermore, the City's Grading and Erosion and Sediment Control Ordinance (Chapter 15.28 of the City Municipal Code) was enacted for the purpose of regulating grading on all property within the City of Rocklin to avoid pollution of watercourses with nutrients, sediments, or other earthen materials generated or caused by erosion and to ensure provisions of the California Building Code as adopted by the City relating to grading activities, City of Rocklin Improvement Standards, any applicable specific plans, or other land use entitlements. As a consequence of the off-site impacts and concerns that are addressed through these entitlement review and regulatory approval processes, the proposed General Plan Update is not anticipated to result in any cumulative impacts that are not already considered under Impact 4.6.2.

Proposed General Plan Update Policies That Provide Mitigation

The proposed General Plan Update policies listed under Impact 4.6.2 would assist in avoiding or minimizing cumulative impacts associated with erosion and loss of topsoil.

As previously discussed, neither the Sixth Amendment to the Redevelopment Plan nor the CAP would result in impacts associated with increase of erosion and loss of topsoil beyond what is analyzed for the General Plan Update above.

Through the required National Pollutant Discharge Elimination System General Construction Storm Water Permit provisions and City standards, projects are evaluated for potential soil erosion impacts on a site-by-site basis. Because impacts are dependent on the type of development, intensity of development, and amount of lot coverage of a particular project, impacts due to soil erosion can vary. However, compliance with adopted erosion control standards and NPDES and SWPPP requirements, as well as implementation of the General Plan Update policies, would ensure that substantial soil erosion and loss of topsoil impacts related to implementation of the proposed project would be less than significant and that, consequently, cumulative impacts would be **less than cumulatively considerable**.

Mitigation Measures

None required.

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