4.11 Geology and Soils

This section of the Draft Environmental Impact Report ("Draft EIR"; "DEIR") describes the geology of the Planning Area, and analyzes issues such as potential exposure of people and future improvements to geologic hazards, alterations to terrain, and erosion. It also discusses the types of soils that have been identified in the Planning Area and their properties as they relate to the proposed project. In addition, potential geologic and seismic hazards, such as earthquakes, slope instability, naturally-occurring asbestos, and landslides, are discussed.

4.11.1 EXISTING SETTING

GEOLOGY AND TOPOGRAPHY

Sierra Nevada Geomorphic Province

California contains 11 geomorphic provinces, which are naturally defined geologic regions displaying a distinct landscape or landform. Amador County (County) is located in the Sierra Nevada geomorphic province, between the Sierra Nevada foothills (Sierra) and the Sacramento Valley (California Geological Survey, 2002b). The Sierra is a tilted fault block nearly 400 miles long. Its east face is a high, rugged multiple scarp, contrasting with the gentle western slope (about 2°) that disappears under sediments of the Central Valley. Deep river canyons are cut into the western slope. The high crest culminates in Mt. Whitney with an elevation of 14,495 feet above sea level near the eastern scarp.

The main mass of the Sierra Nevada is a huge batholith of granodiorite and related rocks that is intrusive into metamorphosed rocks of Paleozoic and Mesozoic age. The metamorphic rocks occur largely along the western foothills and in the northern end of the range. They are complexly folded and faulted and consist of a number of major rock units. The principal units are the slates, phyllites, schists, quartzites, hornfels, and limestones of the Calaveras Formation (Carboniferous to Permian); the Amador Group (Middle and Upper Jurassic) of metasedimentary and metavolcanic rocks; the Mariposa Formation (Upper Jurassic), much of which is slate; schists, phyllites, and quartzites of the Kernville Series (Jurassic or older) in the southern Sierra Nevada; and a vast amount of undifferentiated pre-Cretaceous greenstones and amphibolites. In addition, there are numerous intrusions of basic and ultra-basic rocks, many of which are serpentinized. The serpentine bodies have been structurally important in the localization of some goldbearing deposits and often are parallel to, or occur within, the belts of gold mineralization. There are also numerous dioritic and aplitic dikes that are closely associated with gold-bearing veins (Clark, 1970).

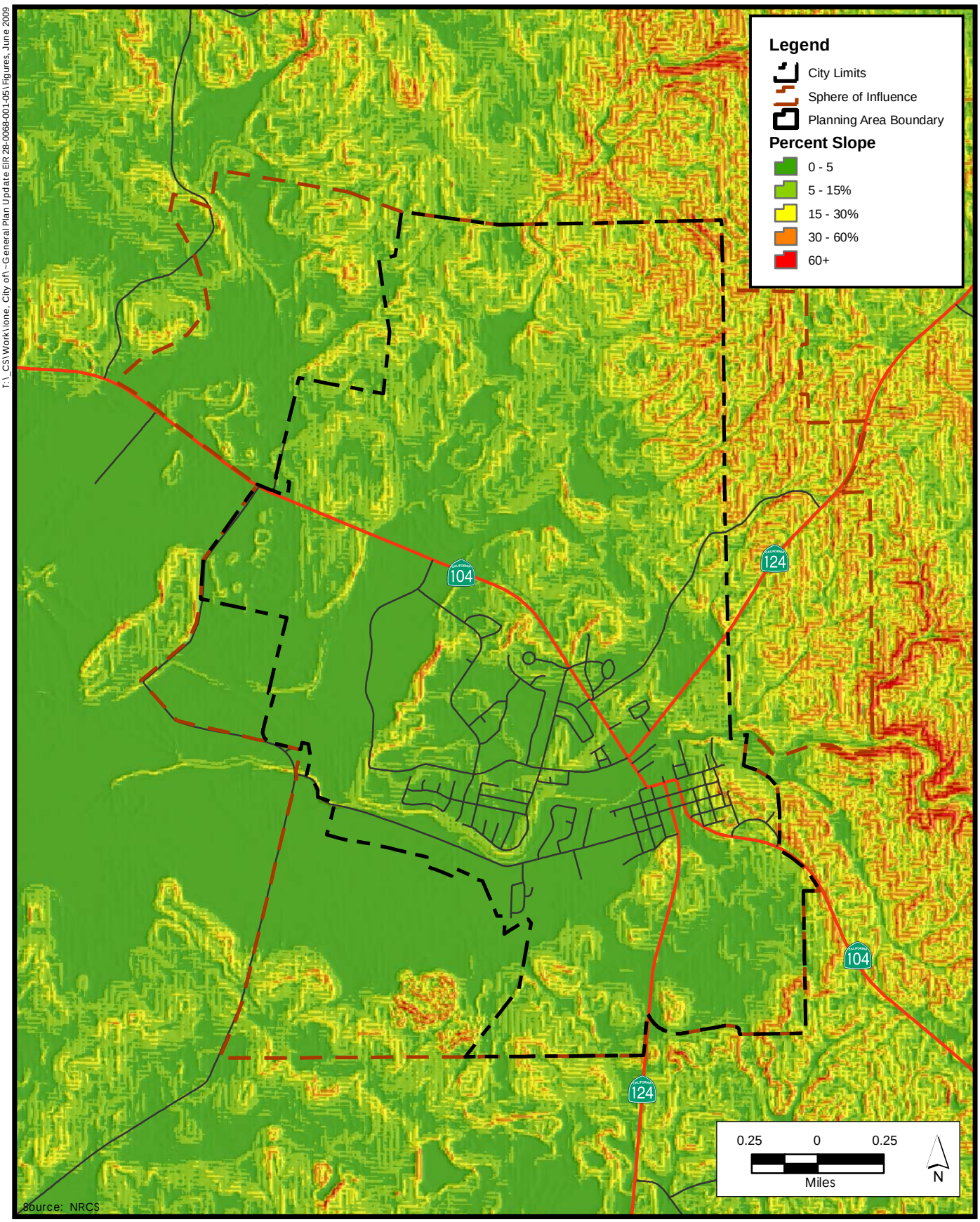
The Sierra Nevada province has been the source of the majority of the state's gold production and contains the richest and the greatest number of districts. Much of the gold mineralization is in the belt of metamorphic rocks that extends along the western foothills and in the northern end of the range, although some important districts are in granitic rocks. Some are associated with small intrusions or stocks related to the Sierra Nevada batholith (Clark, 1970). In the central portion of the Sierra Nevada province, the most productive and best-known districts are in the Mother Lode gold belt.

Mother Lode

Although the entire foothill region of the Sierra Nevada is sometimes loosely termed the "Mother Lode Country," technically the Mother Lode is a 120-mile-long system of linked gold-quartz veins and mineralized schist and greenstone that extends from the town of Mariposa north and northwest to northern El Dorado County. The most productive portion of the Mother Lode has been the Jackson-Plymouth district in Amador County. Three geologic formations cover the

Planning Area. They include Alluvium, the Ione Formation, and the Amador Group (City of Ione, 1982). The Ione Formation extends from the Feather River in the north to the San Joaquin River in the south and consists of quartz sand, sandstone, and clay, lignite beds. The Amador Group consists of meta-andesite (greenstone), schists, sandstone, and conglomerate.

The majority of the Planning Area is relatively flat; however there are some areas with slopes greater than 15 percent and some areas with slopes greater than 30 percent, primarily in the northeast portion of the Planning Area (see **Figure 4.11-1**).



City of Ione
Planning Department

Figure 4.11-1
Slope in the Planning Area

Soils

The U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS) characterizes the soils throughout Amador County and within the Planning Area. Soil types within the Planning Area are summarized in **Table 4.11-1** and are depicted on **Figure 4.2-1** in Section 4.2, Agricultural Resources. Soils in the Planning Area include the Auburn-Exchequer association in the eastern foothills and the Pentz-Pardee and Honcut-Snelling-Ryer association in the south and west. The Mokelumne series is also prominent within the Planning Area.

TABLE 4.11-1
PLANNING AREA SOIL TYPES BY ACREAGE

Map Unit	Soil Type	Acres within Planning Area
101sa	Amador-Gillender complex, 2 to 15 percent slopes	112.5
132sa	Creviscreek sandy loam, 0 to 3 percent slopes	24.0
160sa	Hicksville sandy clay loam, 0 to 2 percent slopes, occasionally flooded	10.6
222sj	Reiff fine sandy loam, 0 to 2 percent slopes, occasionally flooded	16.1
AfD	Ahwahnee extremely rocky loam, 9 to 51 percent slopes	9.3
AnD	Argonaut gravelly loam, 3 to 31 percent slopes	16.9
ApD	Auburn silt loam, 0 to 31 percent slopes	65.5
ArC	Auburn silt loam, moderately deep, 3 to 16 percent slopes	10.2
AsB2	Auburn very rocky silt loam, 3 to 9 percent slopes, eroded	213.8
AsD	Auburn very rocky silt loam, 3 to 31 percent slopes	1,033.0
AsE	Auburn very rocky silt loam, 31 to 51 percent slopes	134.4
AtD	Auburn very rocky silt loam, moderately deep, 3 to 31 percent slopes	52.1
AuD	Auburn extremely rocky silt loam, 3 to 31 percent slopes	362.9
AuF	Auburn extremely rocky silt loam, 31 to 71 percent slopes	27.2
AwC	Auburn-Argonaut silt loams, 0 to 16 percent slopes	213.3
AxD	Auburn-Argonaut very rocky silt loams, 3 to 31 percent slopes	1,395.1
CP	Clay pits	33.1
EcD	Exchequer very rocky silt loam, 3 to 31 percent slopes	423.0
EcE	Exchequer very rocky silt loam, 31 to 51 percent slopes	2,360.1
ExD	Exchequer and Auburn very rocky loams, 3 to 31 percent slopes	39.2
Hm	Honcut clay loam, over clay	234.0
Hn	Honcut silt loam	492.2
Ho	Honcut very fine sandy loam	1,427.5
Hs	Honcut very fine sandy loam, moderately well drained	410.4
Hv	Honcut very fine sandy loam, channeled	831.1
IrE	Inks loam and Rock land, 3 to 45 percent slopes	444.4
IsE	Iron Mountain very stony loam, 9 to 51 percent slopes	7.4
LaC	Laniger sandy loam, 2 to 16 percent slopes	253.6
MP	Mine pits	5.9
Mn	Mine tailings and Riverwash	702.3
Mo	Mixed alluvial land	39.5
Mp	Mixed wet alluvial land	2.0

Map Unit	Soil Type	Acres within Planning Area
MrB	Mokelumne sandy loam, 2 to 5 percent slopes	330.0
MsD	Mokelumne coarse sandy loam, 5 to 36 percent slopes	8.6
Mt	Mokelumne soils and alluvial land	839.1
PaD	Pardee cobbly loam, 3 to 31 percent slopes	1,090.0
PnC	Pentz sandy loam, 2 to 16 percent slopes	1,878.0
PnD	Pentz sandy loam, 16 to 31 percent slopes	284.8
PoE	Pentz sandy loam, very shallow, 2 to 51 percent slopes	1,250.1
PpC	Pentz gravelly sandy loam, 2 to 16 percent slopes	259.0
PrA	Perkins loam, 0 to 3 percent slopes	196.5
PrC	Perkins loam, 3 to 16 percent slopes	213.1
Pw	Placer diggings and Riverwash	649.4
QU	Quarries	5.7
RbB	Red Bluff-Mokelumne complex, 0 to 5 percent slopes	2,019.5
RbD	Red Bluff-Mokelumne complex, 5 to 16 percent slopes	4,304.9
RbE2	Red Bluff-Mokelumne complex, 16 to 36 percent slopes, eroded	545.7
RmD	Red Bluff-Mokelumne-Mine pits complex, 2 to 16 percent slopes	396.6
Ro	Rock land	219.6
RyA	Ryer silty clay loam, 0 to 3 percent slopes	207.1
Sa	Sedimentary rock land	4,203.1
SwD	Snelling sandy loam, 9 to 16 percent slopes	112.1
SyD	Supan very cobbly loam, moderately deep, 3 to 31 percent slopes	25.2
SyE	Supan very cobbly loam, moderately deep, 31 to 51 percent slopes	50.4
-	Surface Water	281.7
	Unknown Soils*	996.85
	Total Acres	**31,769.65**

*Notes: * Data is not available for 996.85 acres in the western portion of the Planning Area.*
Source: NRCS, 2009a.

The Auburn series consists of shallow to moderately deep, well drained soils formed in material weathered from amphibolite schist. Auburn soils are located on foothills and have slopes of 2 to 75 percent. Auburn soils are characterized as well drained with low to very high runoff and moderate permeability. These soils are generally best suited for use as annual rangeland with small areas suitable for irrigated pasture (NRCS, 2009b).

The Exchequer series consists of shallow, somewhat excessively drained soils that formed in material weathered from hard andesitic breccia, schist, and metamorphosed volcanic rocks. These soils are on undulating to steep uplands and are characterized as somewhat excessively draining with medium to rapid runoff and moderate permeability. These soils are generally used for rangeland (NRCS, 2009b).

The Pentz series consists of shallow, well drained soils that formed in material weathered from weakly consolidated basic andesitic tuffaceous sediments. Pentz soils are on hills with mound, intermound microrelief and on backslopes of hills. Slopes are 2 to 50 percent. These soils are characterized as well drained with slow to rapid runoff and moderately rapid permeability. Pentz soils are used mainly for livestock grazing (NRCS, 2009b).

The Pardee series consists of shallow, well drained gravelly or cobbly soils formed in old mixed alluvium. These soils are on hills in widely scattered areas of lower foothills and have slopes of 0 to 30 percent. These soils are characterized as well drained with slow to rapid runoff and moderately slow permeability. Pardee soils are generally suitable for use as rangeland (NRCS, 2009b).

The Honcut series consists of very deep well drained soils that formed in moderately coarse textured alluvium from basic igneous and granitic rocks. These soils are characterized as well drained with slow to medium runoff and moderately rapid permeability. Honcut soils are highly productive under irrigation and some areas are dry farmed (NRCS, 2009b).

The Mokelumne series consists of moderately deep, well or moderately well drained soils formed in hillslope alluvium underlain by material weathered from sandstone and weakly consolidated clayey marine sediments. Mokelumne soils are located on dissected terraces, hills, sideslopes of terrace remnants, and in swales. Slopes are 2 to 35 percent. These soils are characterized as well drained or moderately well drained in swales with medium to rapid runoff and very slow permeability. Mokelumne soils are generally used for annual rangeland and grazed woodland, with a few areas used for mining clay (NRCS, 2009b).

Potential Soils Hazards

Soil hazards that have the potential to affect the Planning Area are as follows: 1) landslides and slope instability, 2)erosion/accelerated erosion, 3) settlement, 4) expansive soils, and 5) naturally-occurring fibrous (asbestiform) minerals. These hazards are further discussed below.

Landslides and Slope Instability

Landslides may be triggered by both natural and human-induced changes in the environment resulting in slope instability. The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over-steepened slope is the primary reason for a landslide, there are other contributing factors:

- Erosion by rivers, glaciers, or ocean waves create oversteepened slopes;
- Rock and soil slopes are weakened through saturation by snowmelt or heavy rains;
- Earthquakes create stresses that make weak slopes fail;
- Earthquakes of magnitude 4.0 and greater have been known to trigger landslides;
- Volcanic eruptions produce loose ash deposits, heavy rain, and debris flows; and
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore, from waste piles, or from man-made structures may stress weak slopes to failure and other structures.

Slope material that becomes saturated with water may develop a debris flow or mud flow. The resulting slurry of rock and mud may pick up trees, houses, and cars, thus blocking bridges and tributaries and causing flooding along its path (USGS, 2009).

Landslides may also occur in areas of generally low relief and occur as cut-and-fill failures; river bluff failures, lateral spreading landslides; collapse of wine-waste piles; failures associated with quarries and open-pit mines (AMEC, 2006).

Human activities such as mining, construction, and changes to surface drainage areas also affect landslide potential in an area. Landslides often accompany other natural hazard events, such as floods, wildfires, or earthquakes. Landslides can occur slowly or very suddenly and can damage and destroy structures, roads, utilities, forested areas and can cause injuries and death (AMEC, 2006).

The majority of the City of Ione is relatively flat, although the city is located within a hilly setting. To the west of the city is the Ione Valley, with elevations ranging from 280 to 240 feet; to the south and east of the city are the hills of the Ione Formation, with elevations ranging from 300 to 350 feet; and to the east are the Sierra Nevada foothills, which range from 400 to 600 feet. Therefore, several areas in the Planning Area have slopes over 15 percent (see **Figure 4.11-1**). The U.S. Geological Survey maps showing landslide incidence and susceptibility indicate that areas in the eastern portion of the Planning Area are in an area of moderate susceptibility for landslides (National Atlas of the United States, 2008).

Erosion/Accelerated Erosion

Erosion is a process whereby soil and highly weathered rock materials are worn away and transported to another area, most commonly by either wind or water. Rates of erosion can vary depending on the competency of the eroding material and the intensity of wind or water flow.

Accelerated erosion is defined by the NRCS as erosion much more rapid than geologic erosion, mainly as a result of human or animal activities, or a catastrophe in nature such as a fire, that expose surface soils (NRCS, Triangle Area Soil Report). Accelerated erosion is often triggered or exacerbated by human activity and can eventually damage building foundations and roadways as well as clog or fill surface drainage facilities (siltation ponds/catchments). Erosion, including accelerated erosion, is most likely to occur on long, moderate, or steeply sloped areas with exposed soil, especially where unnatural slopes are created by cut-and-fill activities. Erosion rates are often higher during earthworks construction.

The NRCS classifies soils based on the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface. Erosion hazard is described as "slight," "moderate," "severe," or "very severe." A rating of slight indicates that erosion is unlikely under ordinary climatic conditions; moderate indicates that some erosion is likely under ordinary climatic conditions and that erosion-control measures may be needed; severe indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and very severe indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical. Many of the soil types found in the Planning Area are moderately to very severely prone to erosion. Specifically, rock land and sedimentary rock land have an erosion hazard rating of very severe and severe, respectively. Several soils in the Exchequer series have erosion hazard ratings of moderate to severe, as do several soils in the Auburn series (NRCS, 2009).

Settlement

Surface settlement can occur due to immediate settlement of coarse-grained soils or consolidation of fine-grained soils under increased loading. Settlement can also result from shrinkage of expansive soil or liquefaction (both discussed below). *Immediate* settlement occurs when a load from a structure or placement of new fill material is applied, causing distortion in the underlying materials. This settlement occurs relatively quickly and is typically substantially complete within several hours or days after placement of the final load. *Consolidation* settlement occurs in saturated or near-saturated fine-grained (clay) soil due to volume change

caused by load-induced squeezing out of water from the pore spaces. Consolidation occurs over a relatively long period of time (often years or even decades) and is followed by secondary compression, which is a continued change in void ratio under the continued application of the load from the pore water to the soil grains. Total settlements can vary over an area, referred to as *differential settlement*, due to variations in loading, soil characteristics, and thickness of compressible layers.

Expansive Soils

Expansive soils are soils that shrink or swell depending on the level of moisture they absorb. These swelling soils typically contain clay minerals, as the amount and kind of clay affect the fertility and physical condition of soil and the ability of the soil to adsorb and retain moisture (NRCS, Triangle Area Soil Report). As they get wet, the clay minerals absorb water molecules and expand; conversely, as they dry they shrink, leaving large voids in the soil. When structures are located on expansive soils, foundations have the tendency to rise during the wet season and shrink during the dry season. This movement can create new stresses on various sections of the foundation and connected utilities and can lead to structural failure and damage to infrastructure.

As discussed in Section 4.10, Hydrology and Water Quality, of this Draft EIR, NRCS groups soils into hydrologic soil groups based on their runoff potential and infiltration rates. The substantial majority of soils in the Planning Area are classified by the NRCS as belonging to Hydrologic Soil Group D, which consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, and soils with a clay pan or clay layer at or near the surface (see **Figure 4.10-3**).

Fibrous (Asbestiform) Minerals

Asbestos is the generic term for the naturally-occurring fibrous (asbestiform) varieties of six silicate minerals. These minerals are chrysotile, tremolite (when fibrous), actinolite (when fibrous), crocidolite (fibrous riebeckite), anthophyllite (when fibrous), and amosite (fibrous cummingonite-grunerite). Chrysotile, which belongs to the serpentine mineral group, and amphibole asbestos (such as tremolite) occur naturally in certain geologic settings in California, most commonly in association with ultramafic rocks and along associated faults (DOC, 2009).

Asbestos is a known carcinogen and exposure to asbestos fibers may result in health issues such as lung cancer, mesothelioma (a rare cancer of the thin membranes lining the lungs, chest, and abdominal cavity), and asbestosis (a non-cancerous lung disease which causes scarring of the lungs) (ARB, 2009). The asbestos contents of many manufactured products have been regulated in the U.S. for a number of years. In 1998 new concerns were raised about possible health hazards from activities that disturb rocks and soil containing asbestos and may result in the generation of asbestos-laden dust. When disturbed, asbestos fibers are released into the air where they can remain suspended for extended periods. If inhaled, these fibers pose a serious health threat as they can become permanently lodged in body tissues. Sources of asbestos emissions include unpaved roads or driveways surfaced with ultramafic rock, construction activities in ultramafic rock deposits, or rock quarrying activities where ultramafic rock is present (ARB, 2009).

As mentioned above, natural asbestos occurs most commonly in association with ultramafic rocks. Therefore, the presence of ultramafic rocks within a region indicates the possibility of naturally-occurring asbestos materials. Both chrysotile and amphibole asbestos are found in serpentine commonly located in the Sierra Nevada foothills and in Amador County. As shown in

Figure 4.11-2, areas containing ultramafic rocks are located to the east of the Planning Area. In addition, the Planning Area contains undivided Mesozoic volcanic and metavolcanic rocks, which may contain some metamorphosed minerals such as serpentinite.

Mineral Resources

Mineral resources have played an important role in the City of Ione's development, and the Planning Area is rich in both metallic and non-metallic mineral resources, including clay, coal, sand, and gravel. As previously mentioned, three geologic formations occur within the Planning Area – Alluvium, the Ione Formation, and the Amador Group (City of Ione, 1982). Of these three formations, the Ione Formation is of importance for non-metallic minerals. The Ione Formation includes an upper and lower layer, with the upper layer being composed of clay, sand, clay-sand, and conglomerate and the lower layer containing sand, clay, and lignite. The Ione Formation (lower to middle Eocene) is a major source of silica sand, refractory clay, specialized lignites, and other materials for the western United States (Force and Creely, 2000). While metallic ores were the primary source of mining activities during the early days of the city, the predominant mining activities of today focus on non-metallics such as clays, sands, and similar materials. Most of the commercial clays desired by mining operations, primarily kaolinite or anauxite, are located in the lower layer of the Ione Formation (City of Ione, 1982). Another commercially important product of the Ione Formation is lignite, which produces montan wax, fertilizer, pigments, and other chemical products. Other non-metallic mineral deposits in the Ione area include gravel and sand used for making glass. Ione minerals are also used extensively to produce stucco.

Several mining operations are located in the Planning Area, including the Unimin Corporation mining operation to the south of the city at 800 Brickyard Road and the Owens-Illinois sand and limestone mining operation south of the city along State Route (SR) 124.

Faulting and Seismicity

Earthquakes are the product of the buildup and sudden release of strain along a fault or zone of weakness in the earth's crust. Stored energy may be released as soon as it is generated, or it may be accumulated and stored for long periods of time. Individual releases may be so small that they are detected only by sensitive instruments, or they may be violent enough to cause destruction over vast areas. Strong ground shaking associated with earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks such as water, power, gas, communication, and transportation lines. Other damage-causing effects of earthquakes include surface rupture, fissuring, settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, seiches, liquefaction, and dam failure (amec, 2006).

Amador County lies between two seismically active regions in the western United States. Tectonic stresses associated with the North American Pacific Plate boundary can generate damaging earthquakes along faults to the west of the county. Eastern Amador County borders the Basin and Range provinces that entail most of Nevada and western Utah. This area is riddled with active faults that are responsible for and form the boundary between each basin or valley and the neighboring mountain range (amec, 2006).

Fault Surface Rupture

Surface rupture occurs when movement on a fault deep within the earth breaks through to the surface. Fault rupture almost always follows preexisting faults, which are zones of weakness. Rupture may occur suddenly during an earthquake or slowly in the form of fault creep. Sudden

displacements are more damaging to structures because they are accompanied by shaking (DOC, 2009).

An "active" fault, as defined by the 1994 Alquist-Priolo Earthquake Fault Zoning Act, is one that shows displacement within the last 11,000 years and therefore is considered more likely to generate a future earthquake and surface rupture than a fault that shows no sign of recent rupture. The Alquist-Priolo Earthquake Fault Zoning Act requires the California State Geologist to establish regulatory zones (known as Earthquake Fault Zones) around the surface traces of active faults and to issue appropriate maps in order to mitigate the hazard of surface faulting to structures for human occupancy. No Alquist-Priolo Earthquake Fault Zones exist within the Planning Area (DOC, 2009).

Amador County is traversed by the Foothills fault system that runs from about Oroville in the north to east of Fresno in the south. The Foothills fault system is a complex series of northwest trending faults that are related to the Sierra Nevada uplift and whose activity is little understood (amec, 2006). The nearest fault to the Planning Area is the Bear Mountain Fault Zone, which is included in the Foothills fault system and is mapped approximately 2 miles to the east of the Planning Area (see **Figure 4.11-3**). The State Geological Survey has not designated the Bear Mountain fault as an active fault (Geotechnical Consultants, Inc., 2003). However, other active faults exist in the region and include the Genoa fault (approximately 51.6 miles away), the Mohawk–Honey Lake Zone (approximately 53.5 miles away), and the Great Valley 7 Fault System (approximately 60.3 miles away) (ENGEO, 2006).

Ground Shaking (Earthquake Magnitude and Intensity)

Earthquakes can cause strong ground shaking that may damage property and infrastructure. The strength of an earthquake is generally expressed in two ways: magnitude and intensity. The magnitude is a measure that depends on the seismic energy radiated by the earthquake as recorded on seismographs. The intensity at a specific location is a measure that depends on the effects of the earthquake on people or buildings and is used to express the severity of ground shaking. Although there is only one magnitude for a specific earthquake, there may be many values of intensity (damage) for that earthquake at different sites.

The most commonly used magnitude scale today is the Moment magnitude (Mw) scale. Moment magnitude is related to the physical size of fault rupture and the movement (displacement) across the fault, and it is therefore a more uniform measure of the strength of an earthquake. The seismic moment of an earthquake is determined by the resistance of rocks to faulting multiplied by the area of the fault that ruptures and by the average displacement that occurs across the fault during the earthquake. The seismic moment determines the energy that can be radiated by an earthquake and hence the seismogram recorded by a modern seismograph (California Geological Survey, 2002a).

The most commonly used scale to measure earthquake intensities (ground shaking and damage) is the Modified Mercalli intensity scale, which measures the intensity of an earthquake's effects in a given locality and is based on observations of earthquake effects at specific places. On the Modified Mercalli intensity scale, values range from I to XII (see **Table 4.11-2**). While an earthquake has only one magnitude, it can have various intensities, which decrease with distance from the epicenter (California Geological Survey, 2002a).

Table 4.11-2 provides descriptions of the effects of ground shaking intensities along with a general range of Moment Magnitudes that are often associated with those intensities. The closest fault to the Planning Area, the Bear Mountain fault, is considered capable of a maximum earthquake of 6.5 Moment Magnitude (ENGEO, 2006).

TABLE 4.11-2
EFFECTS OF RICHTER MAGNITUDE AND MODIFIED MERCALLI INTENSITY

Mw	Modified Mercalli Scale	Effects of Intensity
1.0 – 3.0	I	I. Not felt except by a very few under especially favorable conditions.
3.0 – 3.9	II – III	II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing. III. 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	IV. 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. V. Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
5.0 – 5.9	VI – VII	VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. VII. Everybody runs outdoors. Damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.
6.0 – 6.9	VIII – IX	VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed. IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
7.0 and higher	X or higher	X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks. XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Board fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly. XII. Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.

Source: California Geological Survey, 2002a

Historic Seismic Activity

Although Amador County has felt ground shaking from earthquakes with epicenters located elsewhere, no major earthquakes have been recorded within the county. Notable regional earthquake events include those detailed below. It is unknown whether damages occurred within Amador County and to what extent these events were actually felt by county residents (amec, 2006).

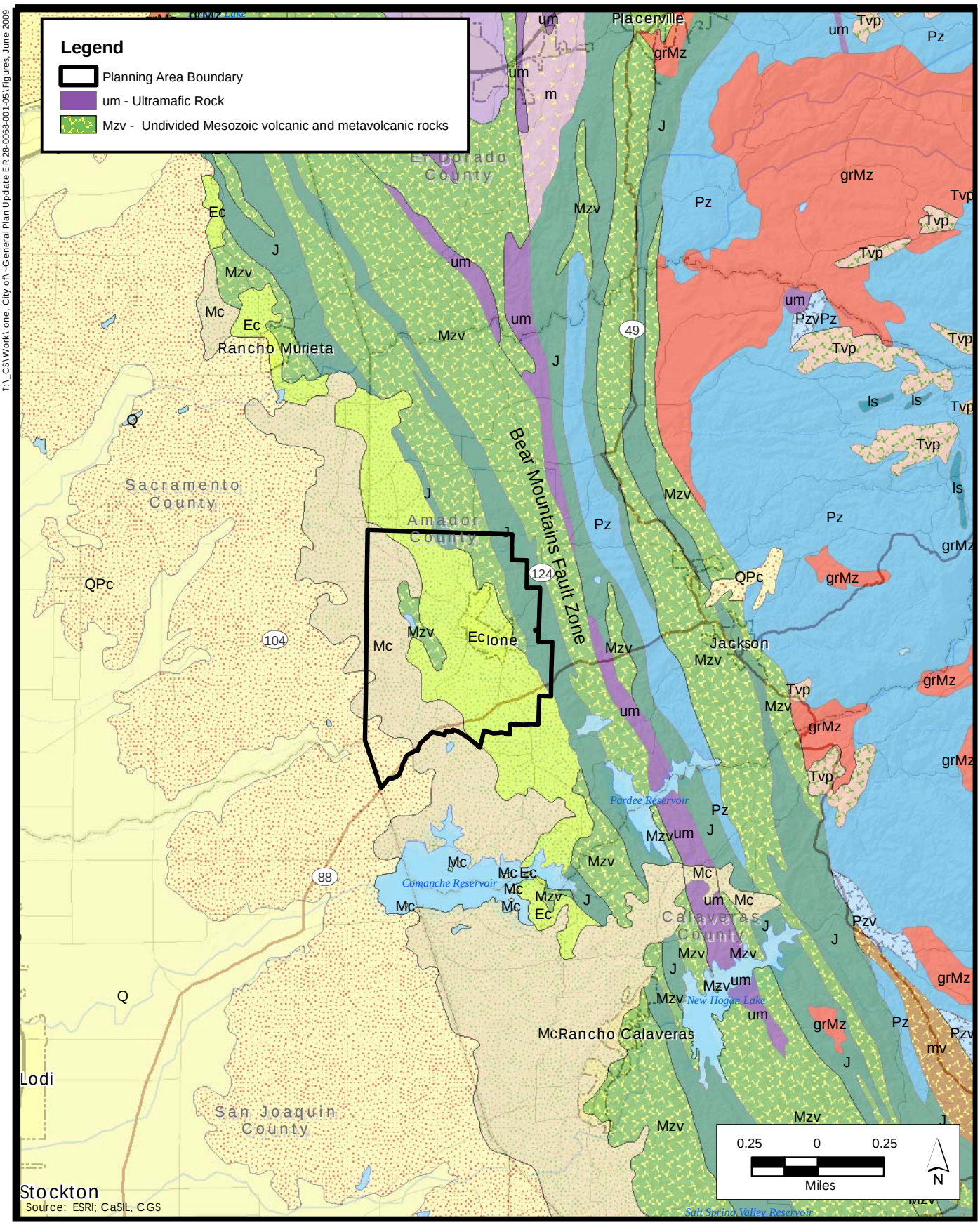


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Figure 4.11-2
Location of Ultramafic Rocks
in the Planning Area

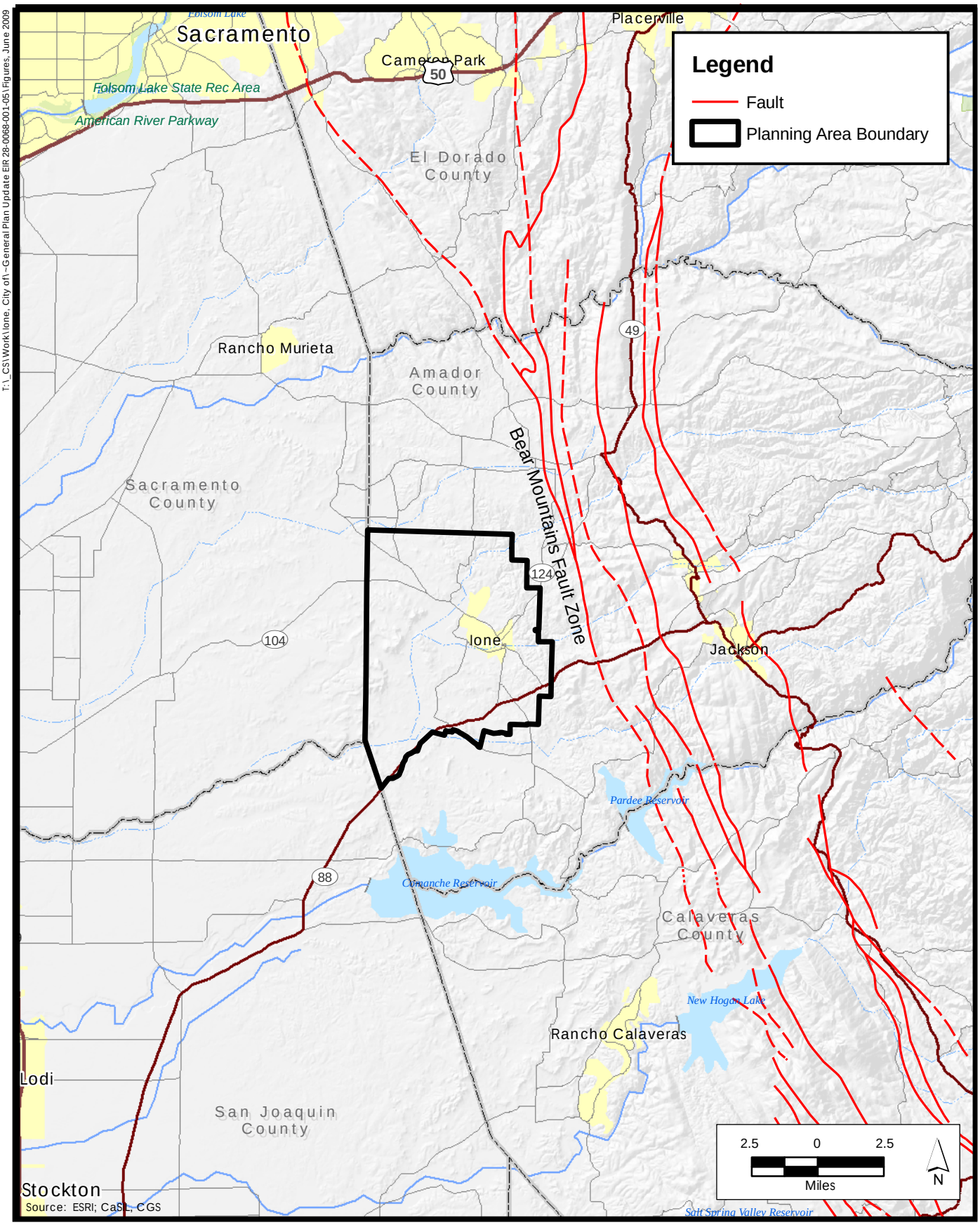

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Figure 4.11-3
Regional Fault Zones

- An earthquake in 1892 on the Midland Fault Zone on the western side of Sacramento Valley, centered between the cities of Vacaville and Winters, caused minor damage in surrounding areas.

- An estimated 4.0+ Richter magnitude earthquake occurred between Auburn and Folsom in nearby Placer County in 1908 with an epicenter possibly associated with the Bear Mountain fault.

- To the east in Nevada, there are several faults associated with a series of earthquakes in 1954, especially the major December 16, 1954, Fairview Peak event (about 100 miles east of Carson City), which had a 7.1 magnitude. These events caused no damage in Reno, but there was some damage in Sacramento, probably because of the soft soil conditions.

- The Cleveland Hills fault, in the western Sierra Nevada foothills, was the source of the 1975 Oroville earthquake (magnitude 5.7), which was felt strongly in neighboring areas.

Probability of Future Seismic Activity

Based on historical data and the location of Amador County relative to potentially active faults, the likelihood of future earthquake occurrences is slight (amec, 2006). Looking at historical data, Amador County is located within a region with faults that are capable of producing maximum credible earthquakes of up to 6.5 magnitude. The California Geological Survey's Seismic Shaking Hazards in California map shows the relative intensity of ground shaking and damage in California from anticipated future earthquakes. The entirety of Amador County, including the Planning Area, is shown as being located in a relatively low intensity ground shaking zone. Specifically, Amador County is located in a region "distant from known, active faults" that "will experience lower levels of shaking less frequently." The map identifies that, in most earthquakes, only weaker, masonry buildings would be damaged within Amador County (California Geological Survey, 2008).

However, western Amador County may experience ground shaking from distant major to great earthquakes on faults to the west and east. The degree of damage resulting from a distant earthquake would depend on many interrelated factors. Among these are the Richter magnitude, intensity, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and finally the design, type, and quality of building construction. To the west, both the San Andreas fault and the closer Hayward fault have the potential for experiencing major to great events (i.e., > 6.7 magnitude). The U.S. Geological Survey estimated in 2004 that there is a 62 percent probability of at least one 6.7 or greater magnitude earthquake occurring that could cause widespread damage in the greater San Francisco Bay Area before 2032 (amec, 2006). Another potential source for earthquakes in Amador County is the faults associated with the western edge of the Central Valley, recently defined as the Coast Range Central Valley (CRCV) boundary thrust fault system. Various documents define portions of this little-known system as the Midland Fault Zone or the Dunnigan Hills fault where the 1892 Vacaville-Winters earthquake occurred. A southern part of the CRCV system may have been the source of the very damaging 1983 Coalinga earthquake.

Other Potential Seismic Hazards

Other potential seismic hazards that could affect the Planning Area include liquefaction and earthquake-induced settlement.

Liquefaction

Liquefaction occurs when loose sand and silt that is saturated with water behaves like a liquid when shaken by an earthquake. Earthquake waves cause water pressures to increase in the sediment and the sand grains to lose contact with each other, leading the sediment to lose strength and behave like a liquid. The soil can loose its ability to support structures, flow down even very gentle slopes, and erupt to the ground surface to form sand boils. Many of these phenomena are accompanied by settlement of the ground surface, usually in uneven patterns that damage buildings, roads, and pipelines (USGS, 2009).

Three factors are required for liquefaction to occur: 1) loose, granular sediment (typically "made" land and beach and stream deposits that are young enough (late Holocene) to be loose); 2) saturation of the sediment by ground water (water fills the spaces between sand and silt grains); and 3) strong shaking. Liquefaction causes three types of ground failure: lateral spreads, flow failures, and loss of bearing strength. In addition, liquefaction enhances ground settlement and sometimes generates sand boils (fountains of water and sediment emanating from the pressurized liquefied zone).

Earthquake-Induced Settlement and Landslides

Past experience has shown that several types of landslides take place in conjunction with earthquakes. The most abundant types of earthquake-induced landslides are rock falls and slides of rock fragments that form on steep slopes. Shallow debris slides forming on steep slopes and soil and rock slumps and block slides forming on moderate to steep slopes also take place, but they are less abundant. Reactivation of dormant slumps or block slides by earthquakes is rare (USGS, 2009).

Large earthquake-induced rock avalanches, soil avalanches, and underwater landslides can be very destructive. Rock avalanches originate on over-steepened slopes in weak rocks. Soil avalanches occur in some weakly cemented fine-grained materials, such as loess, that form steep stable slopes under non-seismic conditions. The size of the area affected by earthquake-induced landslides depends on the magnitude of the earthquake, its focal depth, the topography and geologic conditions near the causative fault, and the amplitude, frequency composition, and duration of ground shaking. In past earthquakes, landslides have been abundant in some areas having intensities of ground shaking as low as VI on the Modified Mercalli Intensity Scale.

4.11.2 REGULATORY FRAMEWORK

STATE

National Pollutant Discharge Elimination System Permit Program

As authorized by the Clean Water Act (CWA), the National Pollutant Discharge Elimination System (NPDES) Permit Program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. It is the responsibility of Regional Water Boards to preserve and enhance the quality of the state's waters through the development of

water quality control plans and the issuance of waste discharge requirements (WDRs). WDRs for discharges to surface waters also serve as NPDES permits (SWRCB, 2008). Under Phase II NPDES permit requirements, dischargers in any location whose projects disturb one or more acres of soil or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres are required to obtain coverage under the statewide General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 99-08-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP should contain a site map(s) which shows the construction site perimeter, existing and proposed buildings, lots, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project. The SWPPP must list best management practices (BMPs) the discharger will use to protect stormwater runoff and the placement of those BMPs. The SWPPP must also include a proposed schedule for the implementation and maintenance of erosion control measures and a description of the erosion control practices, including appropriate design details and a time schedule. Consideration must be given to the full range of erosion control BMPs and the discharger is required to consider any additional site-specific and seasonal conditions when selecting and implementing appropriate BMPs. The SWPPP is also required to include a description of BMPs to reduce wind erosion at all times for the areas of active construction, with particular attention paid to stockpiled materials (SWRCB, 2008).

California Air Resources Board

The California Air Resources Board (ARB) has adopted two Airborne Toxic Control Measures (ATCMs) for naturally-occurring asbestos. The first is the Asbestos ATCM for Surfacing Applications and the second is the Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations. Also, while the U.S. Environmental Protection Agency (USEPA) is responsible for enforcing regulations relating to asbestos renovations and demolitions, authority can be delegated to state and local agencies. ARB and local air districts have received delegated authority to enforce the federal National Emission Standards for Hazardous Air Pollutants (NESHAPS) regulations for asbestos.

Asbestos ATCM for Surfacing Applications

In 1990, ARB adopted the Asbestos Airborne Toxic Control Measure for Asbestos-Containing Serpentine (1990 Asbestos ATCM). ARB staff developed amendments to the 1990 Asbestos ATCM that were adopted by the Board on July 20, 2000, as the Asbestos Airborne Toxic Control Measure for Surfacing Applications, section 93106, title 17, California Code of Regulations (amended Asbestos ATCM or amended ATCM). The amended ATCM became effective on November 13, 2001. The amended Asbestos ATCM was developed to reduce the public's exposure to airborne asbestos emissions from surfacing applications, such as unpaved roads surfaced with aggregate containing naturally-occurring asbestos. The amended Asbestos ATCM prohibits the sale or use of restricted material (includes aggregate material extracted from an ultramafic (or ultrabasic) rock unit as shown on the geologic maps referenced in the amended ATCM, ultramafic rock including serpentine, aggregate material shown to have an asbestos content of 0.25 percent or more, or any mixture containing 10 percent of these materials) for unpaved surfacing unless it has been tested and found to have an asbestos content that is less than 0.25 percent. The test method required to determine the asbestos content is either ARB Test Method 435 or a method approved by the Executive Officer of ARB (ARB, 2002a).

Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations

At its July 2001 hearing, ARB approved an Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations. This ATCM requires road construction and maintenance activities, construction and grading operations, and quarrying and surface mining operations in areas where naturally-occurring asbestos is likely to be found to employ the best available dust mitigation measures. Areas are subject to the regulation if they are identified on maps published by the Department of Conservation as ultramafic rock units or if the Air Pollution Control Officer (APCO) or owner/operator has knowledge of the presence of ultramafic rock, serpentine, or naturally occurring asbestos on the site. The ATCM also applies if ultramafic rock, serpentine, or asbestos is discovered during any operation or activity.

The ATCM requires that road construction and maintenance operations use dust control measures for a specified set of emission sources and prevent visible emissions crossing the project boundaries. The local air pollution control or air quality management district must also be notified before any work begins. For construction and grading projects that will disturb one acre or less, the regulation requires several specific actions to minimize emissions of dust such as vehicle speed limitations, application of water prior to and during the ground disturbance, keeping storage piles wet or covered, and track-out prevention and removal. Construction projects that will disturb more than one acre must prepare and obtain district approval for an asbestos dust mitigation plan. The plan must specify how the operation will minimize emissions and must address specific emission sources. Regardless of the size of the disturbance, activities must not result in emissions that are visible crossing the property line. Quarries and surface mines must also obtain district approval for an asbestos dust mitigation plan, which must address specific emission sources. In addition, they must meet specific opacity standards for certain types of equipment and ensure that there are no visible emissions crossing the property line (ARB, 2002b).

Asbestos NESHAP Program

The ARB Asbestos Program oversees implementation of and compliance with the Federal Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP), and investigates all related complaints, as specified by the California Health and Safety Code (HSC) Section 39658(b)(1). The Asbestos NESHAP regulation, 40 CFR, Subpart M, Section 61.145 requires written notification of demolition or renovation operations. Of the 35 air districts in California, 19 of these districts do not have an asbestos program in place. For these "non-delegated" districts, ARB reviews and investigates the demolition/renovation notifications for compliance with the Asbestos NESHAP. Amador County falls within a non-delegated air district. Therefore, ARB requires that a notification be sent to ARB and USEPA for those renovations and/or demolitions taking place in Amador County (ARB, 2009).

Surface Mining and Reclamation Act of 1975

The Surface Mining and Reclamation Act (SMARA), Chapter 9, Division 2 of the Public Resources Code, requires the State Mining and Geology Board to adopt state policy for the reclamation of mined lands and the conservation of mineral resources. SMARA provides a comprehensive surface mining and reclamation policy (found in California Code of Regulations, Title 14, Division 2, Chapter 8, Subchapter 1) with the regulation of surface mining operations to assure that adverse environmental impacts are minimized and mined lands are reclaimed to a usable condition. SMARA also encourages the production, conservation, and protection of the state's mineral resources. Public Resources Code Section 2207 provides annual reporting requirements

for all mines in the state, under which the State Mining and Geology Board is also granted authority and obligations (DOC, 2009).

Mineral Resource Classification

The California Geological Survey Mineral Resources Project provides objective geologic expertise and information about California's diverse non-fuel mineral resources. The primary focus of the Mineral Resources Project is to classify lands throughout the state that contain regionally significant mineral resources as mandated by SMARA. The process of inventorying the non-fuel mineral resources of the state is called mineral land classification. The non-fuel mineral resources include the metals such as gold, silver, iron and copper; the industrial minerals such as boron compounds, rare-earth elements, clays, limestone, gypsum, salt and dimension stone; and construction aggregate which includes sand and gravel and crushed stone. These materials occur in unique geological settings and therefore must be mined where they are found. The Mineral Land Classification Project provides objective classification maps, technical mineral resource data, and mineral-related economic investigations about economically exploitable non-fuel mineral resources in the state. The intent of classification is to assist lead agencies, planners, and the public in the wise use, management, and conservation of California's mineral resources.

Classification is completed by the State Geologist into Mineral Resource Zones (MRZ). Classification of MRZs is based on geologic and economic factors without regard to existing land use and land ownership. The areas are categorized into four general classifications (MRZ-1 through MRZ-4) and are defined as follows (State Mining and Geology Board, 2009).

MRZ-1: Areas where available geologic information indicates that little likelihood exists for the presence of significant mineral resources.

MRZ-2a: Areas underlain by mineral deposits where geologic data indicate that significant measured or indicated resources are present. MRZ-2 is divided on the basis of both degree of knowledge and economic factors. Areas classified MRZ-2a contain discovered mineral deposits that are either measured or indicated reserves as determined by such evidence as drilling records, sample analysis, surface exposure, and mine information. Land included in the MRZ-2a category is of prime importance because it contains known economic mineral deposits.

MRZ-2b: Areas underlain by mineral deposits where geologic information indicates that significant inferred resources are present. For this report, areas classified MRZ-2b contain discovered mineral deposits that are significant inferred resources as determined by their lateral extension from proven deposits or their similarity to proven deposits. Further exploration work could result in upgrading areas classified MRZ-2b to MRZ-2a.

MRZ-3a: Areas containing known mineral occurrences of undetermined mineral resource significance. Further exploration work within these areas could result in the reclassification of specific localities into MRZ-2a or MRZ-2b categories. MRZ-3 is divided on the basis of knowledge of economic characteristics of the resources.

MRZ-3b: Areas containing inferred mineral occurrences of undetermined mineral resource significance. Land classified MRZ-3b represents areas in geologic settings that appear to be favorable environments for the occurrence of specific mineral deposits. Further exploration work could result in the reclassification of all or part of these areas into the MRZ-2a or MRZ-2b categories.

MRZ-4: Areas of no known mineral occurrences where geologic information does not rule out either the presence or absence of significant mineral resources.

Of the above classifications, the MRZ-2 classification is recognized in land use planning because the likelihood for occurrence of significant mineral deposits is high, and the classification may be a factor in the discovery and development of mineral deposits that would tend to be economically beneficial. The majority of Ione and surrounding area are located in MRZ-2 through -3a (City of Ione, 1982).

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. A direct result of the 1971 San Fernando earthquake and the extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures, the Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Seismic Hazards Mapping Act (discussed below) addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.

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

Seismic Hazards Mapping Act

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

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

California Building Code

The California Building Code (CBC) is another name for the body of regulations found in the California Code of Regulations (CCR), Title 24, Part 2, which is a portion of the California Building Code. The purpose of the CBC 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 building and structures within its jurisdiction. The provisions of the CBC apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout the State of California (CBSC, 2008).

Published by the International Conference of Building Officials, the International Building Code is a widely adopted model building code in the United States. The CBC incorporates by reference the International Building Code (IBC) with necessary California amendments. These amendments include significant building design criteria that have been tailored for California earthquake conditions. Design criteria for seismic loading and other geologic hazards are included in the design standards in the CBC. The CBC provides design criteria for geologically induced loading that govern sizing of structural members and provides calculation methods to assist in the design process.

The City of Ione Building Department enforces provisions of the CBC that address seismic design criteria. Ione is in Zone 3 under the CBC classification, which indicates the possibility of major damage corresponding to earthquakes equivalent or greater than Richter Magnitude 6 and requires special design requirements for building and foundation stress capabilities, masonry and concrete reinforcement, and building spacing.

LOCAL

Amador County General Plan

The County of Amador General Plan was adopted by the County Board of Supervisors in 1973 and is currently undergoing an update. The County General Plan is a policy document designed to give long-range guidance regarding the growth and resources of the unincorporated Amador County jurisdiction. It includes policies and implementation measures that apply to development within the Planning Area that are outside of the city limits, until such time those areas are annexed into the city as part of the ultimate development under Ione's updated General Plan development potential. The Safety and Seismic Safety Elements within the County General Plan include the following policies and implementation measures relevant to geology and soils-related impacts within Amador County:

Safety Policy 1: It is proposed that ordinances, codes, regulations and standards of local jurisdictions be reviewed and amended as may be necessary to effectuate the Safety and Seismic Safety elements proposals, and that new regulations be added as necessary for such purposes. This plan will be supplemented by a set of proposed sample ordinance provisions to assist member jurisdictions in the foregoing.

Safety Policy 3: It is proposed that all local Emergency Operation Plans and programs be reviewed and updated to reflect hazards indicated herein, to include active programs for more effective operations in emergency or disaster situations, and to provide representation of fire, police and other

emergency and protective agencies wherever safety factors are involved in the planning process.

Safety Policy 4: It is proposed that these Safety and Seismic Safety elements, together with all related governmental safety planning programs, be reviewed, revised, and maintained at an active level aimed at effectuation of proposals in a vital ongoing planning operation.

Safety Policy 5: It is proposed that review and updating processes of the Area Council and member jurisdictions include consideration of:

a) New seismic hazards data as may become available through further scheduled studies by the U.S. Geologic Survey and the State Division of Mines and Geology.

b) Detailed soil stability, landslide and mudslide locations, soil depth and permeability, moisture content, water table depth, and other such data from Soil Survey reports of the Soil Conservation Service and other such sources.

c) Progressive improvements in fire protection services, facilities and equipment per Board of Fire Underwriters distribution, increased water pressure, additional equipment and personnel, etc.

d) Relationships, responsibilities, and mutual aid plans of Forest Service, Division of Forestry, Fire Districts and City Fire Departments.

e) Present and planned systems of evacuation routes, fire access trails and fire breaks, and of regulatory measures pertaining to seismic and fire safe construction, location and clearance around structures, etc.

f) Organization and effectiveness of local Emergency Operation Plans.

Amador County Multi-Hazard Mitigation Plan

The Amador County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that includes the County and the communities of Amador City, Ione, Jackson, Plymouth, and Sutter Creek. The purpose of hazard mitigation and this plan is to reduce or eliminate long-term risk to people and property from natural hazards and their effects in Amador County. The plan acknowledges that Amador County is vulnerable to several natural hazards including wildfires, floods, earthquakes, and drought. Each hazard is identified, profiled, and analyzed in the plan. The plan and planning process lay out a strategy intended to enable Amador County to become less vulnerable to future disaster losses. This plan has been formally adopted by each participating entity and is required to be updated a minimum of every five years. The City of Ione utilizes the Amador County Multi-Hazard Mitigation Plan as its local emergency management plan.

City of Ione Grading Permit

When property is developed for the first time or when the site is being cleared for an entirely new building, grading of the site usually needs to take place. The City of Ione requires a grading permit for all grading work, including filling excavations, except as specifically exempted by California Building Code Appendix J. Applications for grading permit are filed and approved by the Public Works Department. The City reviews applications for grading permits based upon the

standards listed in the California Building Code. The City has not adopted any special standards, requirements, or exemptions for grading of property (City of Ione, 2008/2009).

4.11.3 IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE CRITERIA

The impact analysis in this section is based, in part, on the following State CEQA Guidelines Appendix G thresholds of significance.

An impact associated with geology and soils 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 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.

4) Be located on expansive soil, as defined in Table 18-1-B of the International Building Code (1994), creating substantial risks to life or property.

5) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

6) 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.

7) 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.

In addition, the City of Ione has prepared a manual that provides an overview of the planning framework and outlines the major planning processes in Ione. The Framework for Planning, Entitlement Review, and Development (2008-2009) contains the City's adopted thresholds for determining environmental significance. These thresholds of significance are intended to provide clear guidelines and benchmarks to support reasoned decision-making. Thresholds of significance established by the City to use in the consideration of environmental effects include

guidelines for transportation impacts, minimization of flood risks, impacts of intensive land use operations (mining), fire hazards, unstable slopes, noise, and biological resources. Therefore, the impact analysis contained in this section is based on the following City of Ione thresholds of significance, in addition to the above CEQA thresholds.

An impact associated with geology and soils is considered significant if implementation of the project would:

- Overcut or undercut slopes greater than 30 percent.

The Planning Area is known to contain naturally-occurring asbestos (NOA). Therefore, the impact analysis in this section also considers the significance of geologic hazards associated with NOA.

METHODOLOGY

Evaluation of potential geologic and soil impacts of the proposed project was based on review of the Natural Resource Conservation Service Soil Survey website, information from the U.S. Geological Survey, and other government agencies. A detailed list of resources used to evaluate potential geologic and soil impacts is located under the References section at the end of this section.

For the purposes of the impacts analysis, the analysis considered the General Plan Planning Area, including land within the existing city limits, the existing Sphere of Influence (SOI), and the proposed SOI. The proposed General Plan land uses were compared to existing geologic conditions in order to identify impacts to the Planning Area resulting from implementation of the proposed General Plan update.

As discussed under the Existing Setting subsection above, the Planning Area is located in a region that is distant from known active faults and no Alquist-Priolo Earthquake Fault Zones exist within the Planning Area. Therefore, no impacts resulting from surface fault rupture are anticipated and surface fault rupture will not be discussed further in the Draft EIR.

Per the proposed General Plan Policy PF.5-2, "The City requires all improved properties to be served by municipal sewer service. Independent community sewer systems may not be established for new development." Therefore, no septic/alternative systems would occur associated with the proposed project and no impact would occur relative to soils incapable of supporting septic systems. This impact will not be discussed further in this DEIR.

The City of Ione General Plan is intended to be a "self-mitigating" document, in that the General Plan polices are designed to mitigate or avoid impacts on the environment resulting from implementation of the proposed project. To that end, the relevant GPU policies providing mitigation have been identified for each significant impact in this section. If the applicable General Plan polices were determined not to fully mitigate or avoid impacts, then additional mitigation measures have been provided. These additional mitigation measures have been written as policy statements that can be incorporated into the final General Plan. Each impact discussion includes a determination as to whether the impacts would be mitigated to a less than significant level or would remain significant and unavoidable after implementation of the updated General Plan policies.

PROJECT IMPACTS AND MITIGATION MEASURES

Seismic Hazards

Impact 4.11.1 Implementation of the proposed General Plan update and other project components would not result in the exposure of new and/or increased development to seismic hazards, including but not limited to, strong ground shaking and seismically related ground failure. This impact is considered **less than significant.**

The Planning Area is located in a relatively low intensity ground shaking zone that is distant from known active faults; however, the Planning Area could experience ground shaking and the associated impacts of seismically related ground failure resulting from distant major to great earthquakes on the San Andreas fault and the closer Hayward fault to the west, as well as the CRCV boundary thrust fault system.

The following is a discussion of seismic hazards associated with each aspect of the proposed project.

General Plan Land Use Map

Areas Within Existing City Limits

The central portion of lands within the existing city limits of Ione is largely built out with retail and commercial businesses in the downtown core and residential uses surrounding the core. The areas that comprise the north/northwestern and south/southeastern lands within the city limits are still largely undeveloped. The proposed General Plan update allows for the intensification of retail, office, and residential uses in the downtown core area, as well as new residential and commercial development in the undeveloped areas within the existing city limits. Therefore, implementation of the proposed General Plan Land Use Map could increase exposure of people and structures within the city limits to seismic hazards including strong ground shaking and seismically related ground failure such as liquefaction and earthquake-induced landslides. Implementation of proposed General Plan policies would reduce impacts associated with seismic hazards to a **less than significant** level as discussed below.

Areas Outside of Existing City Limits

Lands within the Planning Area that are outside the existing city limits are largely undeveloped, with some agricultural land (primarily grazing lands) and three mining operations. The proposed General Plan update would primarily designate these areas as General Agriculture (AG), Open Space (OS), or Surface Mining (SM). Therefore, areas outside of the existing city limits would, to a significant extent, maintain current land uses. However, to the west of the of the city limits at the northern boundary, the proposed General Plan designates land for new residential development and a small portion of heavy industrial uses to the northwest. In addition, the Triangle Policy Area in the southeast designates land for industrial, office, and commercial uses in addition to the existing mining operations. 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 and there are no known active faults occurring within the Planning Area. The Planning Area, as with virtually all sites within the State of California, is, however, subject to minor ground shaking and potential secondary hazards as a result of earthquakes. Minor ground shaking can result in partial collapse of buildings and extensive damage in poorly built or sub-standard

structures. However, the combination of the Planning Area characteristics and compliance with the UBC and CBC would be sufficient to prevent significant damage from ground shaking during seismic events resulting from movement on any of the faults or fault systems described within this DEIR. Therefore, implementation of the proposed General Plan Land Use Map outside the existing city limits would not, following annexation to the city, result in increased exposure of people and structures to seismic hazards including strong ground shaking and seismically related ground failure such as liquefaction and earthquake-induced landslides. This is a **less than significant** impact.

Sphere of Influence Amendment/Annexations

As part of the proposed project, the City plans to amend its Sphere of Influence (SOI) to include the site of the Castle Oaks Water Reclamation Plant (COWRP), the City Corporation Yard and adjacent land and to expand the Old Stockton Road and Industrial Park Special Planning Areas. In addition, the City is proposing to annex three areas currently located outside the city limits. These areas are identified on Figure 3.0-6 in Section 3.0 and are referred to as (1) the Collins Road Annexation Area consisting of about 1 acre; (2) the Wastewater Treatment Plant Annexation Area consisting of about 9.7 acres; and (3) the State Property Annexation Area consisting of about 3.7 acres.

The proposed SOI amendment and annexations are policy actions that would not directly increase exposure to seismic hazards, these actions would allow the future development of additional and/or expanded facilities associated with the City's WWTP and the Collins Road and State Property annexations. The northwest parcel (Collins Road Annexation Area) will be prezoned C-3 Heavy Commercial, while the 3.7-acre parcel to the northeast (State Property Annexation Area), and the 9.7 acre Wastewater Treatment Plant Annexation Area will be prezoned PF Public Facilities.

As discussed previously, the combination of the Planning Area characteristics and compliance with the UBC and CBC would be sufficient to prevent significant damage from ground shaking during seismic events resulting from movement on any of the faults or fault systems described within this DEIR. Therefore, the proposed SOI amendment, annexations, and future expansion of the WWTP could increase exposure to seismic hazards. This is a **less than significant** impact.

Zoning Code Update

The proposed project also includes several updates to the City's Zoning Code. These updates involve the addition of new zoning districts, as well as amendments to development standards for several existing zoning districts as discussed in Section 3.0, Project Description, of this Draft EIR. The proposed Zoning Code updates are largely administrative and are intended to clarify the types of uses that are permitted under a particular General Plan land use designation. Therefore, the proposed Zoning Code updates would have **no impact** associated with seismic hazards beyond those addressed for the General Plan.

West Ione Roadway Improvement Strategy

The proposed project includes the West Ione Roadway Improvement Strategy (WIRIS), which consists of both improvements to existing roadways and the construction of new roadway segments in order to create a bypass to provide traffic relief through downtown. Therefore, implementation of the proposed WIRIS would result in new infrastructure prone to seismic hazards. Implementation of proposed General Plan policies would reduce impacts associated with seismic hazards to a **less than significant** level as discussed below.

Proposed General Plan Policies and Action Items that Provide Mitigation

The Noise and Safety Element of the proposed General Plan update contains the following policies and actions that are specific, enforceable requirements and/or restrictions and corresponding performance standards that assist in mitigating potential seismic hazards impacts.

Noise and Safety Element

Policy NS-2.3: Prepare for emergencies and disasters prior to their occurrence.

Action NS-2.3.1: Create, adopt and update as needed a local Emergency Management Plan identifying leadership, representatives, coordination and action for responding to emergencies in a timely and efficient manner.

Action NS-2.3.2: Participate in the Standardized Emergency Management System (SEMS) and the National Incident Management System (NIMS) and comply with the State of California Emergency Services Act.

Action NS-2.3.3: Consult with the County and other cities on the update, adoption, and implementation of the regional Amador County Multi-Hazard Mitigation Plan.

Action NS-2.3.4: Develop and adopt a pre-disaster ordinance for post-disaster recovery and reconstruction that includes provisions for debris clearance, damage assessment, demolitions, re-occupancy and building moratorium criteria, fee waivers and deferrals and expedited permitting procedures for repair and reconstruction.

Policy NS-2.4: Ensure plans are kept current to maintain the City as a safe community in the region.

Action NS-2.4.1: Develop and update risk assessments and emergency management provisions to maintain or improve the safety rating of the community.

Policy NS-4.1: Support efforts by federal, state, and local jurisdictions to investigate local seismic and geologic hazards and support those programs that effectively mitigate seismic and safety hazards.

Action NS-4.1.1: Continue to implement the California Building Code to ensure that structures meet all applicable seismic standards.

Policy NS-4.2: Ensure that new structures are protected from damage caused by geologic and/or soil conditions to the greatest extent feasible.

Action NS-4.2.1: Continue to require that all new construction projects complete a geotechnical report or conduct other appropriate analysis to determine the soils characteristics and associated development constraints and impose appropriate measures for geologically sensitive areas.

Implementation of the above General Plan policies would reduce impacts associated with seismic hazards. Specifically, Policy NS-4.2 would ensure that for new development projects, consistent with the updated General Plan, site-specific geotechnical evaluations would be conducted that would identify geotechnical hazards and measures to reduce potentially

significant effects associated with those hazards. In addition, Policy NS-4.1 supports programs that effectively mitigate seismic and safety hazards and requires that new development comply with seismic standards in the California Building Code. Therefore, seismic hazard impacts associated with implementation of the General Plan Land Use Map, SOI amendment/annexations, and WIRIS would be reduced to a **less than significant** level.

Mitigation Measures

None required.

Soil Erosion or Loss of Topsoil

Impact 4.11.2 Implementation of the proposed General Plan update could result in new and/or increased development that would result in soil erosion, wind and water erosion, and loss of topsoil. This is a **less than significant** impact.

As discussed under the Existing Setting subsection, many of the soil types found in the Planning Area are moderately to very severely prone to erosion. In addition, accelerated erosion is often triggered or exacerbated by human activity, such as construction activities, and is most likely to occur on long, moderate, or steeply sloped areas with exposed soil. Many areas in the Planning Area contain slopes greater than 15 percent, and some areas have slopes over 30 percent. Therefore, construction activities associated with any new development resulting from proposed project, especially construction in areas with steep slopes, could result in increased erosion and loss of topsoil in the Planning Area.

The following is a discussion of the potential erosion impacts associated with each aspect of the proposed project.

General Plan Land Use Map

As discussed under **Impact 4.11.1**, the proposed General Plan update allows for the expansion of urbanization in the currently undeveloped areas within the existing city limits and identifies land uses within the Planning Area that are outside the existing city limits, primarily in the form of new residential, industrial, and public facility land use designations to the north/northwest and new industrial, office, and commercial designations in the Triangle Policy Area. Grading and other site preparation activities for future development in these areas would remove topsoil, thus disturbing the underlying soils and exposing them to potential erosion from a variety of sources, including wind and water. In addition, construction activities generally involve the use of water, which could further erode the topsoil as the water moves across the ground. Much of the western portion of the Planning Area is covered by steep slopes (greater than 30 percent). These areas are more susceptible to accelerated erosion, particularly from construction activities in the Triangle Policy Area and in areas north of the city that are designated for public facilities. Therefore, implementation of the proposed General Plan Land Use Map could result in increased loss of topsoil and erosion in the city limits. Implementation of proposed General Plan policies would reduce impacts associated with loss of topsoil and erosion to a **less than significant** level as discussed below.

Sphere of Influence Amendment/Annexations

As part of the proposed project, the City plans to amend its Sphere of Influence (SOI) to include the site of the Castle Oaks Water Reclamation Plant (COWRP), the City Corporation Yard and adjacent land and to expand the Old Stockton Road and Industrial Park Special Planning Areas.

In addition, the City is proposing to annex three areas currently located outside the city limits. These areas are identified on Figure 3.0-6 in Section 3.0 and are referred to as (1) the Collins Road Annexation Area consisting of about 1 acre; (2) the Wastewater Treatment Plant Annexation Area consisting of about 9.7 acres; and (3) the State Property Annexation Area consisting of about 3.7 acres. The northwest parcel (Collins Road Annexation Area) will be prezoned C-3 Heavy Commercial, while the 3.7-acre parcel to the northeast (State Property Annexation Area), and the Wastewater Treatment Plant Annexation Area will be prezoned PF Public Facilities.

The proposed SOI amendment and annexations are policy actions that would not directly increase result in the loss of topsoil and erosion. However, these actions would allow the future development of additional and/or expanded facilities associated with the City's WWTP and the Collins Road and State Property annexations. Therefore, the proposed SOI amendment, annexations, and future expansion of the WWTP could result in construction activities that would Implementation of proposed General Plan policies would reduce impacts associated with loss of topsoil and erosion to a **less than significant** level as discussed below.

Zoning Code Update

The proposed project also includes several updates to the City's Zoning Code. These updates involve the addition of new zoning districts, as well as amendments to development standards for several existing zoning districts as discussed in Section 3.0, Project Description, of this Draft EIR. The proposed Zoning Code updates are largely administrative and are intended to clarify the types of uses that are permitted under a particular General Plan land use designation. Therefore, the proposed Zoning Code updates would have **no impact** associated with loss of topsoil and erosion.

West Ione Roadway Improvement Strategy

The proposed project includes the West Ione Roadway Improvement Strategy (WIRIS), which consists of both improvements to existing roadways and the construction of new roadway segments in order to create a bypass to provide traffic relief through downtown. Therefore, implementation of the proposed WIRIS would result in the construction of new infrastructure as shown in **Figure 3.0-11**. Grading, earthmoving, and other site preparation activities associated with the construction of new roadway segments could remove topsoil, thus disturbing the underlying soils to potential erosion from a variety of sources, including wind and water. Implementation of proposed General Plan policies would reduce impacts associated with loss of topsoil and erosion to a **less than significant** level as discussed below.

Proposed General Plan Policies and Action Items that Provide Mitigation

The following proposed General Plan update policies and action items are identified in the General Plan Conservation Element that address soil erosion through the use of enforceable performance standards.

Conservation and Open Space Element

Policy CO-4.4: Minimize erosion into stream channels resulting from new development in urban areas, consistent with State law.

Action CO-4.4.1: Require development projects to contain urban runoff control strategies and requirements that are consistent with Drainage Master Plans and the City's urban runoff management program.

Action CO-4.4.2: Require development within newly urbanizing areas to incorporate runoff control measures into their site design or to participate in an area-wide runoff control management effort, consistent with standards developed by the City.

Action CO-4.4.3: Encourage new development to incorporate features such as grassy swales, multi-use retention or detention basins, and integrated drainage systems to enhance water quality.

Action CO-4.4.4: Require the use of best management practices to protect receiving waters from the adverse effects of construction activities, sediment and urban runoff.

In addition to the above policies, construction activities in the Planning Area 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) would be subject to coverage under the State's National Pollutant Discharge Elimination System General Construction Storm Water Permit as discussed under the Regulatory Framework subsection above. As part of the NPDES permit process, project applicants would be required to prepare and comply with a Storm Water Pollution Prevention Plan that specifies best management practices, including a proposed schedule for the implementation and maintenance of erosion control measures and a description of the erosion control practices with appropriate design details and a time schedule. Site-specific and seasonal conditions must be considered when selecting and implementing appropriate erosion BMPs. The SWPPP is also required to include a description of BMPs to reduce wind erosion at all times for the areas of active construction, with particular attention paid to stockpiled materials.

Implementation of proposed General Plan policies, as well as compliance with NPDES requirements, would ensure that future development projects would be evaluated for potential soil erosion impacts on a site-by-site basis and that runoff and erosion control measure would be integrated into the construction process and project site design. Therefore, impacts associated with loss of topsoil and erosion resulting from implementation of the General Plan Land Use Map, SOI amendment/annexations, and WIRIS would be reduced to a **less than significant** level.

Mitigation Measures

None required.

Slope Instability and Landslides

Impact 4.11.3 Implementation of the proposed project could result in new and/or increased development in areas prone to slope instability and landslides. This impact is **potentially significant.**

Slope instability is often manifested as landslides, and steep slopes heighten the susceptibility to landsliding. However, steep slopes alone do not determine susceptibility. For a slope to fail, the driving forces that cause failure must exceed the resisting forces that maintain stability. Human activities such as mining, construction, grading, landscape irrigation, broken utility lines, and changes to surface drainage areas can increase landslide potential in an area. Structures and infrastructure located on or in the path of a landslide can be seriously damaged or destroyed.

The following is a discussion of the potential slope instability and landslide impacts associated with each aspect of the proposed project.

General Plan Land Use Map

Areas Within Existing City Limits

As previously discussed, the central portion of lands within the existing city limits of Ione is largely built out with retail and commercial businesses in the downtown core and residential uses surrounding the core. However, the areas that comprise the north/northwestern and south/southeastern lands within the city limits are still largely undeveloped and the proposed General Plan update allows for new residential and commercial development in the undeveloped areas within the existing city limits. As shown in **Figure 4.11-1**, the majority of the city is relatively flat. There are small portions of the city limits (in the northwest) that contain slopes greater than 30 percent. The updated General Plan Land Use Map would allow for the development of public facility and residential uses in these areas. Development of urban uses in these areas could result in slope instability near the edges of steep slopes and if temporary or permanent cut and/or fill slopes were made during construction. Therefore, implementation of the proposed General Plan Land Use Map could expose new development within the city limits to hazards associated with slope instability and landslides. This is a **potentially significant** impact.

Areas Outside of Existing City Limits

As previously discussed, lands within the Planning Area that are outside the existing city limits would, to a significant extent, maintain current land uses after implementation of the General Plan Land Use Map, including grazing land, mining, and open space. However, to the north of the city limits, the proposed General Plan designates land for residential and public facilities, as well as a small portion of heavy industrial land uses to the northwest. These areas do not contain steep slopes and are not expected to be susceptible to landslide impacts. The Triangle Policy Area to the southeast of the city limits would be designated for industrial, office, and commercial land use in addition to the existing mining operations. This area contains steep slopes (greater than 30 percent) and could experience slope instability near the edges of steep slopes and if temporary or permanent cut and/or fill slopes were made during construction activities. Therefore, implementation of the proposed General Plan Land Use Map outside the existing city limits could, following annexation to the city, expose new development to hazards associated with slope instability and landslides. This is a **potentially significant** impact.

Sphere of Influence Amendment/Annexations

As part of the proposed project, the City plans to amend its Sphere of Influence (SOI) to include the site of the Castle Oaks Water Reclamation Plant (COWRP), the City Corporation Yard and adjacent land and to expand the Old Stockton Road and Industrial Park Special Planning Areas. In addition, the City is proposing to annex three areas currently located outside the city limits. These areas are identified on Figure 3.0-6 in Section 3.0 and are referred to as (1) the Collins Road Annexation Area consisting of about 1 acre; (2) the Wastewater Treatment Plant Annexation Area consisting of about 9.7 acres; and (3) the State Property Annexation Area consisting of about 3.7 acres. The northwest parcel (Collins Road Annexation Area) will be prezoned C-3 Heavy Commercial, while the 3.7-acre parcel to the northeast (State Property Annexation Area), and the 9.7 acre Wastewater Treatment Plant Annexation Area will be prezoned PF Public Facilities.

The proposed SOI amendment and annexations are policy actions that allow for the future development of these areas. However, these parcels are relatively flat and do not contain steep slopes or areas that could experience slope instability. Therefore, the proposed SOI amendment, annexation, and future expansion of the WWTP would result in **no impact** associated with slope instability and landslides.

Zoning Code Update

The proposed project also includes several updates to the City's Zoning Code. These updates involve the addition of new zoning districts, as well as amendments to development standards for several existing zoning districts as discussed in Section 3.0, Project Description, of this Draft EIR. The proposed Zoning Code updates are largely administrative and are intended to clarify the types of uses that are permitted under a particular General Plan land use designation. Therefore, the proposed Zoning Code updates would have **no impact** associated with slope instability and landslides.

West Ione Roadway Improvement Strategy

The proposed project includes the West Ione Roadway Improvement Strategy (WIRIS), which consists of both improvements to existing roadways and the construction of new roadway segments in order to create a bypass to provide traffic relief through downtown. The eastern portion of the WIRIS bypass would be constructed in areas with slopes. Therefore, implementation of the proposed WIRIS would result in new infrastructure in areas prone to slope instability and landslides. This impact is considered a **potentially significant** impact.

Proposed General Plan Policies and Action Items that Provide Mitigation

The following proposed General Plan policy is identified in the Land Use Safety Element to address soil and geologic stability through specific performance based standards.

Land Use Element

Policy LU-2.4: Promote high quality, efficient, and cohesive land utilization that minimizes negative impacts (e.g., traffic congestion and visual blight) and environmental hazards (e.g. flood, soil instability) on adjacent areas and infrastructure and preserve existing and future residential areas from encroachment of incompatible activities and land uses.

Action LU-2.4.1: Establish development standards in the Zoning Code to address compatibility between existing and proposed development.

Action LU-2.4.2: Minimize impacts between urban and agricultural uses through the use of buffers, increased setbacks, roadways, decreased densities, landscaping, and/or other appropriate methods to avoid conflicts.

Action LU-2.4.3: Promote the disclosure of potential land use compatibility issues in all parts of the City, such as noise, dust, odors, etc., in order to provide potential purchasers with the information necessary to make informed decisions about the Policy Area and its future land uses.

Action LU-2.4.4: Work with utility providers to coordinate location of transmission lines and substations during development review.

Implementation of the above policy would reduce impacts associated with soil and geologic stability, but the impact remains potentially significant and additional mitigation is required.

Mitigation Measures

MM 4.11.3a The following policy shall be incorporated into the Noise and Safety Element of the General Plan:

Slope stability analysis shall be performed by a licensed Geotechnical Engineer for new improvements planned to be built on slopes greater than 30 percent or on or near constructed cut slopes. The purpose of the analysis shall be to develop design parameters for new improvements that will not induce slope failure and subsequently expose people and structures to hazards associated with slope instability.

MM 4.11.3b The following policy shall be incorporated into the Noise and Safety Element of the General Plan:

Construction activities for all development activities within the city shall comply with OSHA (Occupational Safety and Hazard Administration) requirements for all temporary and permanent cut slopes.

Implementation of mitigation measure **MM 4.11.3a** would sufficiently protect people and structures from the impact of slope instability that may occur at natural slopes and permanent cut slopes by requiring that development in areas prone to slope instability hazards be analyzed and designed to reduce slope failure hazards. Mitigation measure **MM 4.11.3b** requires that construction activities for new development follow OSHA requirements intended to protect people from slope instability hazards. Therefore, slope instability resulting from implementation of the proposed project would be reduced to a **less than significant** level.

Location on Unstable and/or Expansive Soil

Impact 4.11.4 Implementation of the proposed project may result in new development on expansive soils. This impact is considered **less than significant.**

General Plan Land Use Map

As discussed in **Impacts 4.11.1** through **4.11.3** above, the proposed project would result in the expansion of urban uses and infrastructure in areas that are currently undeveloped, both within and outside the existing City limits. As a result, the possibility exists for new development to be placed on expansive or unstable soils.

Much of the Planning Area contains soils in Hydrologic Soil Group D, which consists chiefly of clay soils with a high swelling potential, soils with a permanent high water table, and soils with a clay pan or clay layer at or near the surface. Proposed General Plan Policy NS-4.2 requires that a geotechnical investigation be conducted on new development sites and that the investigation must identify unstable and expansive soils on the site. Furthermore, this policy requires that the investigation provide appropriate recommendations to remediate potential hazards associated with such soils. Site-specific geotechnical investigations would identify and mitigate any impacts associated with future development being placed on unstable or expansive soils on a site-by-site basis. As such, impacts resulting from expansive and/or unstable soils would be considered **less than significant**.

Sphere of Influence Amendment/Annexations

As part of the proposed project, the City plans to amend its Sphere of Influence (SOI) to include the site of the Castle Oaks Water Reclamation Plant (COWRP), the City Corporation Yard and adjacent land and to expand the Old Stockton Road and Industrial Park Special Planning Areas. In addition, the City is proposing to annex three areas currently located outside the city limits. These areas are identified on Figure 3.0-6 in Section 3.0 and are referred to as (1) the Collins Road Annexation Area consisting of about 1 acre; (2) the Wastewater Treatment Plant Annexation Area consisting of about 9.7 acres; and (3) the State Property Annexation Area consisting of about 3.7 acres. The northwest parcel (Collins Road Annexation Area) will be prezoned C-3 Heavy Commercial, while the 3.7-acre parcel to the northeast (State Property Annexation Area), and the 9.7 acre Wastewater Treatment Plant Annexation Area will be prezoned PF Public Facilities.

The proposed SOI amendment and annexations are policy actions that could result in future development of these areas with various types of urban development and the possibility exists for this development to be placed on expansive or unstable soils. However, implementation of this portion of the proposed project would not result in impacts related to expansive or unstable soils beyond that addressed under the proposed project. Furthermore, proposed General Plan Policy NS-4.2 requires preparation of a geotechnical investigation for all new development to ensure that unstable or expansive soil conditions are properly mitigated. As such, this impact is **less than significant**.

Zoning Code Update

The proposed project also includes several updates to the City's Zoning Code. These updates involve the addition of new zoning districts, as well as amendments to development standards for several existing zoning districts as discussed in Section 3.0, Project Description, of this Draft EIR. The proposed Zoning Code updates are largely administrative and are intended to clarify the types and forms of uses that are permitted under a particular General Plan land use designation. Therefore, the proposed Zoning Code updates would have **no impact** associated with unstable or expansive soils.

West Ione Roadway Improvement Strategy

Finally, the proposed project includes the West Ione Roadway Improvement Strategy (WIRIS), which consists of both improvements to existing roadways and the construction of new roadway segments in order to create a bypass to provide traffic relief through downtown. Portions of the WIRIS bypass could be constructed in areas with unstable and/or expansive soils. However, further, project-level environmental review and document would be completed prior to implementation of these improvements which would include a geotechnical investigation and appropriate mitigation. Therefore, this impact would be **less than significant**.

Proposed General Plan Policies and Action Items that Provide Mitigation

The following proposed General Plan update policy and action item are identified in the General Plan Noise and Safety Element that address impacts related to unstable and expansive soils through the use of enforceable performance standards:

Policy NS-4.2: Ensure that new structures are protected from damage caused by geologic and/or soil conditions to the greatest extent feasible.

Action NS-4.2.1: Continue to require that all new construction projects complete a geotechnical report or conduct other appropriate analysis to determine the soils characteristics and associated development constraints and impose appropriate measures for geologically sensitive areas.

Mitigation Measures

None required.

Loss of Mineral Resources

Impact 4.11.5 Implementation of the proposed project could result in the loss of availability of a potentially valuable mineral resource. This impact is considered **significant.**

The majority of the Planning Area is located in MRZ-2 through -3a (City of Ione, 1982). These zones all represent areas where either mineral resources are known to exist and are currently in mining operations or where geologic data indicates significant resources may be present. In particular, land included in the MRZ-2a category is of prime importance because it contains known economic mineral deposits. Urban development that includes intensive paving, structures, and the creation of impervious surfaces could permanently preclude the future exploration for, and extraction of, mineral resources in areas where mineral resources are available but not currently mined.

The following is a discussion of mineral resource impacts associated with each aspect of the proposed project.

General Plan Land Use Map

Areas Within Existing City Limits

The central portion of lands within the existing city limits of Ione is largely built out with retail and commercial businesses in the downtown core and residential uses surrounding the core. The areas that comprise the north/northwestern and south/southeastern lands within the city limits are still largely undeveloped. The proposed General Plan update allows for the intensification of retail, office, and residential uses in the downtown core area, as well as new residential and commercial development in the undeveloped areas within the existing city limits. Therefore, implementation of the proposed General Plan Land Use Map would allow urban development, including residences, in areas that may contain important mineral resources. Based on the urban nature of the development allowed (e.g., residential and commercial areas and associated infrastructure), along with the fact that mining operations cannot be located within a buffer area (10,000 feet) of existing residences (see proposed General Plan policies below), future development within the city limits could potentially preclude the exploration for and extraction of mineral resources. This is a **significant** impact.

Areas Outside of Existing City Limits

Lands within the Planning Area that are outside the existing city limits are largely undeveloped, with some agricultural land (primarily grazing lands) and three existing mining operations. The proposed General Plan update would primarily designate these areas as General Agriculture (AG), Open Space (OS), or Surface Mining (SM). Therefore, areas outside of the existing city limits would, to a significant extent, maintain current land uses and current mining operations would

be preserved. Furthermore, agriculture and open space lands would not result in land uses that would preclude future exploration for, and extraction of, mineral resources, since agriculture and open space generally do not involve the construction of a significant number of structures or extensive paving and other impervious surfaces.

However, to the north of the city limits, the proposed General Plan designates land for residential and public facilities, as well as a small portion of heavy industrial land use to the northwest. In addition, the Triangle Policy Area in the southeast is proposed for designation as a Special Planning Area (SPA), with the intent to allow for industrial, office, and commercial land uses in addition to the existing mining operations. Encroachment of urban uses can result in conflicts with existing mining operations. Conflicts could include noise generation of the mining and processing equipment, the release of gases, dust in suspension, airborne particles, and groundborne vibrations from the machines and explosions. Conflicts are generally associated with residences or other sensitive receptors.

In addition, based on the urban nature of the development allowed (e.g., residential, office, and commercial areas and associated infrastructure), along with the fact that mining operations cannot be located within a buffer area (10,000 feet) of existing residences (see proposed General Plan policies below), future development on land within the Planning Area that is outside the existing city limits could potentially preclude the exploration for and extraction of mineral resources, particularly in areas with mineral resources. This is a **significant** impact.

Sphere of Influence Amendment/Annexations

As part of the proposed project, the City plans to amend its Sphere of Influence (SOI) to include the site of the Castle Oaks Water Reclamation Plant (COWRP), the City Corporation Yard and adjacent land and to expand the Old Stockton Road and Industrial Park Special Planning Areas. In addition, the City is proposing to annex three areas currently located outside the city limits. These areas are identified on Figure 3.0-6 in Section 3.0 and are referred to as (1) the Collins Road Annexation Area consisting of about 1 acre; (2) the Wastewater Treatment Plant Annexation Area consisting of about 9.7 acres; and (3) the State Property Annexation Area consisting of about 3.7 acres. The northwest parcel (Collins Road Annexation Area) will be prezoned C-3 Heavy Commercial, while the 3.7-acre parcel to the northeast (State Property Annexation Area), and the 9.7 acre Wastewater Treatment Plant Annexation Area will be prezoned PF Public Facilities.

The proposed SOI amendment and annexations are policy actions that would not directly result in the loss of a mineral resource, rather these actions would allow the future development of additional and/or expanded facilities associated with the City's WWTP. Therefore, the proposed SOI Amendment/Annexation would have **no impact** associated with mineral resources.

Zoning Code Update

The proposed project also includes several updates to the City's Zoning Code. These updates involve the addition of new zoning districts, as well as amendments to development standards for several existing zoning districts as discussed in Section 3.0, Project Description, of this Draft EIR. The proposed Zoning Code updates are largely administrative and are intended to clarify the types of uses that are permitted under a particular General Plan land use designation. Therefore, the proposed Zoning Code updates would have **no impact** associated with mineral resources.

West Ione Roadway Improvement Strategy

The proposed project includes the West Ione Roadway Improvement Strategy (WIRIS), which consists of both improvements to existing roadways and the construction of new roadway segments in order to create a bypass to provide traffic relief through downtown. The WIRIS would result in permanent infrastructure in MRZ-2 areas. Therefore, implementation of the proposed WIRIS would result in potential loss of mineral resources. This impact is considered a **significant** impact.

Proposed General Plan Policies and Action Items that Provide Mitigation

The following proposed General Plan update policies and action items are identified in the General Plan Conservation and Open Space, Noise and Safety, and Economic Development Elements that address impacts to mineral resources through the use of enforceable performance standards:

Conservation and Open Space Element

Policy CO-5.1: Ensure that the environmental effects of mining and reclamation on aquifers, streams, scenic views, and surrounding residential uses are prevented or minimized.

Action CO-5.1.1: Regulate surface mining operations within the City limits as required by California's Surface Mining and Reclamation Act of 1975 (SMARA), Public Resources Code Section 2207 (relating to annual reporting requirements), and State Mining and Geology Board regulations for surface mining and reclamation practice.

Action CO-5.1.2: Coordinate mining operations and urban development to minimize conflicts between residents and mining, particularly where mining is conducted before urbanization.

Policy CO-5.2: Eliminate residual hazards to the public health and safety.

Action CO-5.2.1: Establish and require minimum setbacks of future and reauthorized surface mining from adjoining residential land uses.

Action CO-5.2.2: Review proposed residential and sensitive land uses adjacent to existing or proposed mining operations for adequate buffering and establish setbacks where necessary to ensure public safety from such uses.

Noise and Safety Element

Policy NS.8-1: Ensure public contact with surface mining operations is limited to the maximum extent possible.

Policy NS.8-2: Work with State and federal agencies to ensure proper permitting of any surface mining operations and the safe closure of any mining operations that are ceasing operations.

Economic Development Element

Policy ED.1.3: The City shall support the retention and ongoing operation of mining and industrial uses within and around the City, including the successful neighboring of such uses with surrounding areas.

Action ED.1.3.1: Actively work with property owners and developers to facilitate development of the planned industrial and office parks in the Industrial Park and Triangle Policy Areas south of the central City and elsewhere as designated by this General Plan.

Action ED.1.3.2: Foster retail and restaurant uses to support new industrial and office development.

Action ED1.3.3: Require heavy industrial uses and mining to include transitions in intensity, buffers, or other methods to reduce potential impacts on residential uses. Buffers may include land designated for other uses, such as agriculture, commercial, or open spaces.

Implementation of the above General Plan policies would support the retention and ongoing operation of mining uses within and around the city and reduce risks associated with local surface mining, which could in turn reduce conflicts between mining operations and surrounding uses. While these policies would mitigate impacts, the loss of availability of known mineral resources areas would still occur after implementation of the proposed project. No mitigation is available that would prevent the permanent loss of these mineral resources. Therefore, implementation of the General Plan Land Use Map and WIRIS would result in the **significant and unavoidable** loss of mineral resources.

Mitigation Measures

None available.

Naturally-Occurring Asbestos

Impact 4.11.6 Trenching, grading, and other excavations resulting from implementation of the General Plan update and other project components could expose zones of asbestos-containing rock and possibly cause airborne releases of fibrous minerals. This is considered a **significant** impact.

As discussed under the Existing Setting subsection above, natural asbestos occurs most commonly in association with ultramafic rocks and the presence of ultramafic rocks within a region indicates the possibility of naturally-occurring asbestos (NOA) materials. As shown in **Figure 4.11-2**, the Planning Area contains undivided Mesozoic volcanic and metavolcanic rocks which may contain some metamorphosed minerals such as serpentinite. Because no safe asbestos exposure has been established for residential areas, public exposure to any amount of asbestos poses a potential health risk.

The following is a discussion of the potential impacts associated with NOA for each aspect of the proposed project.

General Plan Land Use Map

Areas Within Existing City Limits and Areas Outside of Existing City Limits

As discussed under **Impact 4.11.1** through **Impact 4.11.4**, the proposed General Plan update allows for the expansion of urbanization in the currently undeveloped areas within the existing city limits. In addition, the proposed General Plan update designates land uses within the Planning Area outside the existing city limits, primarily in the form of residential, industrial, and public facilities to the north/northwest and industrial, office, and commercial land use designations in the Triangle SPA. Trenching, grading, and other excavations associated with future development could expose zones of asbestos-containing rock and possibly cause airborne releases of fibrous minerals in areas containing ultramafic rocks or potentially in areas containing undivided Mesozoic volcanic and metavolcanic rocks. Therefore, implementation of the proposed General Plan Land Use Map could result in releases of, and exposure to, NOA. This is a **significant** impact.

Sphere of Influence Amendment/Annexation

As part of the proposed project, the City plans to amend its Sphere of Influence (SOI) to include the site of the Castle Oaks Water Reclamation Plant (COWRP), the City Corporation Yard and adjacent land and to expand the Old Stockton Road and Industrial Park Special Planning Areas. In addition, the City is proposing to annex three areas currently located outside the city limits. These areas are identified on Figure 3.0-6 in Section 3.0 and are referred to as (1) the Collins Road Annexation Area consisting of about 1 acre; (2) the Wastewater Treatment Plant Annexation Area consisting of about 9.7 acres; and (3) the State Property Annexation Area consisting of about 3.7 acres. The northwest parcel (Collins Road Annexation Area) will be prezoned C-3 Heavy Commercial, while the 3.7-acre parcel to the northeast (State Property Annexation Area), and the 9.7 acre Wastewater Treatment Plant Annexation Area will be prezoned PF Public Facilities.

The proposed SOI amendment and annexations are policy actions that would not directly result in NOA release and exposure on the parcels. However, these actions would allow the future development of additional and/or expanded facilities on the parcels. Therefore, implementation of the SOI amendment/annexations could result in releases of and exposure to NOA. This is a **significant** impact.

Zoning Code Update

The proposed project also includes several updates to the City's Zoning Code. These updates involve the addition of new zoning districts, as well as amendments to development standards for several existing zoning districts as discussed in Section 3.0, Project Description, of this Draft EIR. The proposed Zoning Code updates are largely administrative and are intended to clarify the types of uses that are permitted under a particular General Plan land use designation. Therefore, the proposed Zoning Code updates would have **no impact** associated with potential release of and exposure to NOA.

West Ione Roadway Improvement Strategy

The proposed project includes the West Ione Roadway Improvement Strategy (WIRIS), which consists of both improvements to existing roadways and the construction of new roadway segments in order to create a bypass to provide traffic relief through downtown. Therefore, implementation of the proposed WIRIS would result in the construction of new infrastructure as

shown in **Figure 3.0-11**. Grading, earthmoving, and other site preparation activities associated with the construction of new roadway segments could expose zones of asbestos-containing rock and possibly cause airborne releases of fibrous minerals in areas containing ultramafic rocks or potentially in areas containing undivided Mesozoic volcanic and metavolcanic rocks. This impact is considered a **significant** impact.

Proposed General Plan Policies and Action Items that Provide Mitigation

Currently there are no proposed General Plan policies that would provide specific mitigation for NOA impacts.

As previously discussed, the ATCM for Construction, Grading, Quarrying, and Surface Mining Operations requires road construction and maintenance activities, construction and grading operations, and quarrying and surface mining operations in areas where naturally-occurring asbestos is likely to be found to use dust control measures for a specified set of emission sources and prevent visible emissions crossing the project boundaries.

Mitigation Measures

MM 4.11.6 The following policy shall be incorporated into the Noise and Safety Element of the General Plan:

> Projects requiring a grading permit or a building permit that would result in any earth disturbance that is located in an area likely to contain naturally-occurring asbestos (based on mapping developed by the DOC) shall prepare an Asbestos Hazard Dust Mitigation Plan that addresses the handling and remediation for NOA sites in accordance with all local, state, and federal regulations for potential hazardous materials. The Asbestos Hazard Dust Mitigation Plan shall include practices to eliminate, to the greatest extent possible, the emission of fugitive dust from grading, excavation, and construction activity in order to protect workers and area residents.

Implementation of the above mitigation measures would minimize the amount of asbestos fiber emissions into the atmosphere during grading and construction, and reduce exposure of construction workers to asbestos. Mitigation would notify future residents to hazards posed by potential NOA.

In addition to the above mitigation measures, future development projects in areas containing potential sources of NOA would be subject to ARB's ATCM for naturally-occurring asbestos. The applicant for development would be required to notify the Amador Air District before any work could begin. For construction and grading projects that would disturb one acre or less, the regulation requires several specific actions to minimize emissions of dust such as vehicle speed limitations, application of water prior to and during the ground disturbance, keeping storage piles wet or covered, and track-out prevention and removal. Construction projects that would disturb more than one acre are required to prepare and obtain district approval for an asbestos dust mitigation plan. The plan must specify how the operation will minimize emissions and must address specific emission sources. Regardless of the size of the disturbance, activities must not result in emissions that are visible crossing the property line.

Implementation of mitigation measure **MM 4.11.6**, along with compliance with ARB's Airborne Toxic Control Measures for naturally-occurring asbestos, would reduce impacts to a **less than significant** level.

4.11.4 CUMULATIVE SETTING, IMPACTS, AND MITIGATION

CUMULATIVE SETTING

The land use policies in the proposed City of Ione General Plan update would provide direction for growth within the city limits, while the Amador County General Plan policies provides direction for growth outside the city limits, but within the Planning Area boundaries (until land areas are annexed into the City). Thus, the setting for this cumulative analysis includes existing, proposed, approved, and planned projects in the City of Ione General Plan Planning Area and surrounding portions of unincorporated Amador County as well as full buildout of the City of Ione General Plan Planning Area as proposed in the General Plan update (occurring after year 2030). Development in the region identified in Section 4.0 would change the intensity of land uses in the region. In particular, this cumulative development scenario would provide additional housing, employment, shopping, and recreational opportunities.

Impacts associated with geology, soils, and seismicity are generally site-specific rather than cumulative in nature as geologic properties can vary by site. Individual development projects would be subject to, at a minimum, uniform site development and construction standards relative to seismic and other geologic conditions that are prevalent in the region. However, land uses that contribute to the prevention of mining mineral resources can contribute to the cumulative loss of availability of such resources. Regional development pressures could result in the cumulative conversion of mineral resource and mining sites to urban uses.

Cumulative Geologic, Soil, and Seismic Impacts

Impact 4.11.7 Implementation of the proposed project, along with other planned, proposed, recently approved, and reasonably foreseeable development within the Planning Area, would not contribute to cumulative geology, soils, and seismicity impacts, as the impacts would be site-specific and not additive in character. Thus, the proposed project's contribution would be **less than cumulatively considerable**.

Geology and soils-related impacts are generally site-specific and are determined by a particular site's soil characteristics, topography, and proposed land uses. Impacts associated with cumulative geology, soils, and seismicity impacts are generally site-specific in nature, based on conditions relating to the subsurface materials that underlie a project site. These inherent conditions are an end result of natural historical events that have played out through vast periods of geologic time. Development projects are analyzed on an individual basis and must comply with established requirements of the City and the UBC as they pertain to protection against known geologic hazards and potential geologic and soils-related impacts.

Proposed General Plan Policies and Action Items that Provide Mitigation

The proposed General Plan update contains several goals, policies, and action items that would assist in reducing this cumulative geology and soils impact. The following list contains those policies and action items that contain specific, enforceable requirements and/or restrictions and corresponding performance standards that assist in reducing this impact. Since these policies and action items have been described in detail in prior impact discussions for this section, the following is limited to only listing the policy and action item numbers.

Noise and Safety Element

Policy NS-2.3, Action NS-2.3.1, Action NS-2.3.2, Action NS-2.3.3, Action NS-2.3.4, Policy NS-2.4, Action NS-2.4.1, Policy NS-4.1, Action NS-4.1.1, Policy NS-4.2, Action NS-4.2.1

Conservation Element

Policy CO-4.4, Action CO-4.4.1, Action CO-4.4.2, Action CO-4.4.3, Action CO-4.4.4

Land Use Element

Policy LU-1.4

Adherence to all federal, state, and local requirements, in addition to implementation of the above General Plan policies, would further minimize the City of Ione's contribution to cumulative geology, soils, and seismicity impacts. Therefore, the General Plan's contribution to cumulative geology, soils, and seismicity impacts would be **less than cumulatively considerable**.

Mitigation Measures

None required.

Cumulative Mineral Resource Impacts

Impact 4.11.8 Implementation of the proposed project, along with other planned, proposed, recently approved, and reasonably foreseeable development in the region, could result in a cumulatively significant loss of mineral resources in the region. The General Plan's incremental contribution to the loss of mineral resources is **cumulatively considerable**.

As discussed under **Impact 4.11.5**, implementation of the proposed project would result in the loss of land areas known to contain important mineral resources (i.e., zoned MRZ-2). Although General Plan policies would minimize loss of availability of such resources, this impact would remain incrementally significant. The proposed General Plan would add to cumulative development pressures to convert such land areas to urban uses.

Proposed General Plan Policies and Action Items that Provide Mitigation

The proposed General Plan update contains several goals, policies, and action items that would assist in reducing this cumulative geology and soils impact. The following list contains those policies and action items that contain specific, enforceable requirements and/or restrictions and corresponding performance standards that assist in reducing this impact. Since these policies and action items have been described in detail in prior impact discussions for this section, the following is limited to only listing the policy and action item numbers.

Conservation Element

Policy CO-5.1, Action CO-5.1.1, Action CO-5.1.2, Policy CO-5.2, Action CO-5.2.1, Action CO-5.2.2

Noise and Safety Element

Policy NS.8-1, Policy NS.8-2

Economic Development Element

Policy ED.1.3, Action ED.1.3.1, Action ED.1.3.2, Action ED1.3.3

Mitigation Measures

Implementation of the above-referenced General Plan policies would minimize local impacts to mineral resources. However, development of areas in MRZ-2 zones within the Planning Area, in addition to other planned, proposed, recently approved, and reasonably foreseeable development in the region, creates significant impacts to mineral resources. The City of Ione's contribution to the cumulative loss of availability of mineral resources is **cumulatively considerable** and the impact is **significant and unavoidable.**

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