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## **6.8 GEOLOGY, SEISMICITY, AND MINERAL RESOURCES**

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### INTRODUCTION

This section describes the existing topography, geology, underlying soil characteristics, soil erosion, slope stability, seismic (earthquake) hazards, volcanic hazards, and mineral and paleontological resources within the Sutter County General Plan (proposed General Plan) policy area.

No comment letters addressing geology, seismicity, and mineral resources were received in response to the Notice of Preparation (NOP).

Data for this section was taken from the 2008 *Sutter County General Plan Update Technical Background Report (TBR)*, *Yuba City-Sutter County, California Multi-Hazard Mitigation Plan*, the Natural Resources Conservation Service (NRCS), California Geological Survey (CGS, formerly the Division of Mines and Geology), County's Surface Mining Code, and the California State Surface Mining and Reclamation Act (SMARA).

The TBR is available electronically on the County's website (<http://www.co.sutter.ca.us/pdf/cs/ps/gp/tbr/tbr.pdf>) and on CD at the back of this document.

### ENVIRONMENTAL SETTING

The discussion of geology, mineral and seismicity included below is presented on a countywide basis. There are no unique issues present in any of the five Growth Areas associated with geologic or seismic issues; therefore, these areas of the county are not specifically discussed in the environmental setting.

#### Topography

The policy area is characterized by relatively flat terrain and valley elevations ranging from 35 to 80 feet above measured sea level.<sup>1</sup> The only prominent topographic feature is the Sutter Buttes, which rises abruptly 2,000 feet above the surrounding valley in the northern part of the County. Juxtaposed to the vast open farmland, the Sutter Buttes create a dramatic landmark that is visible throughout the County. With the exception of the Sutter Buttes, the policy area does not have slopes in excess of 9 percent.

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1 Yuba City and Sutter County, *Yuba City-Sutter County, California Multi-Hazard Mitigation Plan*, prepared by AMEC, October 2007.

## **Geology**

Sutter County is located in the Great Valley geomorphic province of California. The Great Valley is an alluvial plain approximately 50 miles wide and 400 miles long in the central portion of California. The Great Valley's northern portion is the Sacramento Valley, drained by the Sacramento River, and its southern portion is the San Joaquin Valley, drained by the San Joaquin River. The geology of the Great Valley is typified by thick sequences of alluvial sediments derived primarily from erosion of the mountains of the Sierra Nevada to the east, and to a lesser extent, erosion of the Klamath Mountains and Cascade Range to the north. These sediments were transported downstream and subsequently laid down as a river channel, floodplain deposits, and alluvial fans. The Sutter Buttes are composed of a volcanic plug that penetrated the alluvial basin sediments during the Pliocene. The policy area is underlain by Modesto, Riverbank, and Turlock Lake formations. See the Paleontological Resources section below for additional discussion on the geologic formations within the policy area.

Though no active earthquake faults are known to exist in the policy area, active faults in the region could generate ground motion felt within Sutter County. Additional information about seismic hazards is summarized in the "Seismic Hazards" subsection, below. Please refer to section 5.1, Geologic and Seismic Hazards, in the TBR for more specific information pertaining to regional faults and geologic hazards.

## **Soils**

The NRCS has mapped over 40 individual soil units in Sutter County. Please refer to Section 6.3, Agricultural Resources, of this Draft EIR for Figure 6.3-3, Soil Classifications.

## **Soil Characteristics**

The predominant soil series in the policy area are the Capay, Clear Lake, Conejo, Oswald, and Olashes soils, which account for over 60 percent of the total land area. The remaining soil units each account for smaller percentages of the total land area. The Capay and Clear Lake soils are generally present in the western and southern parts of the policy area. The Conejo soils occur in the eastern part closer to the incorporated cities within the policy area. Oswald and Olashes soils are located in the central portion of the policy area extending north to south, with scattered areas along the southeastern edge of the policy area. Please refer to Section 4.2, Agriculture, Soils, and Mineral Resources, in the TBR for soil descriptions of the principal soil units in the policy area.

## Soil Hazards

### Erosion

Erosion is a two-step process by which soils and rocks are broken down or fragmented and then transported. The breakdown processes include mechanical abrasion, dissolution, and weathering. Erosion occurs naturally in most systems, but is often accelerated by human activities that disturb soil and vegetation. Erosion increases with increasing slope, increasing precipitation, and decreasing vegetative cover. Erosion can be extremely high in areas where vegetation has been removed by fire, construction, or cultivation. High rates of erosion may have several negative impacts including degradation and loss of agricultural land, degradation of streams and other water habitats, and rapid silting of reservoirs. Please refer to section 5.1, Geologic and Seismic Hazards, in the TBR for more specific information pertaining to the potential erodibility, or the vulnerability to erosion of natural soil types in the policy area and the factors that make the policy area an area of low erosion activity.

### Expansive Soils

Expansive soils are prone to change in volume due to the presence of moisture. Soft clay soils have the tendency to increase in volume when moisture is present and shrink when it is dry (shrink-swell). The force of expansion is capable of exerting pressures of 20,000 pounds per square foot (psf) or greater on foundations, slabs, and other confining structures.<sup>2</sup> Expansive soils can cause damage including structural damage; cracked driveways, sidewalks, heaving of roads and highway structures; and disruption of pipelines and other utilities. Building can occur successfully on expansive soils with proper mitigation to offset the vertical and horizontal forces of the soil type. Expansive soils are most likely to occur in basins and on basin rims with non-expansive soils accruing along the river and river valley and steep mountain slopes. Several soil types in the policy area have been identified with a combination shrink-swell potential changing at varying soil depth, where 34 percent have a high shrink-swell potential and 23 percent have a low potential.<sup>3</sup>

### Subsidence

Subsidence is the sinking of a large area of ground surface in which the material is displaced vertically downward, with little or no horizontal movement. Subsidence is usually a direct result of groundwater, oil, or gas withdrawal and is a greater hazard in areas where subsurface geology includes compressible layers of silt and clay. The damaging effects of subsidence include gradient changes in roads, streams, canals, drains, sewers, and dikes. Such systems are typically constructed with slight gradients and effects include damage to

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2 Ibid.

3 Ibid.

water wells resulting from sediment compaction and increased likelihood of flooding of low-lying areas.

Subsidence due to groundwater withdrawal generally affects larger areas and presents a more serious hazard than does subsidence due to oil and gas withdrawal. The amount of subsidence caused by groundwater withdrawal depends on several factors, including: (1) the extent of water level decline, (2) the thickness and depth of the water-bearing strata tapped, (3) the thickness and compressibility of silt-clay layers within the vertical sections where groundwater withdrawal is occurring, (4) the duration of maintained groundwater level decline, (5) the number and magnitude of water withdrawals in a given area, and (6) the general geology and geologic structure of the groundwater basin.

The policy area is not subject to high subsidence, as a number of the previously described factors needed to cause subsidence do not exist. A list of the factors contributing to the low subsidence potential within the policy area is discussed in more detail on page 5.1-5 in Section 5.1, Geologic and Seismic Hazards, of the TBR.

### **Seismic Hazards**

Earthquakes are due to a sudden slip of plates along a fault. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. 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.

### **Seismicity**

Earthquake magnitude is a quantitative measure of the strength of an earthquake or the strain energy released by it, as determined by the seismographic or geologic observations. This differs from earthquake intensity, which is a qualitative measure of the effects a given earthquake has on people, structures, loose objects, and the ground at a specific location. Although the most commonly known scale measures Richter Magnitude, the most commonly used scale called the moment magnitude (M<sub>w</sub>) scale. Earthquake intensity in a given locality is typically measured using the Modified Mercalli intensity scale with values of this scale ranging from I to XII (Table 6.8-1). Please refer to Section 5.1, Geologic and Seismic Hazards, in the TBR for more specific information pertaining to seismicity and magnitude scales.

TABLE 6.8-1

## EARTHQUAKE MAGNITUDE SCALES

Richter Scale	Modified Mercalli Scale	Effects
0.1 – 0.9	I	Earthquake shaking not felt.
1.0 – 2.9	II	Shaking felt by those at rest.
3.0 – 3.9	III	Felt by most people indoors; some can estimate duration of shaking.
4.0 – 4.5	IV	Felt by most people indoors. Hanging objects rattle wooden walls and frames creak.
4.6 – 4.9	V	Felt by everyone indoors; may estimate duration of shaking. Standing autos rock. Crockery clashes, dishes rattle, and glasses clink. Doors open, close and swing.
5.0 – 5.5	VI	Felt by all who estimate duration of shaking and direction. Sleepers awoken, liquids spill, objects displaced, weak materials crack.
5.6 – 6.4	VII	People frightened and wall unsteady. Pictures and books thrown, dishes/glass are broken. Weak chimneys break. Plaster, loose bricks and parapets fall.
6.5 – 6.9	VIII	Difficult to stand, waves on ponds, cohesionless soils slump. Stucco and masonry walls fall. Chimneys, stacks, towers and elevated tanks twist and fall.
7.0 – 7.4	IX	General fright as people thrown down. Hard to drive, trees broken, damage to foundation and frames. Reservoirs damaged. Underground pipelines broken.
7.5 – 7.9	X	General panic, ground cracks, masonry and frame buildings destroyed. Bridges dams, dikes and embankments damaged. Railroads bent slightly.
8.0 – 8.4	XI	Large landslides, water thrown, general destruction of buildings, pipelines destroyed railroads bent.
8.5 +	XII	Total nearby damage, rock masses displaced. Lines of sight/level distorted. Objects thrown into air.

Source: Sutter County, General Plan Update Technical Background Report, February 2008, p. 5.1-6.

Active faults, as defined by the California Mining and Geology Board, are faults that have caused soil and strata displacement with evidence of surface displacement within the Holocene epoch; that is, within the last 11,000 years. Some faults are characterized as active based on surface displacements within historic time, approximately the last 200 years, while others are characterized as active based on surface displacements in rocks or sediments that are less than 11,000 years old. Potentially active faults are also defined by the California Mining and Geology Board and are those for which there is evidence of surface displacement within the Quaternary period, that is, within the last 1.6 million years. Faults that have experienced movement in the last 11,000 to 750,000 years are conditionally active faults.

There are two areas that faults are identified in Sutter County: a series of small Quaternary faults, located in the northern section of the policy area within the Sutter Buttes, and the Pre-Quaternary fault, located in the southeastern corner of the policy area, just east of where Highway 99 enters the County (see Figure 6.8-1, Seismic Hazards). Both faults are listed as non-active, but have the potential for seismic activity. Table 6.8-2 provides the most recent regional seismic activity for the policy area.

TABLE 6.8-2

## LOCAL AND REGIONAL FAULTS

Fault	Most Recent Activity / Richter Scale Magnitude
Sutter Buttes	Quaternary Period <sup>1</sup>
Dunnigan Hills (near Arbuckle)	Holocene Epoch <sup>1</sup>
Foothills Suture Zone Cleveland Hill Swain Ravine-Spenceville	1975 / M 5.7
Midland	Quaternary Period <sup>1</sup>
Unnamed (1892 epicenters between Vacaville and Winters)	--2
Green Valley-Concord -Calaveras	--2
Rodgers Creek-Hayward	1968 / M 6.8 1936 / M 7.0
San Andreas (Loma Prieta)	1989 / M 7.1 1906 / M 8.3
Eastern Sierra Nevada (1) Sulphur creek (2) Stampede valley (3) Genoa	(1) 1875 / --2 (2) 1966 / --2 (3) Holocene Epoch <sup>1</sup>
Notes:	
1. Period of geologic time most recent activity is estimated to have occurred. Quaternary period dates back to approximately 2.5 million years ago and includes the Holocene Epoch, which began approximately 12,000 years ago. No known earthquakes have occurred along these faults since records have been kept.	
2. Information unavailable.	
Source: Sutter County, General Plan Update Technical Background Report, February 2008, p. 5.1-7.	

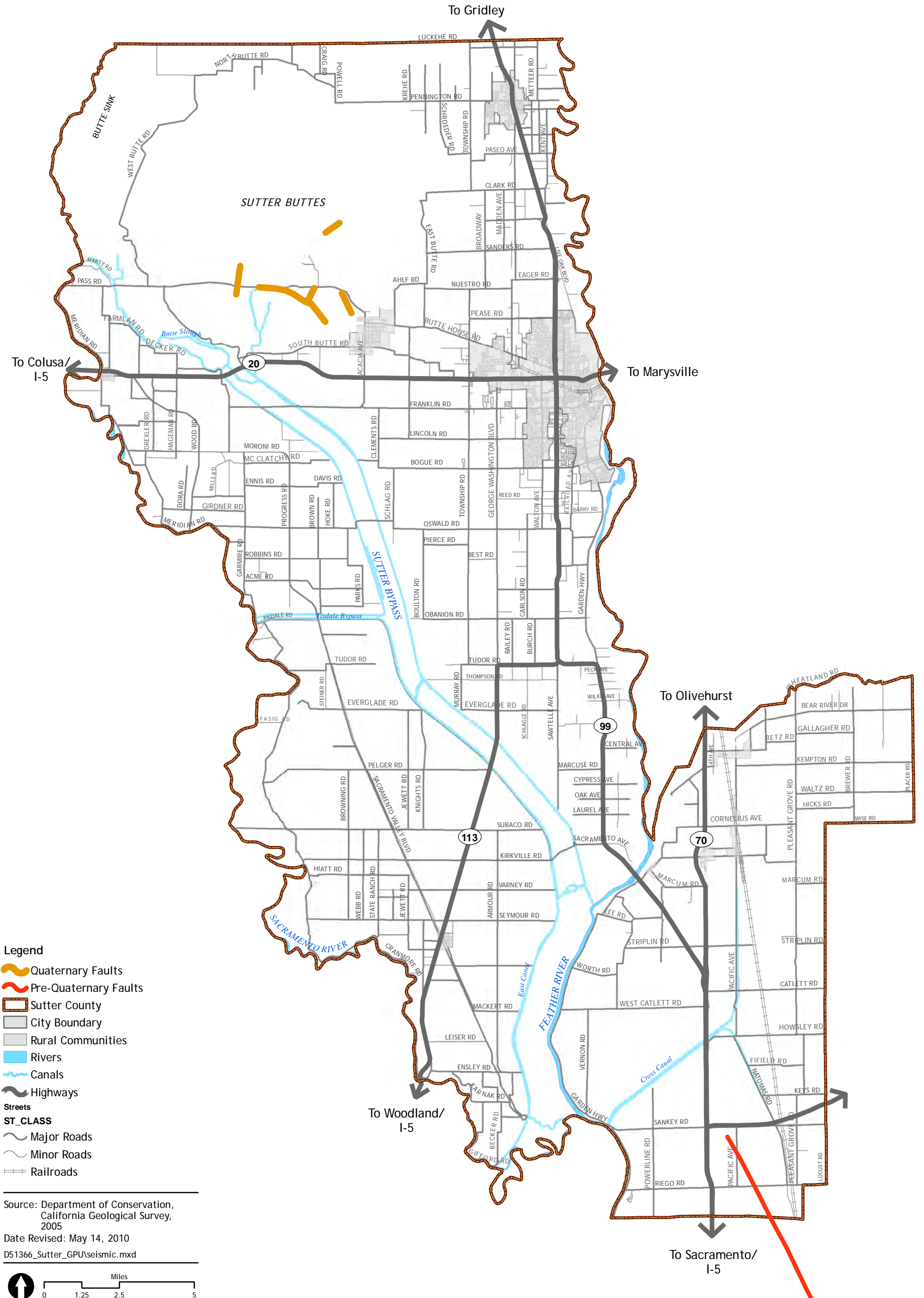
## Ground Shaking

Although Sutter County has felt ground shaking from earthquakes with epicenters located elsewhere, no major earthquakes or earthquake related damage have been recorded within the policy area. Please refer to Section 5.1, Geologic and Seismic Hazards, of the TBR for more specific information pertaining to the low to moderate potential of the policy area to experience ground shaking.

Sutter County is on an alluvial plain that contains some low-lying, poorly consolidated to unconsolidated sediment that are often water-saturated and, therefore, subject to seismically induced ground disturbance. A discussion of potential seismic hazards is presented below.

## Liquefaction Potential

Liquefaction, which can occur in earthquakes with strong ground shaking, is mostly found in areas with sandy soil or fill and a high water table located 50 feet or less below the ground surface. Damage to property can occur when the ground below structures liquefies making the structure unstable causing sinking or other major structural damage. Evidence of





liquefaction may be observed in "sand boils," which are expulsions of sand and water from below the surface due to increased pressure below the surface.<sup>4</sup>

Liquefaction during an earthquake requires strong shaking, which is not likely to occur in the policy area due to the relatively low occurrence of seismic activity; however, the clean sandy layers paralleling the Sacramento River, Feather River, and Bear River have lower soil densities and high overall water table and are potentially at a higher risk if major seismic activity were to occur. Areas of bedrock, including the Sutter Buttes have high density compacted soils and contain no liquefaction potential, although localized areas of valley fill alluvium can have moderate to high liquefaction potential.

### Landslides

Landslides are downward and outward movements of slope forming materials which may be rock, soil, artificial fill, or combinations of such materials. A landslide may move down a slope rapidly or much slower, called creep. The susceptibility of a given area to landslides depends on a great many variables. However, the general characteristics which influence landslide hazards are well understood and thus it is possible to map areas in terms of general susceptibility to landslides. Please refer to Section 5.1, Geologic and Seismic Hazards, in the TBR for more specific information pertaining to the factors which govern the formation of landslides.

With the exception of the Sutter Buttes, the policy area is within a landslide-free zone due to the flat topography. The Sutter Buttes are considered to be in a low landslide hazard zone as documented in Bulletin 198 by the CGS.

### Volcanic Hazards

The most probable centers of future volcanic eruptions generally lie along the eastern margin of California, with the greatest concentrations in northeastern California and along the eastern margin of the Sierra Nevada. Mount Lassen, an active volcano, is the southernmost volcano in the Cascade Range and last erupted between 1914 and 1921 with steam, ash, and lava flow eruptions. Like the other volcanoes in the Cascades, Mount Lassen is considered dormant, or not currently erupting, but may erupt again in the future.

The Sutter Buttes are volcanic in origin and last erupted between 1.60 and 1.35 million years ago. Despite the general severity of volcanic hazards, potential volcanic hazards for the policy area are unlikely. The State does not identify the policy area as being located in an area of potential volcanic hazards. In historic times, there were no records of significant ash falls, explosive effects, lava flows or mud flows within the policy area. Further, impending

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4 Ibid.

volcanic eruptions generally give numerous advance warning signs and thus it is usually possible to evacuate residents in areas subject to volcanic hazards.

### **Mineral Resources**

The policy area has some deposits in mineral resources. Construction aggregate is currently the main market for mining resources produced in the policy area and consists predominantly of sand, gravel, soil for construction projects, and crushed stone. The CGS has classified regions of the state according to the presence or absence of significant concrete-grade aggregate deposits. Please refer to Section 4.2, Agriculture, Soils, and Mineral Resources, in the TBR for more information pertaining to the land classifications and CGS guidelines for establishing the Mineral Resource Zones.

The distinction between the MRZ-1 and the MRZ-4 categories is important for land use considerations. The MRZ-1 classification indicates areas where there is little or no likelihood for the presence of significant mineral resources. The MRZ-4 classification implies there is a lack of knowledge regarding mineral occurrence, which does not rule out the presence or absence of significant mineral resources. Further exploration of MRZ-4 areas could result in the reclassification of land to a MRZ-3 or MRZ-2 category. Please refer to Section 4.2, Agriculture, Soils, and Mineral Resources, in the TBR for more information pertaining to the finding that no significant or substantial deposits are located within the policy area.

### **Mining Activity**

The Sutter County Surface Mining Code and the Zoning Code provide for the extraction of mineral resources from the policy area. The extraction of mineral resources has historically been limited to the extraction of clay, sand, soils, and rock. These materials have generally been used for construction; with the exception of clay that was extracted by Gladding-McBean for its Lincoln processing facility to manufacture tile, brick, and other clay products.

The four active mining operations within the policy area are open-pit type or surface mines. Sutter County has no deep-shaft mining activity. All mining operations in the policy area require the possession of a valid surface mining permit and reclamation plan under both the County's Surface Mining Code and the SMARA. Table 6.8-3 summarizes the permitted surface mining operations found within the policy area.

In February 2008, when the TBR was prepared, the County expected new applications requesting 3 to 4 mines (borrow pits) to be filed in the next few years due to the material that will be needed for future levee construction and Highway 70 widening. In June 2008, a borrow pit for Highway 70 was approved by the County. This mine, called the State Route 70 Upgrade Borrow Site, is currently active, and was anticipated to be complete in three to five years from approval (June 2011 or June 2013). Additionally, the "Meyer" mine, also

TABLE 6.8-3

## PERMITTED SURFACE MINES

Mine/Operator	Minerals Mined	Location	Yield <sup>1</sup>	Reserve
South Butte Quarry/ Butte Sand & Gravel	Sand and gravel	On the south side of the Sutter Buttes, north of South Butte Road	1.0 to 2.0 million tons	40 million cubic yards
Bihlman Pit/Bihlman Butte Rock	Sand and gravel	South of North Butte and Pennington Roads	Data not available	Data not available
Reclamation District 1001	Clay	Southeastern policy area, south of the community of Trowbridge, on the east side of Pacific Avenue and north of Catlett Road	< 1,000 cubic yards	Million cubic yards total allowable yield
State Route 70 Upgrade Borrow Sites	Soil	Off Marcum Road, approximately 0.5 mile west of State Route 70, 2 miles east of Highway 99, and approximately one mile south of the rural community of East Nicolaus	1.5 million cubic yards	n/a
West Butte Pit	Sand and gravel	On the east side of West Butte Road approximately 0.25 north of South Butte Road	unknown	3.9 million tons

Note:  
1. Yield is contingent on market demand.  
Source: Butte Sand and Gravel Company Reclamation Plan, 2007 and Sutter County, 2010; Leanne Mueller, Senior Planner, Sutter County Community Services Department, personal communication, June 29, 2010.

called West Butte Pit, is located within the policy area west of the Butte Sand & Gravel location. This mine is officially considered an “idle” mine or inactive and has an idle mine status through 2014.

### Paleontological Resources

Paleontological resources include fossil remains, as well as fossil localities and rock or soil formations that have produced fossil material. Fossils are the remains or traces of prehistoric animals and plants. Fossils are important scientific and educational resources because of their use in: (1) documenting the presence and evolutionary history of particular groups of now extinct organisms, (2) reconstructing the environments in which these organisms lived, and (3) determining the relative ages of the strata in which they occur and of the geologic events that resulted in the deposition of the sediments that formed these strata and in their subsequent deformation. The policy area is underlain by Modesto (alluvium), Riverbank (alluvium), and Turlock Lake (sand, silt, and gravel) formations. The Modesto Formation is generally located in the eastern portions of the policy area, running north/south along the Feather River; the Riverbank Formation is generally located at the base of the Sutter Buttes and in the southern portion of the policy area; and the Turlock Lake Formation is generally located in the southwestern and southeastern portions of the policy area, adjacent to Placer and Yuba counties. The paleontological sensitivity of these formations is described below.

### Modesto and Riverbank Formations

Two sites near Yuba City have yielded vertebrate fossils: one site yielded a Pleistocene-age bison in sediments referable to the Modesto Formation, and the other a Pleistocene-age horse in sediments referable to the Riverbank Formation.<sup>5</sup>

The University of California Museum of Paleontology (UCMP) collections includes records of numerous vertebrate fossil localities referable to either the Modesto or the Riverbank formations in the greater Central Valley, including specimens of ground sloth, saber-toothed cat, bison, camel, coyote, horse, sloth, mammoth, and several types of plants. Fossil specimens from sediments referable to the Modesto Formation have been reported at numerous locations throughout the San Joaquin Valley, including fish, turtles, snakes, birds, moles, gophers, mice, wood rats, voles, jackrabbits, coyote, red fox, grey fox, badger, horse, camel, pronghorn antelope, elk, deer, and bison.<sup>6</sup> The occurrence of recorded vertebrate fossil remains in sediments referable to these two formations elsewhere in the Central Valley suggests there is a potential for uncovering additional similar fossil remains during construction-related earth-moving activities within the policy area.

### Turlock Lake Formation

Vertebrate fossils have been recovered from the Turlock Lake Formation in the greater Central Valley, including mammoth, ground sloth, bear, sabertooth cat, wolf, deer, camel, horse, antelope, rodents, birds, reptiles, and several types of plants. The occurrence of recorded vertebrate fossil remains in sediments referable to Turlock Lake Formation elsewhere in the Central Valley suggests there is a potential for uncovering additional similar fossil remains during construction-related earth-moving activities within the policy area.<sup>7</sup>

## **REGULATORY CONTEXT**

### **Federal**

#### **Seismicity**

The international Building Code (IBC) provides minimum requirements for grading, building siting, development, and seismic design. The IBC is the basis of the California Building Code (see below). The California Building Code (CBC) is the only code that is used within the state to ensure buildings are sited, designed and constructed to meet specific state standards.

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5 Sutter County. Sutter Pointe Specific Plan Draft EIR SCH #2007032157, prepared by EDAW, December 2008, pp. 3.6-12-3.6-13.

6 Ibid.

7 Ibid.

## Geology and Mineral Resources

There are no specific federal regulations pertaining to local geology or mineral resources that are applicable.

## Paleontological Resources

A variety of federal, state, and local regulations and policies protect paleontological resources. These include, NEPA, CEQA, the federal Antiquities Act of 1906, the National Natural Landmarks Program, and the California Public Resources Code. Under California law, paleontological resources are included in CEQA (California Administrative Code, Title 14, section 4306 et seq. and Public Resources Code section 5097.5) and are required to be examined as part of the CEQA process.

The Society of Vertebrate Paleontology (SVP), a national scientific organization of professional vertebrate paleontologists, has established standard guidelines (not regulations) that outline acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, specimen preparation, analysis, and curation. Most practicing professional paleontologists in the nation adhere to the SVP assessment, mitigation, and monitoring requirements, as specifically spelled out in its standard guidelines.

## State

### Seismicity

#### California Building Code

The CBC provides minimum requirements for grading, building siting, development, and seismic design. Typically, most local jurisdictions adopt building standards that are at least as stringent, if not more stringent than the CBC. All development in the county must comply with the provisions of the CBC, at a minimum.

California Code of Regulations (CCR), Title 24, Part 2, the CBC, provides minimum standards for building design. Local codes are permitted to be more restrictive than Title 24, but are required to be no less restrictive. Chapter 16 of the CBC deals with General Design Requirements, including (but not limited to) regulations governing seismically resistant construction. Chapter 18 deals with site demolition, excavations, foundations, retaining walls, and grading, including (but not limited to) requirements for seismically resistant design, foundation investigations, stable cut and fill slopes, and drainage and erosion control. Construction activities are subject to occupational safety standards for excavation, shoring, and trenching as specified in Cal-OSHA regulations (CCR, Title 8).

Among other things, the CBC defines different building regions in the state and ranks them according to their seismic hazard potential. The County is in Seismic Site Class D; accordingly, any future development would be required to comply with all design standards applicable to Seismic Site Class D.

Sutter County implements the CBC through the building permit process (County Code, Title 13, Building Safety Codes).

### Seismic Hazards Map Act

Under the Seismic Hazards Mapping Act of 1990 (Public Resources Code section 2690-2699.6), seismic hazard zones are identified and mapped to assist local governments in land use planning. The Seismic Hazards Mapping Act addresses seismic hazards other than surface rupture such as liquefaction, landslides, ground failure, or other hazards caused by earthquakes. The Act specifies that the lead agency or a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils. In addition, CGS's Special Publications 117, "*Guidelines for Evaluating and Mitigating Seismic Hazards in California*," provides guidance for the evaluation and mitigation of earthquake-related hazards for projects within designated zones of required investigations. The Sutter County region has not been subject to any seismic hazards mapping by CGS.

### Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Special Studies Act was signed into law in 1972 (in 1994 it was renamed the Alquist-Priolo Earthquake Fault Zoning Act). The primary purpose of the Act is to mitigate the hazard of fault rupture by prohibiting the location of structures for human occupancy across the trace of an active fault. This state law was passed in direct response to the 1971 San Fernando earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. Surface rupture is the most easily avoided seismic hazard. The Act requires the State Geologist to delineate "Earthquake Fault Zones" along faults that are "sufficiently active" and "well defined." The Act dictates that cities and counties withhold development permits for sites within an Earthquake Fault Zone until geologic investigations demonstrate that the sites are not threatened by surface displacements from future faulting. No portion of Sutter County is within an Earthquake Fault Zone.

## **Geology and Mineral Resources**

### Surface Mining and Reclamation Act

As previously discussed, mining activities are regulated by SMARA (Public Resources Code section 2710 et seq.). The purpose of this act is to create and maintain an effective and comprehensive surface mining and reclamation policy with regulation of surface mining operations so as to assure that: (1) adverse environmental effects are prevented or minimized and that mined lands are reclaimed to a usable condition which is readily adaptable for alternative land uses; (2) the production and conservation of minerals are encouraged, while giving consideration to values relating to recreation, wildlife, range and forage, and aesthetic enjoyment; and (3) residual hazards to the public health and safety are eliminated. These goals are achieved through land use planning by allowing a jurisdiction to balance the economic benefits of resource reclamation with the need to provide other land uses.

Performance standards for mine reclamation are set forth in Title 14 of the CCR section 3700 et seq. With regard to geotechnical considerations, these regulations generally address soil erosion control and drainage, re-soiling and revegetation, backfilling, regrading, slope inclination and stabilization, and recontouring, but the specific methods to achieve conformance with the standards are not specified.

Sections 2761 (a) and (b) and 2790 of the SMARA provides for a mineral lands inventory process termed classification-designation. The CGS and the State Mining and Geology Board (SMGB) are the State agencies responsible for administering this process. The primary objective of the process is to provide local agencies, such as cities and counties, with information on the location, need, and importance of minerals within their respective jurisdictions. It is also the intent of this process, through the adoption of general plan mineral resource management policies, that this information be considered in future local land-use planning decisions (Public Resources Code section 2762).

Mining operations and mine reclamation activities must be performed in accordance with laws and regulations adopted by the SMGB, which are contained in Title 14 of the CCR section 3500 et seq. The Office of Mine Reclamation (OMR) in the State Department of Conservation oversees reclamation requirements.

## Local

### **Seismicity, Geology and Mineral Resources**

#### Yuba City-Sutter County Multi-Hazard Mitigation Plan

The Yuba City-Sutter County, California Multi-Hazard Mitigation Plan (October 2007) aims to reduce or eliminate long-term risk to people or property from natural disasters, including flood and seismic events. Sutter County and the incorporated cities of Yuba City and Live Oak have developed a comprehensive Multi-Hazard Mitigation Plan to better position resources in addressing potential hazards before they occur and to maintain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA). In compliance with the Disaster Mitigation Act of 2000, the final plan has been adopted by Sutter County, City of Yuba City, City of Live Oak, Gilsizer Drainage District, Levee District 1, and Reclamation Districts 70, 1001, 1500, and 1660. The adoption was recognized by FEMA and the plan received final approval in January 2008. The Multi-Hazard Mitigation Plan is valid for five years and covers areas within the policy area.

#### Sutter County Ordinance Code

##### *Chapter 290 (Surface Mining and Reclamation Code)*

This chapter provides effective and comprehensive surface mining and reclamation procedures, processes, and responsibilities for the implementation of SMARA and other applicable State regulations that apply to Sutter County to ensure that adverse environmental and other effects of surface mining operations will be minimized or prevented.

##### *Chapter 1300 (Building Safety Codes)*

As mentioned above, Sutter County implements the CBC through the building permit process. The State of California provides minimum standards for seismic structural design and site development through the California Building Standards Code (California Code of Regulations, Title 24). Specific minimum seismic safety and structural design requirements are set forth in Chapter 16 of the CBC. The CBC identifies seismic factors that must be considered in structural design. Chapter 18 of the CBC regulates the excavation of foundations and retaining walls, and Appendix Chapter A33 regulates grading activities, including drainage and erosion control, and construction on unstable soils, such as expansive soils and liquefaction areas.



### *Chapter 1770 (Land Grading and Erosion Control)*

Sutter County's land grading and erosion control ordinance applies to the unincorporated area of Sutter County and those areas in County drainage districts. The purpose of the ordinance is to minimize damage to surrounding properties public rights-of-way; minimize the degradation of the water quality of watercourses; minimize the disruption of natural or County-authorized drainage flows caused by the activities of clearing and grubbing, grading, filling, and excavating land; minimize sediment and pollutant runoff from other construction related activities; and comply with the provisions of National Pollution Discharge Elimination System (NPDES) permits covering activities of the County issued by the California Regional Water Quality Control Board (RWQCB). See the Sutter County Ordinance Code for more information on which activities require the issuance of a grading and erosion control permit and which activities are except (e.g., grading activities necessary for agricultural operations).

### Sutter County 2015 General Plan

The County's 2015 General Plan contains policies and implementation measures relevant to Geology, Seismicity, and Mineral Resources. The 2015 General Plan included policies focusing on minimizing the risk of personal injury and property damage due to seismic and geological hazards, and minimizing the impacts of mineral resource extraction to local residents, county roadways, services, and facilities. Upon approval of the proposed General Plan, all policies and implementation measures in the 2015 General Plan would be superseded. Therefore, they are not included in this analysis.

## **IMPACTS AND MITIGATION MEASURES**

### **Methods of Analysis**

The analysis of impacts associated with geology, seismicity, and mineral resources is based on a review of available information, including the TBR, regarding topography and geology, soil characteristics, seismic hazards, volcanic hazards, and mineral and paleontological resources within the policy area.

The impact analysis analyzes buildout of the proposed General Plan under both the adjusted buildout scenario as well as full buildout.

### **Proposed Sutter County General Plan Goals and Policies**

Goals and policies from the proposed General Plan relevant to geology, seismicity, and mineral resources within the entire policy area are listed below.

## PUBLIC HEALTH AND SAFETY ELEMENT (PHS)

### Geologic and Seismic Hazards

**Goal PHS 2 Minimize the risk of personal injury and property damage due to geologic and seismic hazards and adverse soil conditions.**

#### Policies

PHS 2.1 **Review Standards.** Review and enforce seismic and geologic safety standards and require the use of best management practices in site design and building construction methods.

PHS 2.2 **Minimize Exposure to Geologic Hazards.** Minimize development in areas where geologic hazards exist from landslides and erosion.

PHS 2.3 **Site-Specific Geotechnical Analysis.** Require the preparation of a County approved site-specific geotechnical analysis prior to approval of development in areas where the potential for geologic or seismic hazards exists (e.g., ground shaking, landslides, liquefaction, expansive soils, steep slopes, subsidence, and erosion) and incorporate recommended project features to avoid or minimize the identified hazards.

PHS 2.4 **Essential Facilities.** Promote the upgrade, retrofitting, and/or relocation of existing essential facilities (e.g., hospitals, schools, law enforcement and fire stations, etc.) that do not meet current building code standards and are within areas susceptible to seismic or geologic hazards.

#### Implementation Programs

PHS 2-A Review and update, when necessary, the Sutter County Ordinance Code when there are updates to the California Building Code to ensure consistency with these codes and best management practices.

## ENVIRONMENTAL RESOURCES ELEMENT (ER)

### Cultural Resources

**Goal ER 8 Identify, protect, and enhance Sutter County's important cultural and paleontological resources to increase awareness of the County's heritage.**

#### Policies

ER 8.1 **Identification.** Identify cultural resources, which include prehistoric, historic, archeological, and paleontological resources, throughout the County to provide adequate protection of these resources.

ER 8.2 **Preservation.** Ensure the preservation of significant cultural and paleontological resources, including those recognized at the national, state, and local levels.

### Mineral Resources

**Goal ER 5 Encourage commercial resource extraction activities in locations where environmental, aesthetic, and adjacent land use compatibility impacts can be adequately mitigated.**

#### Policies

- ER 5.1 **Significant Resources.** Conserve and protect mineral resources that may be identified by the State as a significant resource to allow for their continued use in the economy.
- ER 5.2 **Compatible Operations.** Require that gas and mineral resource extraction activities be designed and operated to minimize incompatibilities with nearby land uses and incorporate features that buffer existing and planned adjacent uses. Extraction activities shall incorporate adequate measures to minimize impacts to local residents, county roadways, services, facilities, and the environment.
- ER 5.3 **No New Operations in Sutter Buttes.** Prohibit the establishment of any new mining operations in the Sutter Buttes.
- ER 5.4 **Reclamation.** Require mined areas to be reclaimed after minerals are extracted in accordance with County and State standards to a condition that is sensitive to the natural environment and where subsequent, beneficial uses can occur.

### Water Resources and Quality

**Goal ER 6 Preserve and protect the County's surface water and groundwater resources.**

#### Policies

- ER 6.11 **New Development.** Require new development to protect the quality of water resources and natural drainage systems through site design, and use of source controls, stormwater treatment, runoff reduction measures, best management practices, and Low Impact Development.

### Implementation Programs

- ER 6-C Update and revise the joint Yuba City – Sutter County Stormwater Management Plan to include the growth areas.
- ER 8-A For projects subject to discretionary approval involving the demolition, relocation, or alteration of a building or structure over 45 years old or that would result in a change to the building or structure's immediate setting, the County shall require an assessment by a professional historic resource consultant to determine if the action would cause a substantial adverse change in the significance of an historical resource pursuant to CEQA Guidelines section 15064.5. (New) (EIR MM)
- ER 8-B If the historical resource assessment determines that the proposed action would cause a substantial adverse change in the significance of an historical resource,

the County shall require as a condition of project approval the implementation of appropriate and feasible measures to reduce the potential impact, including the appropriate level of written and photographic documentation of significant historical resources that would be demolished.

ER 8-C For projects subject to discretionary approval, which involve grading, excavation, or construction, require the applicant to hire a professional that meets the Secretary of Interior's professional qualifications standards for archaeology to conduct an archaeological resource investigation. As determined necessary by the archaeologist and the County, the investigation may include, but not be limited to, an updated records search, pre-construction field surveys, research, and testing, and/or other methods that identify whether a substantial adverse impact on significant archaeological resource would occur. If cultural resources are discovered, the resource shall be examined by a qualified archaeologist to determine its significance and develop appropriate protection and preservation measures.

ER 8-D Require that when any subsurface cultural resources, paleontological resources, or human remains are encountered, all work within 100 feet of the discovery be stopped and the area protected from further disturbance until the discovery is evaluated. The appropriate County personnel shall be notified immediately. The resources shall be examined by qualified personnel to determine their significance and develop appropriate protection and preservation measures.

If human remains are discovered, they shall be treated in compliance with applicable State and federal laws, including notifying the County Coroner and consulting with the California Native American Heritage Commission, as appropriate.

### **Standards of Significance**

For the purposes of this EIR, impacts to geology, seismicity, and mineral resources are considered significant if the proposed General Plan would:

- expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - the 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 active fault;
  - strong seismic ground shaking;
  - seismic-related ground failure, including liquefaction; or
  - landslides;
- result in substantial soil erosion or the loss of topsoil;

- locate uses on soils that are unstable or expansive, or would become unstable as a result of development, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state;
- 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; or
- directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.<sup>8</sup>

### **Impacts and Mitigation Measures**

#### **6.8-1 Implementation of the proposed General Plan could expose the public or structures to loss, injury, or death involving the rupture of a known earthquake fault, strong seismic ground shaking, or seismic-related ground failure including liquefaction, or landslides.**

The two fault systems identified within the policy area are a series of Quaternary faults (northern section of the county within the Sutter Buttes), and the Pre-Quaternary (southeastern corner of the county east of Highway 99). As stated in the Environmental Setting, both faults are listed as non-active but have the potential for seismic activity, and although Sutter County has felt ground shaking from earthquakes with epicenters located elsewhere, no major earthquakes or earthquake related damage have been recorded within the policy area. Therefore, the chance of fault rupture within the policy area would be highly unlikely. Consequently, implementation of the proposed General Plan would not expose the public or structures to the possibility of fault rupture.

Despite its relatively distant location from known faults and fault zones, the public and structures within the policy area could be subject to the effects of ground shaking caused by a seismic event located miles away. The resulting vibration could cause damage to buildings, roads, and infrastructure (primary effects), and could cause ground failures such as liquefaction or settlement in loose alluvium and/or poorly compacted fill (secondary effects). An earthquake on the San Andreas Fault, Rodgers Creek-Hayward, or Dunnigan Hills fault, which are the closest active faults to the policy area, could cause the potential for ground shaking experienced in the policy area, although unlikely.

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8 An important paleontological rock unit is one that has a high potential paleontological productivity rating and is known to have produced unique, scientifically important fossils. The potential paleontological productivity rating of a rock unit refers to the abundance/densities of fossil specimens and/or previously recorded fossil sites.

Sutter County is on an alluvial plain that contains some low-lying, poorly consolidated to unconsolidated sediment that are often water-saturated and, therefore, subject to seismically induced ground disturbance. Liquefaction is not likely to occur in the policy area due to the relatively low occurrence of seismic activity; however, the clean sandy layers paralleling the river corridors in the policy area have lower soil densities and a high overall water table and are potentially at a higher risk if a major seismic event were to occur. Areas of bedrock, including the Sutter Buttes have high density compacted soils and contain no liquefaction potential. With the exception of the Sutter Buttes, which is a low landslide hazard zone, the policy area is within a landslide-free zone due to the flat topography. Therefore, the chance of seismic-related ground failure due to liquefaction or a landslide within the policy area would be low.

In populated areas, the greatest potential for loss of life and property damage can come as a result of ground shaking from a nearby earthquake. The degree of damage depends on many interrelated factors. Among these are the Richter magnitude, 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 ground water, topography, and finally, the design, type, and quality of building construction. Proposed goal PHS 2 would minimize the risk of personal injury and property damage due to geologic and seismic hazards and adverse soil conditions. Proposed policy PHS 2.1 would require review and enforcement of seismic and geologic safety standards and require the use of best management practices in site design and building construction methods. Policy PHS 2.2 would minimize development in areas where geologic hazards exist from landslides and erosion. Policy PHS 2.3 would require the preparation of a county approved site-specific geotechnical analysis prior to approval of development in areas where the potential for geologic or seismic hazards exists (e.g., ground shaking, landslides, liquefaction, expansive soils, steep slopes, subsidence, and erosion) and incorporate recommended project features to avoid or minimize the identified hazards.

Along with implementation of the above General Plan goal and policies, compliance with the existing regulatory framework that addresses earthquake safety issues and requires adherence to the International Building Code seismic safety requirements and other various design standards would ensure that no direct or indirect adverse effect would occur. Therefore, seismically induced ground shaking and secondary effects would not be a substantial hazard in the policy area. This is a *less-than-significant impact*.

### Full Buildout Analysis

Under the full buildout scenario, the same effects would occur as discussed above under the adjusted buildout scenario. There would be additional development that would be subject to the same General Plan policies as well as state and local laws that oversee

building in California to minimize damage associated with any seismic event. The additional growth that could occur under full buildout would go beyond 2030 and future planning efforts and environmental analysis would address this additional growth and the potential implications of this growth.

### Mitigation Measure

*None required.*

#### **6.8-2 Implementation of the proposed General Plan could result in development that may cause substantial soil erosion or the loss of topsoil.**

Erosion is often accelerated by human activities that disturb soil and vegetation. High rates of erosion may have several negative impacts including degradation and loss of agricultural land and degradation of streams and other water habitats. As stated in the Environmental Setting, with the exception of moderate to high erosion in the Sutter Buttes, the policy area is an area of low erosion activity due to the statistics that the average annual precipitation is 15 to 20 inches, slopes are generally not in excess of 9 percent, and little to no naturally erodible soil types are located within the policy area with the exception of some soil types located in the Sutter Buttes.

New development would result from the implementation of the proposed General Plan. Construction is one of the primary activities that can lead to soil erosion or the loss of topsoil. Construction site Best Management Practices (BMPs) are used to minimize erosion and prevent contamination of runoff from construction sites. The use of BMPs to achieve structural source controls during construction of new development per the Storm Water Management Plan/Program (SWMP) is required under proposed policy ER 6.11. Goal PHS 2 would minimize the risk of personal injury and property damage due to geologic and seismic hazards and adverse soil conditions. Policy PHS 2.2 would minimize development in areas where geologic hazards exist from landslides and erosion. While policy PHS 2.3 would require the preparation of a county approved site-specific geotechnical analysis prior to approval of development in areas where the potential for geologic or seismic hazards exists (e.g., ground shaking, landslides, liquefaction, expansive soils, steep slopes, subsidence, and erosion) and incorporate recommended project features to avoid or minimize the identified hazards.

Sutter County implements the CBC through the building permit process and Appendix Chapter A33 regulates grading activities, including drainage and erosion control. Sutter County's Land Grading and Erosion Control Ordinance requires implementation of specific actions and BMPs that would limit the amount of construction-related erosion.

Along with implementation of the above General Plan goals and policies, compliance with the existing regulatory framework, CBC, and BMPs that addresses and minimizes the potential for erosion would ensure that no direct or indirect adverse effect would occur. Therefore, the potential for development to occur in the policy area that may cause substantial soil erosion or the loss of topsoil would be unlikely. This is a *less-than-significant impact*.

### Full Buildout Analysis

Under the full buildout scenario, the same effects would occur as discussed above under the adjusted buildout scenario. There would be additional development that would be subject to the same General Plan policies as well as state and local laws that oversee building in California to minimize loss of topsoil and to reduce any potential for erosion. The additional growth that could occur under full buildout would go beyond 2030 and future planning efforts and environmental analysis would address this additional growth and the potential implications of this growth.

### Mitigation Measure

*None required.*

#### **6.8-3 Implementation of the proposed General Plan could result in development located on soils that are unstable or expansive, which could potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.**

Expansive soils can cause structural damages; however, building can occur successfully on expansive soils with proper mitigation to offset the vertical and horizontal forces of the soil type. The damaging effects of subsidence include gradient changes in roads, streams, canals, drains, sewers, and dikes. As stated in the Environmental Setting, the policy area is not subject to high subsidence because the factors needed to cause subsidence do not exist. A list of the factors contributing to the low subsidence potential within the policy area is discussed in more detail on page 5.1-5 in Section 5.1, Geologic and Seismic Hazards, of the TBR. Therefore, the potential for unstable soils within the policy area is low.

Proposed goal PHS 2 would minimize the risk of personal injury and property damage due to geologic and seismic hazards and adverse soil conditions. Proposed policy PHS 2.3 would require the preparation of a county approved site-specific geotechnical analysis prior to approval of development in areas where the potential for geologic or seismic hazards exists (e.g., ground shaking, landslides, liquefaction, expansive soils, steep slopes, subsidence, and erosion) and incorporate recommended project features to avoid or minimize the identified hazards.



Sutter County implements the CBC through the building permit process and Appendix Chapter A33 regulates grading activities, including construction on unstable soils, such as expansive soils and liquefaction areas. Soil characteristics within the policy area may vary considerably from the mapped locations and descriptions due to development and other uses. Project-specific geotechnical studies are required to identify actual engineering properties of soils at specific locations to determine whether there are specific soil characteristics that could affect foundations, drainage, infrastructure, or other structural features.

Along with implementation of the above proposed General Plan goals and policies, compliance with the existing regulatory framework and CBC that address and minimize potential hazards due to unstable soils would ensure that no direct or indirect adverse effects would occur. Therefore, the potential for development to be located on soils that are unstable or expansive within the policy area that could potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse would be low. This is a *less-than-significant impact*.

#### Full Buildout Analysis

Under the full buildout scenario, the same effects would occur as discussed above under the adjusted buildout scenario. There would be additional development that would be subject to the same General Plan policies as well as state and local laws that oversee building in California to ensure future development is not constructed in areas where soil stability is a concern. The additional growth that could occur under full buildout would go beyond 2030 and future planning efforts and environmental analysis would address this additional growth and the potential implications of this growth.

#### Mitigation Measure

*None required.*

#### **6.8-4 Implementation of the proposed General Plan could result in the loss of mineral resources or mineral resource recovery sites.**

The policy area has some deposits in mineral resources. Construction aggregate is currently the main market for mining resources produced in the policy area and consists predominantly of sand, gravel, and crushed stone. As stated in the Environmental Setting, no significant or substantial mineral deposits are located within the policy area. Please refer to section 4.2, Agriculture, Soils, and Mineral Resources, in the TBR for more information.

The Sutter County Surface Mining and Zoning Code provide for the extraction of mineral resources from the policy area. There are four active mining operations within the policy area and all operations require and have a valid surface mining permit and reclamation

plan under both the County's Surface Mining Code and SMARA. The Surface Mining and Reclamation Code in the Sutter County Ordinance Code provides effective and comprehensive surface mining and reclamation procedures, processes, and responsibilities for the implementation of SMARA and other applicable state regulations that apply to Sutter County to ensure that adverse environmental and other effects of surface mining operations will be minimized or prevented. Any change to a Mineral Resource Zone designation to allow for new development would be conditioned under SMARA requirements.

Proposed goal ER 5 would encourage commercial resource extraction activities only in locations where environmental, aesthetic, and adjacent land use compatibility impacts can be adequately mitigated. Proposed policy ER 5.1 would conserve and protect mineral resources that may be identified by the State as a significant resource to allow for their continued use in the economy. Policy ER 5.3 would prohibit the establishment of any new mining operations in the Sutter Buttes. Policy ER 5.4 would require mined areas be reclaimed after minerals are extracted in accordance with County and State standards to a condition that is sensitive to the natural environment and where subsequent, beneficial uses can occur.

Along with implementation of the above proposed General Plan goals and policies, compliance with the existing regulatory framework including SMARA and local codes that address the extraction of mineral resources would ensure that no direct or indirect adverse effects would occur. Therefore, the potential for development to be located that could result in the loss of mineral resources or locally important mineral resource recovery sites would be low. This is a *less-than-significant impact*.

### Full Buildout Analysis

Under the full buildout scenario, the same effects would occur as discussed above under the adjusted buildout scenario. The additional growth that could occur under full buildout would go beyond 2030 and future planning efforts and environmental analysis would address this additional growth and the potential implications of this growth.

### Mitigation Measure

*None required.*

**6.8-5 Implementation of the proposed General Plan could result in development that may directly or indirectly destroy a unique paleontological resource or site, or unique geologic feature.**

The policy area is underlain by Modesto, Riverbank, and Turlock Lake formations. Two locations in Sutter County near Yuba City have yielded vertebrate fossils: a Pleistocene-age

bison and a Pleistocene-age horse. Vertebrate fossils have also been recovered from the Turlock Lake Formation in the greater Central Valley, including mammoth, ground sloth, bear, sabertooth cat, wolf, deer, camel, horse, antelope, rodents, birds, reptiles, and several types of plants. The occurrence of recorded fossil remains in sediments referable to Modesto, Riverbank, and Turlock Lake formations suggests there is a potential for uncovering additional similar fossil remains during construction-related earth-moving activities within the policy area.

Implementation Program ER 8-D for policy ER 8.2 in the General Plan requires that when paleontological resources are encountered, all work within 100 feet of the discovery shall be stopped and the area protected from further disturbance until the discovery is evaluated. The appropriate county personnel shall be notified immediately. The resource shall be examined by qualified personnel in accordance with SVP guidelines to determine their significance and to develop appropriate protection and preservation measures. This is a *less-than-significant impact*.

### Full Buildout Analysis

Under the full buildout scenario, the same effects would occur as discussed above under the adjusted buildout scenario. The additional growth that could occur under full buildout would go beyond 2030 and future planning efforts and environmental analysis would address this additional growth and the potential implications of this growth.

### Mitigation Measure

*None required.*

### Growth Areas

The analysis conducted for geology, seismicity, and mineral resources is countywide, and the anticipated impacts to the growth areas are the same as the policy area analysis, discussed above under both the adjusted buildout as well as full buildout. A discussion of the Sutter Pointe Specific Plan is included to provide the reader with a summary of the EIR findings specific to the plan area. Please refer to Chapter 3, Project Description, for more specific information pertaining to the General Plan growth areas.

### **Sutter Pointe Specific Plan Area**

The Sutter Pointe Specific Plan (SPSP) Draft EIR found that project implementation would include substantial construction activity over the entire 7,500-acre project site. The EIR concluded that a direct, potentially significant impact from soil erosion could result from

construction activities associated with the proposed project.<sup>9</sup> Mitigation measures included in the EIR would reduce the potentially significant temporary, short-term construction-related erosion impact to a less-than-significant level by requiring preparation and implementation of a grading and erosion control plan, which includes implementation of specific actions and BMPs that would limit the amount of construction-related erosion.

The EIR also concluded there is a potential for damage from strong seismic ground shaking. Implementation of mitigation measures included in the SPSP EIR would reduce the potentially significant impacts to a less-than-significant level by requiring that the design recommendations of a geotechnical engineer, in accordance with the CBC, be required for all buildings, structures, roadways, and infrastructure to reduce potential damage from seismic events. In addition, a licensed geotechnical or soils engineer is required to provide on-site monitoring to ensure that earthwork is being performed as specified in the plans.<sup>10</sup>

### **Cumulative Impacts and Mitigation Measures**

The potential loss of unique geological resources or features, paleontological resources, or mineral resources within the policy area is evaluated in Impacts 6.8-1 through 6.8-5. The cumulative effects of buildout of the General Plan on unique geological resources or features, paleontological resources, or mineral resources would be substantially similar. There are no known projects within the policy area that, when combined together, along with the General Plan would compound or increase environmental effects on geologic, paleontological, or mineral resources. Therefore, the cumulative impacts of the General Plan are addressed in Impacts 6.8-1 through 6.8-5, which all result in less-than-significant impacts.

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9 Sutter County, Sutter Pointe Specific Plan Draft EIR SCH #2007032157, prepared by EDAW, December 2008, p. 3.6-23.

10 Ibid., p. 3.6-24.