

# 11 GEOLOGY, SOILS, AND MINERAL RESOURCES

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This chapter provides an evaluation of the potential geologic, soils, and mineral resource effects of implementing the proposed City of Folsom 2035 General Plan (2035 General Plan). As established in the Notice of Preparation for the proposed 2035 General Plan (see Appendix A, *Notice of Preparation*), urban development and other activities subject to the plan may result in increased risks from geologic events or impacts to existing geologic, soils, and mineral resources. Future development may increase the number of structures or facilities located in areas at risk of seismic related damage from strong ground shaking, subsidence, or liquefaction.

The following environmental assessment includes a review of geologic and soil resources potentially affected by the implementation of the 2035 General Plan, including existing soil and mineral resources within the City of Folsom, and seismically active faults in or bordering the city. This analysis includes a review of regulations, requirements, plans, and policies applicable to geological and mineral resources, in addition to geological hazards.

The existing condition of the geologic resource and seismic hazard environment in the city of Folsom was determined by a review of soil data websites, mineral resource research, and hazard mitigation plans. Potential impacts related to geologic, soils, and mineral resources were determined by comparing potential activities to the existing environment, based on CEQA assessment criteria, and by considering the policies, regulations, and guidelines adopted by the City of Folsom and by federal and state resource agencies.

## 11.1 SETTING

The environmental and regulatory setting of the City of Folsom with respect to geology, soils, and seismic hazards is described below for both the physical environment and the applicable body of federal, state, and local policies and regulations that govern such resources.

### 11.1.1 ENVIRONMENTAL SETTING

#### GEOLOGIC AND SEISMIC HAZARDS

Folsom is located within the Great Valley geomorphic province, composed of the San Joaquin and Sacramento Valleys. The province is generally bounded by the Sierra Nevada Mountains to the east, Coast Ranges to the west, Transverse Ranges to the south, and Klamath Mountains to the north. The region has been determined by the California Division of Mines and Geology (CDMG) as generally being underlain on the west with alluvium, lake, playa, and terrace deposits and on the east with Pliocene or Pleistocene sandstone, shale, and gravel deposits.

#### *Faults and Shaking*

Figure 11-1 maps the locations and activity classifications of known seismic faults in the region of Folsom. The only “active” fault in the Sacramento area is the Dunnigan Hills fault, located northwest of Woodland. This fault has shown activity in the last 11,000 years but not in the past 200 years.

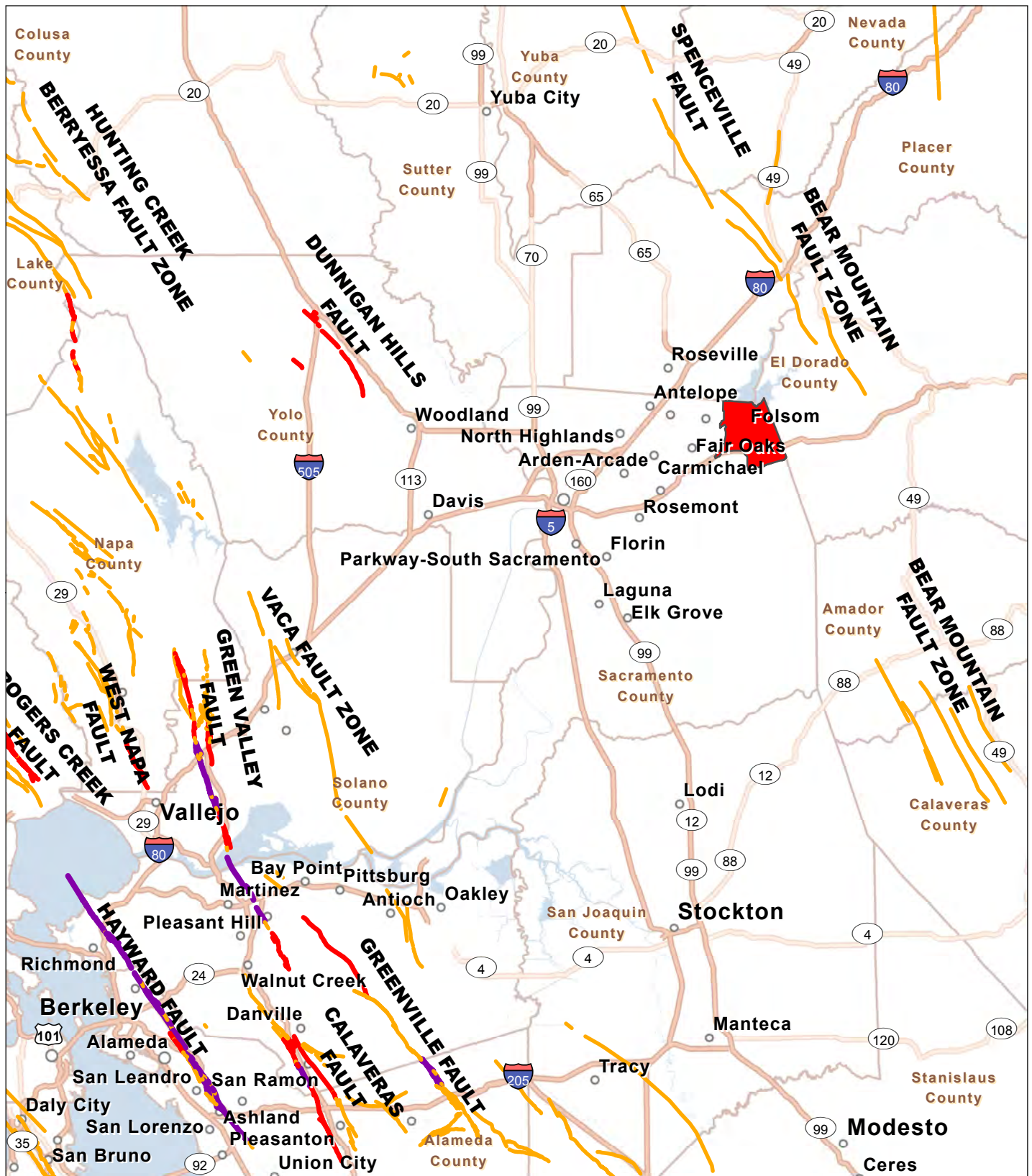
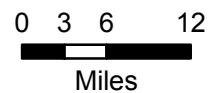


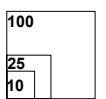
Figure 11-1  
 City of Folsom  
**Seismic Hazards**

- Active Fault with Historic (last 200 years) Displacement
- Active Fault with Holocene (last 11,000 years) Displacement
- Potentially Active Fault with Quaternary (last 1,600,000 years) Displacement



Created by Planning Partners 2018.

Additional Source:  
 California Department of Conservation, 2017.



ACRES

The West Branch of the Bear Mountain fault is located approximately five miles northeast of the Folsom city limits. The CDMG classifies this fault as Late Quaternary, with movement sometime in the last 700,000 years, but not in the last 11,000 years. The Bear Mountain fault is part of the Foothills fault system, which is 360 miles long and has a slip rate of 0.05 millimeters (mm) per year, +/-0.03 mm, with a maximum Richter scale magnitude of 6.5. In comparison the San Andres Fault has a slip rate ranging from 17 to 34 mm per year, depending on location (California Geological Survey [CGS] 2003).

The eastern edge of Folsom is the location of the inactive Mormon Island Fault, which extends in the city for around two miles before crossing into El Dorado County. The fault zone was evaluated for earthquake activity in 1983 and it was concluded that it has not undergone displacement during the last 65,000 to 70,000 years at minimum, and probably has not been the locus of large displacements since the late Mesozoic.

Two laws have affected how earthquake faults and seismic hazards are evaluated. The Alquist-Priolo Earthquake Fault Zoning Act, passed in 1972, is intended to prevent the construction of buildings meant for human occupation on the surface traces of active faults. The law requires the establishment and mapping of Earthquake Fault Zones around the surface traces, to be used by local agencies in the regulation of development projects. The City of Folsom and its proposed 2035 Plan Evaluation Area are not located in an Alquist-Priolo Earthquake Fault Zone.

The Seismic Hazards Mapping Act addresses earthquake hazards not associated with surface ruptures, such as landslides and liquefaction. To support the Act, the CDMG has a program to map liquefaction and landslide potential in various parts of the state (the Seismic Hazards Zonation Program) and provides policies and criteria regarding the responsibilities of cities, counties, and state agencies pursuant to development in designated seismic hazard areas. The Act mandates that prior to approval of development within hazard zones, a geotechnical report on the site must be prepared and evaluated pursuant to these policies and criteria. Sacramento County, including Folsom, has not yet been mapped by the Seismic Hazards Zonation Program.

The United States Geological Survey (USGS)/CGS Probabilistic Seismic Hazards Assessment Model, revised in 2008, places Folsom in the second lowest category for seismic shaking potential out of nine zones. The model predicts peak ground acceleration (Pga) based on location and underlying geology. For Folsom, the model estimates the Pga for throughout the city ranging from 0.135g<sup>1</sup> to 0.145g depending upon bedrock and soil conditions.<sup>2</sup> (USGS 2018, CGS 2018) These levels of ground shaking would equate to a maximum VI intensity earthquake on the Mercalli scale, with strong perceived shaking and light potential damage (USGS 2006).

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<sup>1</sup> 'g' is the acceleration of gravity - 9.8 (m/s<sup>2</sup>). When acceleration acts on a physical body, the body experiences the acceleration as a force. The force we are most experienced with is the force of gravity, which causes us to have weight. (USGS 2018)

<sup>2</sup> Data from [http://www.quake.ca.gov/gmaps/PSHA/psha\\_interpolator.html](http://www.quake.ca.gov/gmaps/PSHA/psha_interpolator.html). Ground motion values are also modified by the local site soil conditions and each value has a ten percent probability of being exceeded in 50 years.

### ***Unstable Soils***

Seismic activity, flooding, heavy rain, and seasonal changes can create instabilities in the ground that can damage built structures such as buildings, roads, and utilities. Liquefaction, landslides, land subsidence, and shrinking or swelling of the soil are the major forms of ground instability that can result.

### ***Liquefaction***

Liquefaction occurs when shaking from an earthquake causes loose soil to be saturated with ground water, transforming it from solid ground to a fluid mix. The resulting liquefaction can result in the warping or collapse of built structures that lie on top of affected ground. Likelihood of liquefaction is a factor of soil type, water table level, and intensity and type of shaking. Sacramento County has not yet been mapped by the Seismic Hazards Zonation Program to determine the possibility of liquefaction during a seismic event, but Folsom's soils are generally not prone to liquefaction. (CGS 2017)

### ***Landslides***

Landslides usually occur in locations with steep slopes and unstable soils. As with liquefaction, Sacramento County has not yet been mapped by the Seismic Hazards Zonation Program to determine landslide potential, but Folsom generally lacks steep slopes in its populated areas and there are no known landslide hazards. In 2011, the State Department of Conservation issued a map showing Susceptibility to Deep-Seated Landslides in California. The map takes previously known landslides, average annual rainfall, and earthquake shaking potential, as well as rock strength and slope class into account. The map is at a statewide scale, but it appears that Folsom is mostly rated as having no landslide susceptibility, with a few pockets of low to moderate susceptibility. The eastern portion of the city, including the Folsom Plan Area Specific Plan (FPASP) area, contains steep slopes; however, no landslides have been recorded in the city, FPASP area, or vicinity. (CGS 2011)

### ***Subsidence***

Land subsidence is defined by the USGS as “a gradual settling or sudden sinking of the Earth’s surface owing to subsurface movement of earth materials...The principal causes are aquifer-system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost.” Sinkholes are a dramatic example of subsidence. Based on data compiled by the Natural Resource Conservation Service (NRCS), no part of Folsom is likely to experience subsidence. (USGS 2017)

### ***Shrink/Swell Potential***

Soils that expand by shrinking or swelling can create a hazard, possibly causing structural damage over a long period of time. Expansive soils are largely comprised of clays, which expand in volume when water is absorbed and shrink as the soil dries, stressing building foundations, roads, and other structures. Shrink/swell potential is measured by a soil’s linear extensibility, with a low potential rating less than 3, moderate between 3 and 6, high between 6 and 9, and very high potential above 9. None of the soils underlying Folsom have high shrink/swell potential. The areas featuring Red Bluff soil have moderate shrink/swell potential, shown on Figure 11-2 as being mostly in the southwestern portions of the city.





Figure 11-2  
City of Folsom

### Unstable Soils

#### Unstable Soils


-  High Corrosion Potential
-  Moderate Shrink-Swell Potential

#### Erosion Susceptibility

-  High
-  Medium-High
-  Medium
-  Low

-  2035 General Plan Planning Area
-  Folsom City Boundary
-  County Boundary
-  Ponds and Lakes
-  Streams and Rivers

N



100

25

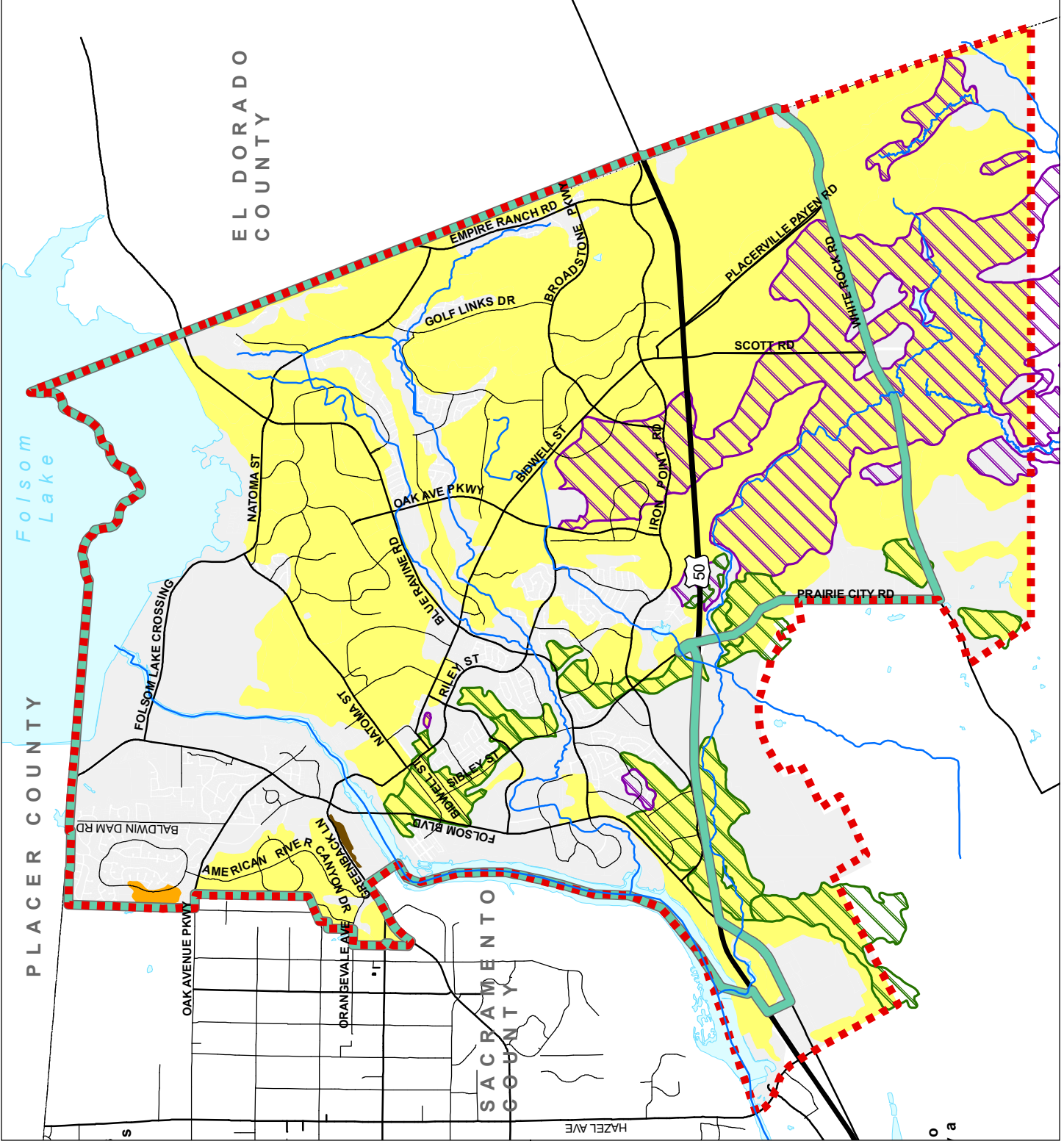
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ACRES

0 0.5 1 2  
Miles

Created by  
Planning Partners 2018.

Additional Sources:  
City of Folsom, 2017;  
County of Sacramento, 2017.



### ***Soil Erosion***

Soil erosion creates a potential hazard for land development, both to on-site structures and waterways and structures downstream of eroding soil. A soil's  $K_w$  factor assesses the erosion potential of soils, measured on a scale of 0 to 0.69, with a higher value indicating a greater susceptibility to erosion. A factor of less than 0.2 is considered low susceptibility, 0.2-0.4 is medium, 0.4-0.6 is high, and above 0.6 very high. One soil type in Folsom (Americanos-Urban land complex) has a high susceptibility for erosion; it is located in a small area in the northwestern corner of the city. Two other soil types have a medium to high susceptibility; these extend over much of Folsom. These areas are mapped on Figure 11-2.

### ***Corrosion***

Certain soil types can damage concrete and uncoated steel due to natural chemical reactions. Factors that influence corrosion risk include soil drainage, acidity, electrical resistance and conductivity, and sulfates. Several of the soils that underlie Folsom have a high risk of corroding unprotected structures. These areas are shown on Figure 11-2, and extend through southern portions of the city into the area south of Highway 50. Note that the soils in Folsom with moderate shrink/swell potential are also at high risk of corroding structures.

## **MINERAL RESOURCES**

The State of California, under the Surface Mining and Reclamation Act (SMARA), can designate certain areas as having mineral deposits of regional significance. Urbanized areas and public parks are typically excluded from this determination, effectively removing almost the entire area North of Highway 50 from consideration for mineral resources. Much of the area of Folsom south of Highway 50, however, is designated under SMARA as having some minerals of regional or statewide value.

As cited by the EIR/EIS for the FPASP, Folsom, south of Highway 50, except for its extreme western edge is classified as containing mineral deposits, particularly aggregate that can be employed for construction and kaolin clay, although both are of unknown significance. (Folsom 2011)

### **11.1.2 REGULATORY SETTING**

The following regulations of federal, state, and local agencies govern various aspects of geologic and seismic hazards and soil and mineral resources. These regulations are summarized below and discussed in detail in Appendix C.

## **FEDERAL LAWS AND REGULATIONS**

### ***Earthquake Hazards Reduction Act of 1977***

The Earthquake Hazards Reduction Act aims to reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program. To accomplish this goal, the act established the National Earthquake Hazards Reduction Program, which includes an earthquake prediction system and seismological resource studies.

### ***Disaster Mitigation Act of 2000***

The Sacramento County Multi-Hazard Mitigation Plan (MHMP) is designed to meet the requirements of the Disaster Mitigation Act of 2000. Formulation of the MHMP was based on: hazard identification and risk assessment of potential natural hazards that could impact Sacramento County, including the City of Folsom, a review of the County's capability to reduce hazards impacts, and recommendations to further reduce vulnerability to potential disasters, including earthquakes.

### ***U. S. Department of Agriculture Natural Resources Conservation Service***

The U. S. Department of Agriculture Natural Resources Conservation Service (NRCS) produces soil surveys that assist planners in determining which land uses are suitable for specific soil types and locations.

## **CALIFORNIA LAWS AND REGULATIONS**

### ***Alquist-Priolo Earthquake Fault Zoning Act of 1972***

The purpose of this Act 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.

### ***California Geologic Survey***

The California Geological Survey (CGS) provides regulatory information pertaining to soils, geology, mineral resources, and geologic hazards. CGS maintains and provides information about California's nonfuel mineral resources. In 2015, California ranked sixth in the United States in non-fuel mineral production. There were 717 active mines in the state in 2015 (CGS 2017a).

### ***California Seismic Hazards Mapping Act of 1990***

The Seismic Hazards Mapping Act directs CGS to identify and map areas prone to earthquake hazards of liquefaction, earthquake-induced landslides, and amplified ground shaking.

### ***California Building Standards Code***

The State of California provides minimum standards for building design through the California Building Standards Code (CBC, California Code of Regulations [CCR] Title 24). The CBC includes regulations for seismic safety, excavation of foundations and retaining walls, and grading activities (including drainage and erosion control and construction on unstable soils).

### ***National Pollutant Discharge Elimination System (NPDES) General Permit for Construction***

The State Water Resources Control Board's (SWRCB) statewide stormwater general permit for construction activity (Order 2009-0009-DWQ) applies to all land-disturbing construction activities that would disturb more than one acre. Activities subject to the NPDES general permit for construction activity must develop and implement a Stormwater Pollution Prevention Plan (SWPPP) designed to reduce erosion and potential impacts to water quality during construction.

### ***Surface Mining and Reclamation Act of 1975***

The SMARA requires all cities and counties to incorporate the mapped mineral resource designations approved by the State Mining and Geology Board in their General Plans.

### **LOCAL LAWS AND REGULATIONS**

The City of Folsom regulates the effects of soils and geological constraints on urban development primarily through enforcement of the CBC, which requires the implementation of engineering solutions for constraints to urban development posed by slopes, soils, and geology. Additional requirements are found in the Folsom Municipal Code (FMC) and in the City's Standard Construction Specifications.

#### ***Hillside Development Standards (FMC Chapter 14.33)***

Regulates urban development on hillsides and ridges to protect property against losses from erosion, ground movement, and flooding.

#### ***Grading Ordinance (FMC Chapter 14.29)***

Requires a grading permit prior to the initiation of any grading, excavation, fill or dredging. Regulates grading citywide to require revegetation and to control erosion, stormwater drainage, and ground movement.

#### ***Standard Construction Specifications***

Requirements of the City's Design and Procedures Manual and Improvement Standards related to soil erosion during grading include:

- 10.4 Erosion and Sedimentation Control
- 20.3 Landscape, Erosion Control

Requirements of the City's Standard Construction Specifications and Details, General Provisions related to soil erosion include:

- 9.1 Clearing and Grubbing

#### ***Folsom Plan Area/Russell Ranch Adopted Mitigation Measures***

Mitigation measures adopted by the City during its approval of the Folsom Plan Area Specific Plan and the Russell Ranch project related to geological hazards, soil erosion, and mineral resources include:

#### **Folsom Plan Area Specific Plan EIR/EIS**

- Mitigation Measure 3A.7-1a: Prepare Site-Specific Geotechnical Report per CBC Requirements and Implement Appropriate Recommendations.
- Mitigation Measure 3A.7-1b: Monitor Earthwork during Earthmoving Activities.
- Mitigation Measure 3A.7-3: Prepare and Implement the Appropriate Grading and Erosion Control Plan
- Mitigation Measure 3A.7-4: Prepare a Seismic Refraction Survey and Obtain Appropriate Permits for all On-Site and Off-site Elements East of Old Placerville Road



- Mitigation Measure 3A.7-5: Divert Seasonal Water Flows Away from Building Foundations
- Mitigation Measure 3A.7-9: Conduct Soil Sampling in Areas of the SPA Designated as Mineral Resource Zone (MRZ)-3 for Kaolin Clay and if Found, Delineate its Location and Notify Lead Agency and the California Division of Mines and Geology.

### **Russell Ranch Project EIR and Initial Study**

- Mitigation Measure 3A.7-5 (FPASP EIR/EIS): Divert Seasonal Water Flows Away from Building Foundations
- Mitigation Measure 3A.9-1 (FPASP EIR/EIS): Acquire Appropriate Regulatory Permits and Prepare and Implement SWPPP and Best Management Practices
- Initial Study VI-1: Prior to issuance of a grading permit, the applicant shall submit to the Engineering Division, for review and approval, a grading plan for the project site which ensures that all geotechnical recommendations specified in the geotechnical report are properly incorporated and utilized in the design.
- Initial Study VI-2: All foundation plans shall be reviewed and approved by the Building Safety Division, respectively, prior to issuance of building permits to ensure that all geotechnical recommendations specified in the geotechnical report are properly incorporated and utilized in the design.
- Initial Study VI-3: Prior to initiation of ground disturbance, a geotechnical engineer shall develop a program to monitor the sites during construction to ensure compliance with the recommendations presented in the geotechnical report(s) and conditions for performing such monitoring. The geotechnical monitoring program shall include a description of the improvements areas where geotechnical monitoring shall be required. The monitoring program shall be subject to review and approval by the Folsom Community Development Department.

### **11.1.3 PROPOSED GENERAL PLAN GOALS AND POLICIES**

The following policies from the proposed 2035 General Plan address geologic and seismic hazards, and mineral resources, as well as guide the location, design, and quality of development to minimize impacts to human health and environment from soil erosion and seismic hazards.

### **NATURAL AND CULTURAL RESOURCES ELEMENT**

**Policy NCR 4.1.5: New Development.** Require new development to protect natural drainage systems through site design, runoff reduction measures, and on-site water treatment (e.g., bioswales).

**Policy NCR 4.1.6: Low-Impact Development.** Require new development to protect the quality of water resources and natural drainage systems through site design, source controls, runoff reduction measures, BMPs, and Low-Impact Development.

### **SAFETY AND NOISE ELEMENT**

**Goal SN 1.1:** Maintain an effective response to emergencies, provide support and aid in a crisis, and repair and rebuild after a crisis.

**Policy SN 1.1.1: Emergency Operations Plan.** Develop, maintain, and implement an Emergency Operations Plan that addresses life and safety protection, medical care, incident stabilization, property conservation, evacuation, escape routes, mutual aid agreements, temporary housing, and communications.

**Policy SN 1.1.2: Community Emergency Response Team.** Support the Community Emergency Response Team program to train and prepare residents to mobilize in the event of a disaster.

**Policy SN 1.1.3: Cooperation.** Coordinate with emergency response agencies, school districts, utilities, relevant nonprofits, and business interests to ensure a coordinated response to and recovery from a disaster.

**Policy SN 1.1.4: Multi-Hazard Mitigation Plan.** Maintain on-going hazard assessment as part of the Sacramento County Multi-Hazard Mitigation Plan within the city.

**Goal SN 2.1:** Reduce risks and minimize impacts to the community from earthquakes and geologic hazards.

**Policy SN 2.1.1: Requirements.** Develop, maintain, and implement land use planning, building construction, and retrofitting requirements consistent with State standards to reduce risk associated with geologic and seismic hazards.

**Policy SN 2.1.2: Roads, Bridges, and Utility Lines.** Ensure that the design and engineering of new roads, bridges, and utility lines can withstand movement or ground failure associated with the seismic risk in Folsom consistent with State standards.

**Policy SN 2.1.4: Dredge Tailings.** Require new development on dredge tailings to conform to the guidelines and regulations of the California Geological Survey.

## 11.2 ENVIRONMENTAL EFFECTS

### 11.2.1 SIGNIFICANCE CRITERIA

As set forth in Appendix G, Questions VI and XI of the State CEQA Guidelines, the following criteria have been established to quantify the level of significance of an adverse effect to geology, soils, and mineral resources evaluated pursuant to CEQA. An impact would exceed a significance threshold under these circumstances:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving: *(VI.a)*
  - 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? *(VI.a.i)*
  - ii) Strong seismic ground shaking or seismic-related ground failure including liquefaction, or landslides? *(VI.a.ii through VI.a.iv)*
- Result in substantial soil erosion or the loss of topsoil. *(VI.b)*
- 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, or be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994). *(VI.c and VI.d)*

- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water. (VI.e)
- Result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state. (XI.a)
- 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. (XI.b)

**11.2.2 ANALYSIS METHODOLOGY**

The evaluation of potential seismic hazards and soil resource impacts associated with implementation of the proposed 2035 General Plan was based on a review of applicable federal, state, and regional laws, regulations, codes, and guidelines, and seismic hazard maps. The evaluation also assessed whether the policies in the 2035 General Plan promote adequate planning and oversight when authorizing the location, construction, and operation of any new development subject to the City’s jurisdiction in order to prevent potential hazards to persons or property, and minimize impacts to soil and mineral resources.

**11.2.3 LESS-THAN-SIGNIFICANT IMPACTS**

Based on the evaluations set forth below, potential impacts for the following specific topics with respect to soils were found to be less than significant. Therefore, they will not be evaluated further in this chapter.

VI. GEOLOGICAL RESOURCES		
Would the Project:	Less than Significant Impact	No Impact
a) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water? (VI.e)	X	

**EVALUATION OF LESS-THAN-SIGNIFICANT IMPACTS**

**Question (e) Septic Systems: Less-than-significant Impact.** For a septic system to function properly, soils must be capable of percolation – that is, a certain volume of water must flow through the soil in a certain time period, as determined by a licensed soils or geotechnical engineer. Wastewater is “treated” as soil bacteria feed on the waste material and in the process, break down the material into more basic elements that are dispersed into the lower layers of the soil horizon. If wastewater percolates through the soil too quickly, the bacteria do not have enough time to digest the material. On the other hand, if wastewater percolates through the soil too slowly, the bacteria are killed by the lack of oxygen.

The City of Folsom is currently served by a community-wide sanitary sewer system. Most of the city and the FPASP area soils consist of a shallow layer of silt, sand, or clay, underlain by bedrock. While much of the city and the entire FPASP area is rated with a severe limitation because the soils are unsuitable for conventional septic systems, the provision of sanitary sewer service is required within the city and planned for the FPASP area, and the use of septic systems would not be required. Therefore, buildout of the 2035 General Plan Planning Area would not result in the installation of septic systems in inadequate soils. This would be a less-than-significant impact, and no mitigation would be necessary.

### 11.2.4 POTENTIALLY SIGNIFICANT ENVIRONMENTAL IMPACTS

The following discussion examines the potential impacts of the proposed project based on the impact threshold criteria described above.

<b>Impact GEO-1 Exposure of people or structures to risk from seismic hazards, including strong groundshaking and liquefaction</b>	
Applicable Regulations	Earthquake Hazards Reduction Act, Disaster Mitigation Act, Alquist-Priolo Earthquake Fault Zoning Act, California Seismic Hazards Mapping Act, California Building Standards Code.
Adopted Mitigation Measures	FPASP Mitigation Measures 3A.7-1a, 3A.7-1b Russell Ranch IS VI-1, VI-2, VI-3.
Proposed GP Policies that Reduce Impacts	Policies SN 1.1.1 - 1.1.4, SN 2.1.1 - 2.1.2.
Significance after Implementation of GP Policies	Less than significant; no mitigation required.

Implementation of the proposed 2035 General Plan would result in urban infill and development, expanding the type and number of structures and associated persons exposed to potential seismic hazards. Compliance with existing regulations, including a comprehensive body of construction requirements enforced by the City, and implementation of 2035 General Plan policies would minimize the potential for loss, injury, or death following a seismic event. This would be a less-than-significant impact.

The 2035 Plan Evaluation Area is not within an Alquist-Priolo Earthquake Fault Zone, and there are no known faults within the 2035 Plan Evaluation Area. Therefore, fault rupture within the 2035 Plan Evaluation Area is highly unlikely; as a result, implementation of the proposed 2035 General Plan would not expose people or structures to the possibility of fault rupture. However, the area may be subject to seismic hazards caused by events occurring outside of the Planning Area. (CGS 2017b; CGS 2015)

The 2035 Plan Evaluation Area is located in an area of low seismic activity, and the seismic shaking potential would equate to strong perceived shaking and light potential damage. Therefore, new structures built under the 2035 General Plan could experience damage during seismic groundshaking events. With this development, additional residents and employees could be exposed to the effects of seismic groundshaking, liquefaction, and landslides from local and regional earthquakes. The 2035 General Plan would encourage infill development, which would in many cases replace older buildings subject to seismic damage with newer structures built to current seismic standards that could better withstand the adverse effects of strong ground shaking. (CGS 2017c)

Table 11-1 includes existing federal and state regulations, policies from the 2035 General Plan, and FPASP mitigation measures that aim to protect the public and the structures from seismic hazards. The table also sets forth how each cited regulation acts to prevent such hazards.

**Table 11-1 Regulatory Requirements and Proposed 2035 General Plan Goals/Policies Related to Seismic Hazards**

Measure Identification	How the Regulation or Policy Avoids or Reduces Impact
<b>FEDERAL REGULATIONS</b>	
<i>Earthquake Hazards Reduction Act</i>	Maintains an effective earthquake hazards reduction program that aims to reduce the risks to life and property from future earthquakes in the United States.
<i>Disaster Mitigation Act</i>	Requires a Multi-Hazard Mitigation Plan that includes hazard identification and risk assessment, including recommendations to reduce vulnerability to potential disasters, such as earthquakes.
<b>STATE REGULATIONS</b>	
<i>Alquist-Priolo Earthquake Fault Zoning Act</i>	Prevents the construction of buildings used for human occupancy on the surface trace of active faults.
<i>California Seismic Hazards Mapping Act</i>	Requires the identification and mapping of areas prone to earthquake hazards of liquefaction, earthquake-induced landslides, and amplified ground shaking.
<i>California Building Standards Code</i>	Provides minimum standards for building design, including regulations for seismic safety.
<b>CITY REQUIREMENTS</b>	
<i>None applicable</i>	--
<b>FOLSOM PLAN AREA SPECIFIC PLAN EIR/EIS</b>	
<i>Mitigation Measure 3A.7-1a</i>	Requires preparation of a geotechnical report for development in the FPASP area that will address and make recommendations on seismic ground shaking and related hazards.
<i>Mitigation Measure 3A.7-1b</i>	Requires a qualified geotechnical engineer to monitor earthwork during earthmoving activities in the FPASP area to implement requirements of the geotechnical report.
<b>RUSSELL RANCH PROJECT EIR</b>	
<i>Initial Study VI-1</i>	Requires a grading plan that includes all geotechnical recommendations specified in the geotechnical report.
<i>Initial Study VI-2</i>	Requires all foundation plans include geotechnical recommendations specified in the geotechnical report.
<i>Initial Study VI-3</i>	Requires a qualified geotechnical engineer to monitor earthwork during earthmoving activities to implement requirements of the geotechnical report.
<b>2035 GENERAL PLAN GOALS AND POLICIES</b>	
<i>Goal SN 1.1</i>	Encourages maintaining an effective response to emergencies, providing support and aid in a crisis, and repairing and rebuild after a crisis.
<i>Policy SN 1.1.1: Emergency Operations Plan</i>	Requires an Emergency Operations Plan to better respond for emergency response to hazardous materials incidents.
<i>Policy SN 1.1.2: Community Emergency Response Team</i>	Supports the provision of training to prepare residents to mobilize in the event of a disaster.
<i>Policy SN 1.1.2: Community Emergency Response Team</i>	Encourages cooperation to ensure a coordinated response in the even of a disaster.
<i>Policy SN 1.1.4: Multi-Hazard Mitigation Plan</i>	Expands the County Multi-Hazard Functional Plan by incorporating additional provisions for mutual aid agencies within the city to improve emergency prevention, preparedness, and response.

**Table 11-1 Regulatory Requirements and Proposed 2035 General Plan Goals/Policies Related to Seismic Hazards**

Measure Identification	How the Regulation or Policy Avoids or Reduces Impact
<i>Goal SN 2.1</i>	Encourages reducing risks and minimizing impacts to the community from earthquakes and geologic hazards.
<i>Policy SN 2.1.1: Requirements</i>	Requires building construction requirements consistent with state standards to reduce risk associated with geologic and seismic hazards.
<i>Policy SN 2.1.2: Roads, Bridges, and Utility Lines</i>	Requires the design and engineering of new roads, bridges, and utility lines can withstand movement or ground failure associated with the seismic risk in Folsom consistent with state standards.

*Source: Planning Partners 2017.*

Folsom’s soils are generally not prone to liquefaction during seismic events. Potential structural damage and the exposure of people to the risk of injury or death from structural failure would be minimized by compliance with CBC engineering design and construction measures. Foundations and other structural support features would be designed to resist or absorb damaging forces from strong ground shaking and liquefaction.

In addition to compliance with mandatory CBC requirements, implementation of several 2035 General Plan policies would further reduce the potential for loss, injury, or death following a seismic event. Additional policies would ensure adequate resources to respond to a seismic event, and educate the public about the dangers of and appropriate response to a seismic event.

For the FPASP area, adopted mitigation measures would minimize damage to people and structures from strong seismic ground shaking by requiring that the design recommendations of a geotechnical engineer to reduce damage from seismic events be incorporated into buildings, structures, and infrastructure as required by the CBC, and that a geotechnical or soils engineer provide on-site monitoring to ensure that earthwork is being performed as specified in the plans.

Although potential damage to people or structures from seismic ground shaking could occur, there is low likelihood of a strong seismic event. Based on an existing regulatory framework that addresses earthquake safety issues and requires adherence to requirements of the CBC and various design standards, as well as existing mitigation measures and 2035 General Plan policies, seismically induced groundshaking and secondary effects would not be a substantial hazard in the 2035 Plan Evaluation Area. In view of the above, the proposed 2035 General Plan would have a less-than-significant impact regarding the exposure of people or structures to damage resulting from strong seismic groundshaking. No mitigation would be required.

**Significance of Impact:** Less than significant.

**Mitigation Measure:** None required.

<b>Impact GEO-2 Result in substantial soil erosion or topsoil loss from heightened exposure to wind or water erosion</b>	
Applicable Regulations	California Building Standards Code, NPDES General Permit for Construction.
Adopted Mitigation Measures	FPASP Mitigation Measures 3A.7-3, 3A.9-1 Russell Ranch Mitigation Measure 3A.9-1 (FPASP EIR/EIS).
Proposed GP Policies that Reduce Impacts	Policies NCR 4.1.5 - 4.1.6.
Significance after Implementation of GP Policies	Less than significant; no mitigation required.

Implementation of the proposed 2035 General Plan would lead to construction activities during project implementation that would involve grading and movement of earth in soils subject to wind and water erosion hazard. Because of a comprehensive body of federal, state, and City requirements, and the policies set forth in the 2035 General Plan that would avoid or reduce the effect of erosion hazards, this impact would be less than significant.

Soil erosion creates a potential hazard for land development, both to on-site structures and waterways and structures downstream of eroding soil. One soil type in Folsom (Americanos-Urban land complex) has a high susceptibility for erosion; it is located in a small area in the northwestern corner of the city. Two other soil types have a medium to high susceptibility; these extend over much of Folsom (see Figure 11-2). In the FPASP area, construction activities would occur in soils that have moderate wind and water erosion hazard potential. Conducting these activities would result in the temporary disturbance of soil and would expose disturbed areas to winter storm events. Rain of sufficient intensity could dislodge soil particles from the soil surface. If the storm is large enough to generate runoff, localized erosion could occur. In addition, soil disturbance during the summer as a result of construction activities could result in soil loss because of wind erosion.

Indirect impacts from soil erosion, such as sediment transport and potential loss of aquatic habitat, are evaluated in Chapter 9, *Biological Resources*, and Chapter 14, *Hydrology and Water Resources*, respectively, of this Draft PEIR.

Table 11-2 includes existing state and City regulations, policies from the 2035 General Plan, and FPASP mitigation measures that minimize soil erosion during construction. The table also sets forth how each cited regulation acts to prevent such hazards.

<b>Table 11-2 Regulatory Requirements and Proposed 2035 General Plan Goals/Policies Related to Soil Erosion</b>	
<b>Measure Identification</b>	<b>How the Regulation or Policy Avoids or Reduces Impact</b>
<b>FEDERAL REQUIREMENTS</b>	
<i>None applicable</i>	--
<b>STATE REGULATIONS</b>	
<i>California Building Standards Code</i>	Provides minimum standards for building design, including guidance on grading and erosion control.
<i>NPDES General Permit for Construction</i>	Minimizes soil erosion from construction.

<b>Table 11-2 Regulatory Requirements and Proposed 2035 General Plan Goals/Policies Related to Soil Erosion</b>	
<b>Measure Identification</b>	<b>How the Regulation or Policy Avoids or Reduces Impact</b>
<b>CITY REQUIREMENTS</b>	
<i>Hillside Development Standards (FMC Chapter 14.33)</i>	Regulates development on hillsides and ridges in order to prevent erosion.
<i>Grading Ordinance (FMC Chapter 14.29)</i>	Requires a grading permit that includes standards and procedures for erosion control.
<i>Design Standards - Erosion and Sedimentation Control, 20.3 Landscape, Erosion Control</i>	Requires cut slopes 2:1 and steeper to have special design provisions to control erosion and runoff.
<i>Standard Construction Specifications - 9.1 Clearing and Grubbing</i>	Requires erosion control during construction and compliance with all provisions of SWPPP.
<b>FOLSOM PLAN AREA SPECIFIC PLAN EIR/EIS</b>	
<i>Mitigation Measure 3A.7-3</i>	Requires a grading and erosion control plan for development in the FPASP area.
<i>Mitigation Measure 3A.9-1</i>	Requires coverage under the SWRCB's NPDES stormwater permit for development in the FPASP area, which must specify erosion and sediment control measures.
<b>RUSSELL RANCH PROJECT EIR</b>	
<i>Mitigation Measure 3A.9-1 (FP ASP EIR/EIS)</i>	Requires coverage under the SWRCB's NPDES stormwater permit for development in the FPASP area, which must specify erosion and sediment control measures.
<b>2035 GENERAL PLAN GOALS AND POLICIES</b>	
<i>Policy NCR 4.1.5: New Development</i>	Require new development to protect natural drainage systems through runoff reduction measures.
<i>Policy NCR 4.1.6: Low-Impact Development</i>	Require new development to protect the quality of water resources and natural drainage systems through runoff reduction measures.

Source: Planning Partners 2017.

The *Folsom Plan Area Specific Plan EIR/EIS* and the *Russell Ranch Project EIR* mitigation measures would reduce construction-related erosion impacts from development in the FPASP area because grading and erosion control plans with specific erosion and sediment control measures would be prepared, approved by the appropriate City or county department, and implemented.

Construction of the land uses in the 2035 General Plan throughout the 2035 Plan Evaluation Area in accordance with the requirements of the CBC would reduce or avoid potential effects from soil erosion hazards. Compliance with the City's Grading Ordinance, the Hillside Development Standards (as applicable), and standard conditions of approval would further minimize impacts related to soil erosion. As a condition of approval, prior to the issuance of a grading or building permit, the City would require the applicant to prepare a soils report, a geotechnical report, and a detailed grading plan by a qualified and licensed engineer. The preparation of a soils and geotechnical report would provide information on soil hazards, reducing potential soil erosion impacts.



A project involving construction activities that disturb one or more acres would require a General Construction Activity Stormwater Permit and a NPDES permit from the SWRCB. Prior to the initiation of grading, the project applicant is required by the SWRCB to prepare and implement a SWPPP designed to reduce potential impacts to water quality during construction of the project. The SWPPP would include dust control BMPs for the stabilization of exposed surfaces.

The implementation of a SWPPP, compliance with the CBC requirements and City standards, as well as implementation of existing mitigation measures and 2035 General Plan policies would reduce impacts from geophysical features related to soil erosion to a less-than-significant level. No additional mitigation measures would be necessary.

**Significance of Impact:** Less than significant.

**Mitigation Measure:** None required.

<b>Impact GEO-3 Potential geologic hazards related to unstable soils</b>	
Applicable Regulations	California Building Standards Code.
Adopted Mitigation Measures	FPASP Mitigation Measures 3A.7-1a, 3A.7-1b, 3A.7-4, 3A.7-5, Russell Ranch Mitigation Measures 3A.7-5 (FPASP EIR/EIS), Initial Study VI-1, VI-2, VI-3.
Proposed GP Policies that Reduce Impacts	None available.
Significance after Implementation of GP Policies	Less than significant; no mitigation required.

Implementation of the proposed 2035 General Plan could lead to the construction and operation of urban development and infrastructure that could be located on unstable or expansive soils, or exposed to geologic hazards. Because of a comprehensive body of construction requirements enforced by the City, and adopted mitigation measures that would avoid or reduce the effect of unstable soils and other types of geologic hazards, this impact would be less than significant.

Future development under the 2035 General Plan may periodically be proposed on expansive soils (i.e., soils with high clay content and a greater potential to expand and contract under saturated and dry conditions). These volume changes can result in damage over time to building foundations, underground utilities, and other subsurface facilities and infrastructure if they are not designed and constructed appropriately to resist the damage associated with changing soil conditions. Development may also occur on unstable soils vulnerable to liquefaction or landslides, though Folsom’s soils are not prone to these hazards.

Development in the eastern portion of the city and the FPASP area would occur in steep slopes underlain by bedrock at shallow depths and rock outcrops that could result in geologic hazards during construction. The primary concerns related to local geologic conditions is related to settlement and differential settlement that could damage proposed foundations, structures, and pipelines. In addition, several of the soils that underlie the city have a high risk of corroding unprotected structures.

Table 11-3 includes existing state and City regulations, policies from the 2035 General Plan, and FPASP mitigation measures that address geologic hazards from unstable soils. The table also sets forth how each cited regulation acts to prevent such hazards.

<b>Table 11-3 Regulatory Requirements and Proposed 2035 General Plan Goals/Policies Related to Geologic Hazards from Unstable Soils</b>	
<b>Measure Identification</b>	<b>How the Regulation or Policy Avoids or Reduces Impact</b>
<b>FEDERAL REQUIREMENTS</b>	
<i>None applicable</i>	--
<b>STATE REGULATIONS</b>	
<i>California Building Standards Code</i>	Provides minimum standards for building design, including regulations for construction on unstable soils.
<b>CITY REQUIREMENTS</b>	
<i>Hillside Development Standards (FMC Chapter 14.33)</i>	Regulates development on hillsides and ridges in order to protect property from geologic hazards, including landslides.
<i>Grading Ordinance (FMC Chapter 14.29)</i>	Requires a grading permit that includes standards and procedures to minimize geologic hazards.
<b>FOLSOM PLAN AREA SPECIFIC PLAN EIR/EIS</b>	
<i>Mitigation Measure 3A.7-1a</i>	Requires preparation of a geotechnical report for development in the FPASP area that will address and make recommendations on unstable soils.
<i>Mitigation Measure 3A.7-1b</i>	Requires a qualified geotechnical engineer to monitor earthwork during earthmoving activities in the FPASP area to implement requirements of the geotechnical report.
<i>Mitigation Measure 3A.7-4</i>	Requires preparation of a seismic refraction survey for development East of Old Placerville road to prevent geologic hazards during construction.
<i>Mitigation Measure 3A.7-5</i>	Requires actions as recommended by the geotechnical engineer to divert seasonal flows from building foundations.
<b>RUSSELL RANCH PROJECT EIR</b>	
<i>Measure 3A.7-5 (FPASP EIR/EIS)</i>	Requires actions as recommended by the geotechnical engineer to divert seasonal flows from building foundations.
<i>Initial Study VI-1</i>	Requires a grading plan that includes all geotechnical recommendations specified in the geotechnical report.
<i>Initial Study VI-2</i>	Requires all foundation plans include geotechnical recommendations specified in the geotechnical report.
<i>Initial Study VI-3</i>	Requires a qualified geotechnical engineer to monitor earthwork during earthmoving activities to implement requirements of the geotechnical report.
<b>2035 GENERAL PLAN GOALS AND POLICIES</b>	
<i>Goal SN 2.1</i>	Encourages reducing risks and minimizing impacts to the community from earthquakes and geologic hazards.
<i>Policy SN 2.1.4: Dredge Tailings</i>	Requires new development on dredge tailings to conform to the guidelines and regulations of the California Geological Survey.

Source: Planning Partners 2017.

The specific policies that would govern grading in the FPASP area have been designed to comply with the City’s Hillside Development Standards and Grading Ordinance. In some cases, policies in

these Ordinances have been refined for use specifically within the FPASP area. The *Folsom Plan Area Specific Plan EIR/EIS* and the *Russell Ranch Project EIR* mitigation measures would reduce potential geologic hazards from unstable soils by requiring geotechnical investigations. The mitigation measures require that the design recommendations of a geotechnical engineer to reduce damage from expansive soils be incorporated into buildings, structures, and infrastructure as required by the CBC, and that a geotechnical or soils engineer provide on-site monitoring to ensure that earthwork is being performed as specified in the plans.

Elsewhere in the city, the City Code requirements for Grading and Hillside Development (FMC Chapters 14.29 and 14.33, respectively) impose standards similar to those identified as mitigation for the FPASP area. These two elements of the City Code would reduce potential geologic hazards from unstable soils by requiring geotechnical investigations, implementation of identified design recommendations of a geotechnical engineer to reduce damage, and monitoring of construction by a geotechnical or soils engineer to ensure that earthwork is being performed as specified in the plans. Additionally, to ensure safety precautions are implemented, Policy SN 2.1.3 requires conformance with the California Geological Survey regulations if new development occurs in areas of dredge tailings.

Compliance with the CBC requirements and City standards, as well as implementation of existing mitigation measures would reduce impacts from geophysical features related to unstable soils to a less-than-significant level. No additional mitigation measures would be necessary.

**Significance of Impact:** Less than significant.

**Mitigation Measure:** None required.

<b>Impact GEO-4 Result in the loss of availability of a locally-important mineral resource recovery site</b>	
Applicable Regulations	Surface Mining and Reclamation Act.
Adopted Mitigation Measures	FPASP Mitigation Measure 3A.7-9.
Proposed GP Policies that Reduce Impacts	None available.
Significance after Implementation of GP Policies	Significant; mitigation required.
Mitigation Measures	None available.
Significance after Mitigation	Significant and unavoidable.

Construction of new development associated with the 2035 General Plan could result in loss of economically valuable mineral resources in the western edge of the 2035 Plan Evaluation Area. Even with mitigation measures to identify if any resources are present, development of urban uses would cover potentially valuable resources, and they would no longer be available for mining. This would be a significant impact.

The presence of mineral resources within the City of Folsom has led to a long history of gold extraction, primarily placer gold. The State of California, under SMARA, can designate certain areas as having mineral deposits of regional significance. Urbanized areas and public parks are typically excluded from this determination, effectively removing almost the entire area north of Highway 50

from consideration for mineral resources. Much of the area of Folsom south of Highway 50, however, is designated under SMARA as having some minerals of regional or statewide value. The western edge of the FPASP area is designated by CDMG as MRZ-3 for kaolin clay. It is currently unknown whether or not an economically valuable deposit of kaolin clay is present.

Table 11-4 includes existing state regulations and mitigation measures for development of the FPASP area that protect the potential mineral resources in the 2035 Plan Evaluation Area. The table also sets forth how each cited regulation acts to protect these sensitive resources.

<b>Table 11-4 Regulatory Requirements and Proposed 2035 General Plan Goals/Policies Related to the Protection of Mineral Resources</b>	
<b>Measure Identification</b>	<b>How the Regulation or Policy Avoids or Reduces Impact</b>
<b>FEDERAL REQUIREMENTS</b>	
<i>None applicable</i>	--
<b>STATE REGULATIONS</b>	
<i>Surface Mining and Reclamation Act</i>	Requires all cities and counties to incorporate the mapped mineral resource designations approved by the State Mining and Geology Board in their General Plans.
<b>CITY REQUIREMENTS</b>	
<i>None applicable</i>	--
<b>FOLSOM PLAN AREA SPECIFIC PLAN EIR/EIS</b>	
<i>Mitigation Measure 3A.7-9</i>	Requires soil sampling in areas of the FPASP designated as MRZ-3 for kaolin clay, and if found, requires delineating its location and notifying the lead agency and the California Division of Mines and Geology.
<b>RUSSELL RANCH PROJECT EIR</b>	
<i>None applicable</i>	--
<b>2035 GENERAL PLAN GOALS AND POLICIES</b>	
<i>None applicable</i>	--

*Source: Planning Partners 2017.*

As cited by the EIR/EIS for the Folsom Plan Area Specific Plan, except for its extreme western edge, Folsom south of Highway 50 is classified as containing mineral deposits, particularly kaolin clay and aggregate that can be employed for construction, although both are of unknown significance. The EIR/EIS calls for soil sampling to occur in these areas prior to development to determine the presence of economically valuable mineral resources. However, if economically valuable mineral resources were found to be present, they would be covered over as a result of FPASP area development with urban land uses, and would no longer be available for mining.

Even with implementation of adopted mitigation measures, because development of urban uses would cover potentially valuable resources, and they would no longer be available for mining, this impact is considered significant.

**Significance of Impact:** Significant.

**Mitigation Measure GEO-4:** None available.

No other feasible mitigation measures are available to reduce impacts associated with potential loss of mineral resources to a less-than-significant level because it is technically infeasible to allow urban development without precluding future mining activities in the area. Because loss of valuable mineral resources could potentially occur as a result of 2035 General Plan buildout, this impact is considered significant and unavoidable.

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