10.0
GEOLOGY, SOILS, AND MINERAL RESOURCES

This chapter provides an evaluation of the potential geologic and soils effects that may occur from the proposed 2035 San Benito County General Plan (2035 General Plan). As established in the Notice of Preparation (see Appendix A, Notice of Preparation), development and other activities resulting from implementation of the 2035 General Plan may lead to increased risks from geologic hazards or impacts to existing geologic, soil, and mineral resources in San Benito County (County). Future development would 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 the existing geologic and soil resources potentially affected by the implementation of the 2035 General Plan, including the County's soil types and associations, their geologic origins, the seismically active faults within or bordering the County, the types and locations of mineral resources within the County, and an evaluation of the project's potential impacts on those resources.

10.1 SETTING

The environmental and regulatory settings for geology, soils and mineral resources are described below are based on the General Plan Background Report (Background Report)(San Benito County 2010b). Pursuant to State CEQA Guidelines §15150, this document is incorporated into the RDEIR by reference as though fully set forth herein. Where necessary, information in the Background Report has been updated with the best available and most current data, as previously discussed in Section 4.3. The Background Report is available for download at: www.sanbenitogpu.com/docs.html. Copies of the Report may be viewed during standard business hours (8:00 a.m. to 12:00 p.m. and 1:00 p.m. to 5:00 p.m.), Monday through Thursday, at the San Benito County Planning and Building Department, 2301 Technology Parkway, Hollister, California 95023. County offices are closed to the public on Fridays.

10.1.1 Environmental Setting

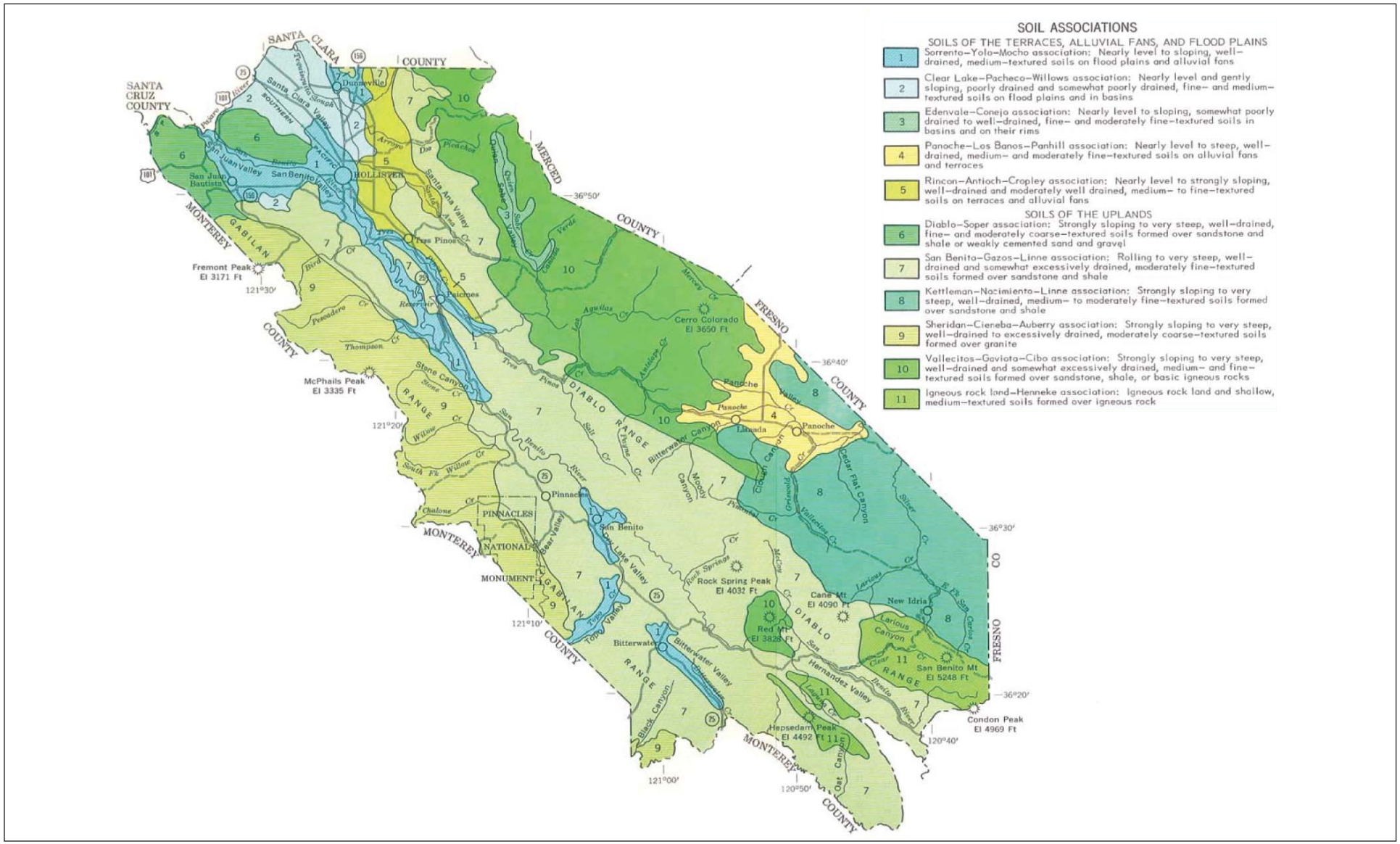
Physiography and Soils

Soils within the unincorporated County consist of eleven soil associations classified into two groups: 1) soils of terraces, alluvial fans, and floodplains; and 2) soils of the upland areas (see Figure 10-1).

Soils of Terraces, Alluvial Fans, and Floodplains

These soils are generally found in areas of little to no topographic relief that grade into areas of moderate slopes along terrace deposits. These soils are composed of alluvium derived from the erosion of sedimentary and igneous rocks. In most areas, they are cultivated as agricultural land. Elevation ranges from approximately 100 to 2,000 feet. Areas that are not cultivated support annual grasses, forbs, and oak trees. The soil group comprises approximately 15 percent of the soil types in the County. The following five soil associations make up this group:

- **Sorrento Yolo Mocho Association.** These soils are nearly flat, well drained, and medium textured; they are found on floodplains and alluvial fans. The soils represent productive agricultural land, and produce irrigated fruits and nuts, row and field crops, alfalfa, and pasture.
- **Clear Lake Pacheco Willows Association.** These soils are nearly flat, poorly drained to somewhat poorly drained, and fine and medium textured; they are found on floodplains and basins. The soils are extensively cultivated with row and field crops, alfalfa, and small grains. Fruits and nuts are grown where soils have been drained.
- **Edenvale Conejo Association.** These soils are nearly level, somewhat poorly drained to well drained, and fine and moderately fine textured; they are found in basins and their rims. Irrigation water supply is limited, and the soils are used mainly for dryland grain and pasture. Within this association Edenvale soils are less fertile due to a high magnesium to calcium ratio.
- **Panoche Los Banos Panhill Association.** These soils are nearly flat, well drained, and medium and moderately fine textured; they are found on alluvial fans and terraces. These soils are used for annual grasses, irrigated cotton, alfalfa, safflower, wheat, and barley. Overgrazing has resulted in erosion where soils are sloped.
- **Rincon Antioch Cropley Association.** Nearly flat to strongly sloping, well drained and moderately well drained, medium to fine textured soils on terraces and alluvial fans. Soils in this association are used for fruits, nuts, alfalfa, row and field crops, and annual grass pasture.



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Source: U.S. Department of Agriculture Soil Conservation Service 2010

Figure 10-1

Soil Associations in San Benito County

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Soils of the Uplands

These soil associations are underlain by igneous and sedimentary rocks. Upland soils comprise about 85 percent of the soil types in the County and consist of the following six soil associations:

- **Diablo Soper Association.** These soils are sloping to very steep, well drained, fine and moderately coarse textured soils over sandstone and shale or poorly cemented sand and gravel. The soil association supports grain, annual grass pasture, and range. The potential for soil erosion is severe, and landslides occur where underlain by soft sediments.
- **San Benito Gazos Linne Association.** These are soils of rolling hills and very steep slopes, well drained to somewhat excessively drained, moderately fine textured soils over sandstone and shale. The soils are moderately to heavily eroded and used for small grain, annual grass pasture, and range. Overgrazing has resulted in erosion.
- **Kettleman Nacimiento Linne Association.** These soils are sloping to very steeply sloping, well drained, medium to moderately fine textured soils over sandstone and shale. The soils are underlain by calcareous sandstone and shale at depths of 20 to 60 inches. Annual grasses, forbs, and oak trees grow commonly. These soils are used for dry grass pasture; overgrazing has removed vegetation and resulted in heavy soil erosion.
- **Sheridan Vieneba Auberry Association.** These soils are sloping to very steep sloping, well drained to excessively drained, moderately coarse textured soils over granite. This soil association is used for pasture, range, watershed, wildlife, and recreation. Overgrazing and wildfires have resulted in severe erosion.
- **Vallecitos Gaviota Cibo Association.** These soils are sloping to very steeply sloping, well drained and somewhat excessively drained, medium and fine textured soils over sandstone, shale and igneous rocks. The soils of this association are used for range, watershed, wildlife, and recreation. Where properly managed, the soils support grazing and forage plants.
- **Igneous Rock Land Henneke Association.** These soils are igneous rock land and shallow, medium textured soils over igneous rock. Soils of this association are used for watershed and recreation. The soils have very low fertility and are severely eroded.

Geology

The County is located within the Coastal Ranges Geomorphic Province. The northern central portion of the County is characterized by the relatively flat San Juan, Hollister, and Santa Ana Valleys that are composed of alluvium. These fertile valleys support extensive agriculture activities and are surrounded by the mountains of the Diablo Range to the east and the Gabilan

Range to the west. There are well-known active geologic features within the County, including the San Andreas Fault. The San Andreas Fault is a right lateral strike slip fault and can be traced offshore from near Cape Mendocino in Humboldt County to the Salton Sea in the Imperial Valley. The San Andreas Fault spans the length of the County, stretching 60 miles from the Santa Cruz County line in the north to the Monterey County line in the south. The San Andreas Fault strike is 45 degrees west of north. Several other known faults also exist in the County, including the Calaveras, Sargent, Paicines, Bear Valley, Zayante Vergeles, and Quien Sabe Faults.

The near surface general geologic units within the San Juan and Hollister Valleys consist of Holocene alluvium approximately 10,000 years in age. With depth, the geologic units are the Pliocene/Pleistocene San Benito Gravels and Santa Clara Formation, the Pliocene Purisima Formation, which ranges in age from 24.5 million to 500,000 years before present, and the Mesozoic basement rocks of the Franciscan Formation, which are older than 65 million years. Holocene alluvium near surface deposits within the San Juan Valley are composed of unconsolidated lenticular beds of gravel, sand, silt, and clay deposited by streams as floodplain, alluvial fan, slope wash, and terrace deposits.

Holocene alluvium deposits can attain thickness of up to 250 feet. Holocene deposits are underlain by deposits of Pliocene and Pleistocene aged San Benito Gravel and the Santa Clara Formation. The San Benito Gravel attains thickness of up to 1,400 feet (Kilburn 1972), and the gravels are recognized only in the Hollister Valley, with surface exposures existing to the east and southwest of Hollister. The Santa Clara Formation underlies the San Benito Gravels and is of undetermined thickness; however, in the San Juan Valley, it is believed that the deposits are less than 300 feet thick. These deposits are exposed along the Calaveras Fault and consist of compact lenticular beds of clay, sand, and gravel.

The Purisima Formation is conglomerate, sandstone, shale, and diatomite with minor ash beds. The Purisima Formation was first described as "extensive series of conglomerates, fine grained sandstones, and shales developed in the vicinity of Purisima Creek, approximately four miles south of Half Moon Bay, some 60 miles northwest of the County." Kilburn distinguishes three members of the Purisima Formation within the San Juan and Hollister Valleys. These are, from youngest to oldest, the upper member, the middle member, and the lower member. The Lomerias Muertas and Flint Hills to the north are identified as the Purisma Formation, and described as the Sargent Anticline.

The Gabilan and Diablo Ranges consist of highly deformed and metamorphosed sedimentary and igneous rocks. Sedimentary formations consist of marine and fluvial deposits. Deposits of sandstone, conglomerate, chert, and greywacke are known and point to alternating episodes of marine and fluvial (river and stream) deposition. The rock formations have been intensely deformed during the collision of the North American Plate and the Pacific Plate. Formations

have undergone low grades of metamorphism. The sedimentary formations have been intruded extensively by Mesozoic age granitic intrusions. Low grade metamorphism has resulted in the alteration of ultramafic rocks to asbestos containing formations. Benitoite is a rare blue gemstone. The only known occurrence of Benitoite in gemstone quality is within ultramafic deposits in the County. Benitoite was designated the official gemstone of California in 1985.

Naturally Occurring Asbestos and Minerals as Hazards

Areas likely to contain asbestos have been identified in the County based on the California Geologic Survey (GCS) Open File Report 2000 19. Naturally Occurring Asbestos (NOA) is likely to be found in the southern part of the County. On May 1, 2008, the Environmental Protection Agency (EPA) issued the CCMA (Clear Creek Management Area) Asbestos Exposure and Human Health Risk Assessment. The study concluded that adults and children visiting the CCMA more than once per year could be exposed to carcinogens such as asbestos that are above EPA acceptable levels. The Bureau of Land Management (BLM) issued the temporary closure order on May 1, 2008, closing 30,000 acres within the Serpentine Area of Critical Environmental Concern. Since the closure order took effect, BLM released a Draft Resources Management Plan & Draft Environmental Impact Statement in November 2009 to develop management alternatives for areas containing asbestos. This area of elevated NOA also includes the Union Carbide Joe Pit Mine, a former asbestos surface mine at the southern tip of the County border.

Earthquakes, Active Faulting, Seismic or Ground Shaking

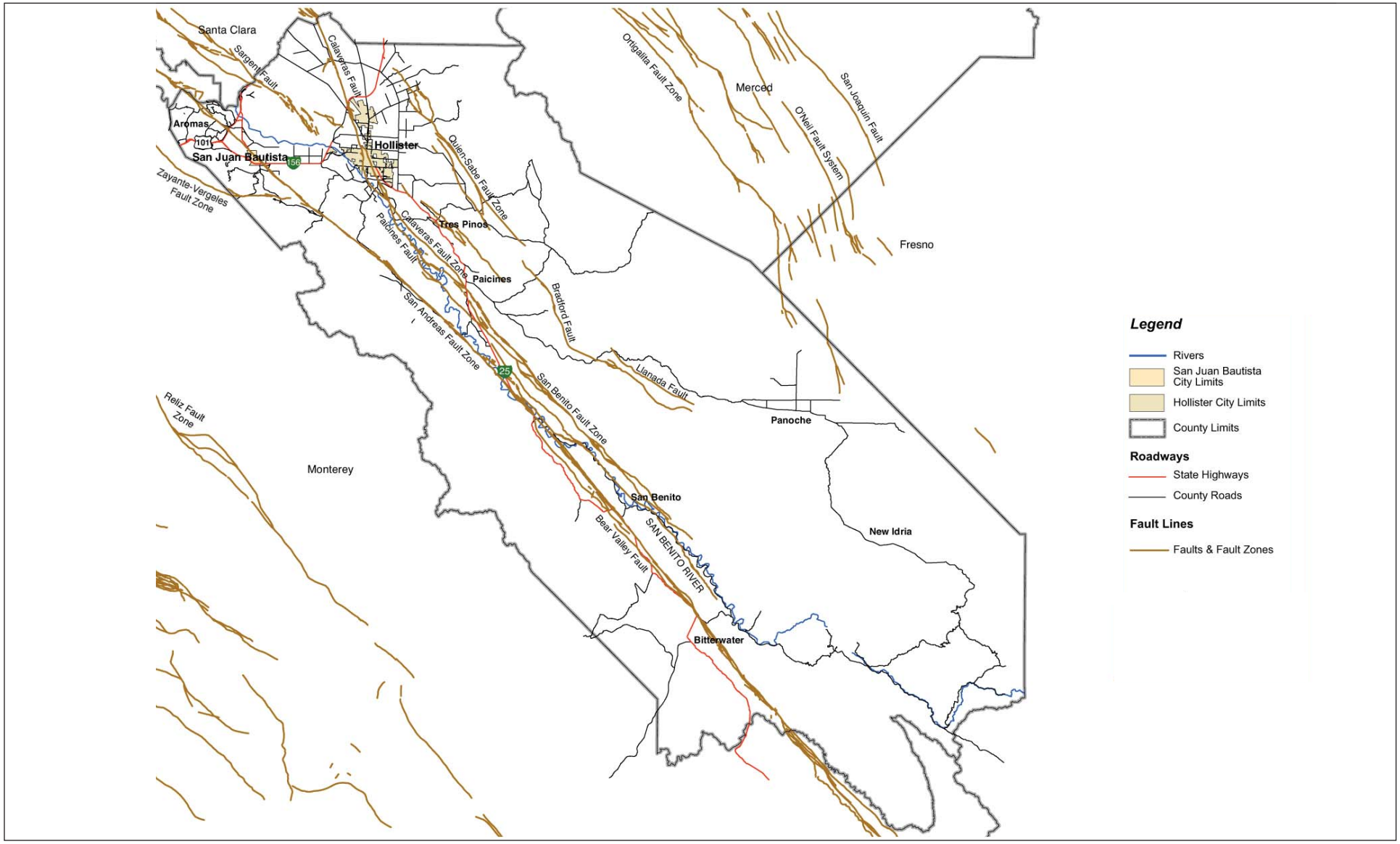
Earthquakes are typically measured using the Richter Scale or the Modified Mercalli Scale. The Richter Scale describes the amplitude of an earthquake using a seismograph. Magnitude (M) is calculated as a logarithmic relationship to amplitude, meaning the amplitude of an M 6.0 earthquake is ten times greater that an M 5.0 earthquake. This relationship means that the energy released by an M 6.0 quake is 32 times greater than an M 5.0 quake. The Mercalli Intensity Scale is based on observable effects of earthquakes. Table 11 1 explains the Richter Scale and the Modified Mercalli Scale.

Faults are surface and subsurface fissures that are located in geologically weak areas and potential displacement areas of the underlying bedrock. There are several faults of major historical significance in the vicinity of the County (see Figure 10-2). The Quaternary Fault, or believed displacements, have occurred in the last 1.8 million years before the present. The San Andreas Fault and the Calaveras Faults have both experienced movement in modern historic times. Other faults present within the County that have experienced movement in the past 11,000 years (Holocene Period) and are considered active, but for which no historic record of movement exists, are: the Quien Sabe Fault along the foot of the Diablo Range in the northeast of the County; the Sargent Fault north of Hollister; the Paicines Fault near Paicines; and the Bear Valley Fault east of the Pinnacles National Monument.

APEFZA prohibits the construction of structures within 50 feet of an active fault trace as identified by the State Geologist. Active faults as identified by the State Geologist were published in CGS Special Publication 42 in 2007. However, it should be noted that APEFZA deals specifically with surface rupture associated with faulting. Therefore, potentially active faults without a surface expression are not included in this document. The principal active faults identified by APEFZA within the County are the San Andreas Fault and the Calaveras Fault. Based on data collected by the CGS regarding California Historic Earthquakes with a magnitude of over 5.5, in excess of 15 earthquakes have been reported in the County dating back to the beginning of the 19th century. Historic records of these quakes indicate that the San Juan Bautista Mission was damaged during the 1906 San Francisco earthquake, and fault rupture was reported. Reports of damage and evidence of previous historical earthquakes have been documented. Fault rupture along the Calaveras Fault was last reported in 1897 during an M 6.3 earthquake.

The California Geologic Survey Probabilistic Seismic Hazard Assessment (PSHA) calculates earthquake shaking hazards through historic seismic activity and fault slip rates. PSHA considers faults that may result in seismic shaking, including faults that have no clear surface expression or that may not have associated surface rupture. Four PHSA identified faults are present within the County. These include the San Andreas, Calaveras, Zayante Vergeles, and Quien Sabe Faults. Shaking is expressed as the Peak Ground Acceleration (PGA) measured as a percentage (or fraction) of acceleration due to gravity (%g) from ground motion that has a 10 percent probability of being exceeded in 50 years. PGA in the County ranges from 30 percent to greater than 80 percent of g (g is acceleration due to gravity, 32.2 ft./sec^2). The highest probability of the 80 percent of g acceleration value is located near the northern boundary of the County along the San Andreas Fault, which traverses the County and continues north into the Bay Area and beyond. In comparison, the majority of the Bay Area has a higher likelihood of exceeding 100 percent of g acceleration.

The Working Group on California Earthquake Probabilities (WGCEP) 2008 Report showed there is a 93 percent probability that an M 6.7 or greater earthquake, and a 16 percent probability of M 7.5 or greater earthquake, would occur during the next 30 years in northern California. The WGCEP 2003 Report indicates a 62 percent probability of an M 6.7 or greater earthquake for the San Francisco Bay Area Region. Individual faults within the County with the highest earthquake probabilities cited in the 2008 report were the San Andreas and Calaveras Faults. A major earthquake in the San Francisco Bay Area could have a significant impact in the County related to but not limited to, seismic shaking, liquefaction, and ground rupture.



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Source: San Benito County Planning and Building Department 2010, U.S. Geological Survey 2010

Figure 10-2
Geologic Faults in San Benito County

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The USGS measures creep along the San Andreas and Calaveras Faults at five locations in or near the County. Two measuring locations for the Calaveras Fault exist in Hollister, at Wright Road and at Seventh Street. Creep rates are measured at 8.9 and 6.8 millimeters (mm) per year respectively since 1979. Three locations are measured along the San Andreas Fault within the County: creep averaged 11.7 mm per year since 1990 at the Mission Vineyard in San Juan Bautista, at Searle Road creep averaged 1.2 mm per year since 1990 and at Cannon Road creep averaged 0.1 mm per year during the same period.

Design criteria for seismic loading and other geologic hazards are provided generally in the seismic elements of city and County general plans, but more specifically in the building and development codes and other regulations under state law and as implemented by these local governments. These documents typically incorporate California Building Code (CBC) design standards and are informed by the APEFZA, as described. The CBC provides design criteria for geologically induced loading that govern sizing of structural members. The CBC also provides calculation methods to assist in the design process. County building and development laws and regulations incorporate the provisions of the CBC by reference, and add additional safety factors for critical structures and local considerations.

Ground Failure and Liquefaction

Seismic ground shaking can result in a great deal of soil compaction and settlement. If the sediments that compact during an earthquake are saturated, water from voids is forced to the ground surface where it emerges in the form of mud spouts or sand boils. If the soil liquefies in this manner (liquefaction), it loses its supporting structure, resulting in a condition where buildings and other constructed facilities could settle into the ground. The extent of structural damage can range from minor displacement to total collapse. Engineering techniques involving the ground, the structures, or both, can be used to reduce the risk of certain hazards, such as liquefaction. However, these solutions are often temporary and costly. Alternatives to engineering solutions include land use restrictions and controls through special ordinances. For example, regulating the type or density of developed uses in a given area can be effective in avoiding or reducing potential hazards. For example, certain low occupancy uses may be acceptable in some risk areas, whereas high occupancy uses or critical facilities (schools, hospitals) may not be.

Ground failure and liquefaction has been reported for historical earthquakes within the County, including near Hollister and San Juan Bautista. During the 1989 Loma Prieta earthquake sand boils, lateral spreading, and ground settlement were reported at four locations within the County. Liquefaction susceptibility was estimated for the nine counties within the San Francisco Bay Area by USGS OFR 00 444. Although the County is not included in the analysis, some inferences can be made based on the similarity of earthquake risk and soils and geologic

conditions between the County and the San Francisco Bay Area. Risk of liquefaction is considered highest near Quaternary alluvial deposits, where soil saturation is close to the land surface. Although no specific liquefaction hazard areas have been delineated in the County, the potential is recognized throughout the Santa Clara Valley and in most areas where unconsolidated sediments and a high water table coincide. Therefore, due to proximity of the County to the Santa Clara Valley, and the similar geology of the two regions, it is reasonable to assume that liquefaction hazards exist near surface streams and in areas of unconsolidated sediment within the County.

Dam Failure and Lurching

Protection against dam and levee failures is critical to the safety and well-being of the County residents. Three surface reservoirs are located in the County: the Hernandez Reservoir (17,200 acre feet capacity), the Paicines Reservoir (2,870 acre feet capacity), and the San Justo Reservoir (7,000 acre feet capacity). These reservoirs are confined by dams constructed from concrete, rock fill, or a combination of both. Dam and levee failure can occur due to natural and human made causes. Poor construction, extensive hydraulic head pressure, and earthquakes can also result in the failure of dams. Please see Section 11.2, Flood Hazards, for further discussion related to flood hazards, including those from dam failure. Lurching is defined as sudden lateral ground movement toward steep, unsupported embankments during seismic shaking. Due to the combination of steep slopes and the proximity of fault zones throughout the County, lurching in populated areas within the County is considered a high risk.

Slope Instability and Subsidence

Slope instability can result in the movement of material down a slope or gradient. Instability can result in a sudden release of material moving rapidly down a hillside. When the moving material consists only of rocks, the phenomenon is known as a rock fall. Slope instability can also result in the gradual movement of a material down a slope in a process known as a landslide. Landslides are usually characterized by little or no deformation of the soil structure associated with the movement. When significant amounts of water are present, the rock and sediment can form rapidly moving slurry known as a debris flow. The driving force behind all these occurrences is gravity; slope instability is usually associated with areas of steep topography. Other factors that influence slope instability include the presence of water within the rock or soil mass, the angle of the bedding plane with respect to the ground surface, previous land movement or instability, human modification of the slope, wildland fire history, and ground shaking caused by an earthquake or human activity.

The USGS (OF 71 231) has mapped a relative abundance of landslides in the San Francisco Bay Area. However, the publication evaluates only the northern portion of the County and does not cover the lightly populated central and southern portions of the County. The USGS map rates

landslide abundance from one (least abundant) to six (most abundant). For example, flat valley floor areas are rated as least abundant. Areas of steeper topography within the Diablo and Gabilan Ranges are rated to have more abundant (two through five) landslides.

The San Francisco Bay Landslide Team has mapped landslides in the ten counties within the San Francisco Bay Area. This includes Santa Clara County to the north and Santa Cruz County to the west (OF 97 745). The mapping showed that most landslides were reported in areas of steep topography within the Gabilan Range. Due to the geologic and topographic similarities between Santa Cruz and Santa Clara Counties, and in comparison the County, areas at risk from landslides within the County are expected to be concentrated along steep topographic slopes. Landslide hazards could occur in the Hollister area (OFR 94 02), and in the Tres Pinos and Paicines areas (OFR 94 03). Existing landslides, earthflows, and other similar features are also abundant along the numerous faults throughout the County and region. Landslides and related features are also associated with micaceous clay shale found in the area (See OFR 94 02 and OFR 94 03 for the graphical depiction of the specific areas most susceptible to landslides and related features).

Subsidence occurs when a large land area settles due to over saturation or extensive withdrawal of ground water, oil, or natural gas. Areas susceptible to subsidence are typically composed of open textured soils that become saturated. These areas are usually composed of soils with high silt or clay content. Subsidence as a result of ground water mining has been well documented in the Santa Clara Valley to the north. Cases of subsidence within the County have not been well documented. Subsidence in the Santa Clara Valley is mainly due to hydrocompaction from groundwater withdrawal. The valley deposits within the County are also at risk for subsidence if groundwater overdraft conditions exist.

Overdraft conditions do not currently existing in the County. As discussed in Chapter 13, Hydrology and Water Resources and Chapter 20, Utilities and Service Systems, groundwater levels have recovered in the San Benito portion of the Gilroy-Hollister groundwater basin, and the basin is essentially full. In addition, the quantity of recharge would be increased by additional urban use of CVP water with subsequent wastewater percolation. See the impact HYD-2 discussion in Chapter 13, Hydrology and Water Resources and impact USS-2 discussion Chapter 20, Utilities and Service Systems.

Expansive Soils

Expansive soils shrink and swell with changes in water content. The shrinking/swelling can adversely impact building structures such as foundations and roads. Shrinking and swelling are related to the clay content of soils, with clay rich soils being prone to swelling, and sand or gravel soils experiencing very little shrinking and swelling. The 1969 USDA Soil Survey identified soils and their shrink and swell potentials within the County. Soil types with moderate

to high shrink and swell potential are as follows: Antioch Montana, Auberry Nacimiento, Botella–clay loam Pacheco, Cibo Pinnacles–coarse sandy clay, Clear Lake Pleasanton–clay loam, gravely clay loam, Climara Rincon, Cometa–clay Salinas, Cotati–clay loam and sandy loam San Benito, Cropley Soper, Diablo Shedd–loam, Edenvale Sorrento–silt loam, silty clay loam, Gazos Sween–rocky clay loam, clay, Lonnes Vallecitos, Los Banos Willows, Los Gatos Yolo, Metz–sandy loam, loamy fine sand, and loam.

Building Collapse

Unreinforced masonry buildings and structures located in geologically hazardous areas are subject to structural failure during geologic events such as earthquake fault displacement, landslide, or soil liquefaction. Unreinforced masonry buildings are considered the foremost threat to life because of their poor performance during earthquakes. Although not every unreinforced masonry building will collapse in a significant earthquake, a large number of these building types will have some degree of life threatening failure. For unreinforced masonry building identified as critical facilities, such as fire stations and hospitals, this potential threat is more significant as these structures are needed during the response to emergencies. Recognizing the danger posed by a significant number of potentially hazardous buildings in California, the State legislature enacted the Unreinforced Masonry Building Law in 1986 (Senate Bill 547 [Alquist], Government Code Section 8875). The law requires cities and counties in Seismic Zone 4 to identify and inventory certain older and potentially hazardous buildings through an earthquake loss reduction program. This law refers to the 1988 UBC classification map of earthquake intensities from Zone 0 through 4 (USGS OFR 95 596). For example, Zone 4 is the highest risk area, Zone 3 is the next highest risk area, and no earthquake requirements are provided for Zone 0. The majority of the County is located in Seismic Zone 4 and parts of the eastern half of the County are located in Zone 3.

The State Seismic Safety Commission has stated that jurisdictions that choose to address hazards beyond those of unreinforced masonry building will further reduce death, injury, and economic loss; they will help protect California's architectural and historic resources from earthquake hazards. With respect to new construction, the 2007 CBC Section 16–Structural Design requires that construction projects be classified on the basis of the proposed building use and local geologic conditions. Once the classification is completed, the specific building design process related to seismic concerns can be finalized. Based on the risk associated with seismic activity within the County, construction has to meet specific requirements of the CBC.

Abandoned Mines

Several historic subsurface hard rock mines are located within the County. Based on California Office of Mine Reclamation estimates, over 47,000 abandoned mines exist in California, several of which are located in the County. The Coastal Range Mountains were actively mined for

mercury during the gold rush, and mercury was used during amalgamation of gold from lode and placer ore. The hazards associated with abandoned mines include the risk of collapse of old shafts and vent tubes, and the release of hazardous materials into the environment. According to the Office of Mine Reclamation, numerous Topographically Occurring Mine Symbols were identified within the County. "Topographically Occurring" means that the mines were mapped via aerial photography or interpretation from topography, but these locations have not been field verified.

Within the Clear Creek Management Area in southeastern the County, five abandoned mines have undergone some measure of remediation; these are the Aurora, Alpine, Jade Hill, Xanadu, and Larcious Mines (BLM RMP/EIS). California's Abandoned Mines Volume I identifies one mine site within the County, the New Idria Mine, which is listed by the agency for chemical risk. This mine, as identified by the Office of Mine Reclamation, was the second largest mercury mine in the state. The New Idria mine operated from 1854 to 1974 (BLM CCMA RMP/EIS) and is a CERCLA site; however, the site is not listed on the National Priorities List.

Mineral Resources

The unincorporated County, and the cities of Hollister and San Juan Bautista, have developed mineral resource management policies that incorporate SMARA mineral classification information. Policies have been created to support mining operations, including dredging and quarrying, and are intended to ensure that mineral resources will be available for development. For instance, in order to sell sand, gravel, aggregates or other mined minerals under SMARA, each mining operation must meet provisions set forth under Public Resources Code Section 2717(b), also known as AB 3098. Aggregate Resources Aggregate is a mixture of sand, gravel, and crushed stone that is used to give bulk and strength to Portland Cement Concrete, asphaltic concrete, plaster, and stucco. These materials are used extensively in road and building construction. Aggregate valued at $1.15 billion accounts for nearly 40 percent of California's non-fuel mineral economy. Transportation costs account for a significant percentage of aggregate cost. For example, transporting aggregate 35 miles will generally double the cost of aggregate to the end user. More than half of construction grade aggregate used in the state is for public works projects funded with taxpayer money. Aggregate deposits are typically formed in channel, floodplain, and alluvial fan deposits. The following is a summary of aggregate resources in the County.

Monterey Bay Production – Consumption Region

Mineral land classification studies completed before 1989 used Production-Consumption (P-C) regions as the study area boundaries. The Monterey Bay P-C Region, which is made up of one or more aggregate production districts, includes portions of Monterey, San Benito, Santa Clara,

San Mateo, and Santa Cruz Counties. As such, the estimated quantitative calculations of both permitted and non-permitted aggregate resources cover the entire Monterey P-C region and the amount of resources that may occur in the County are limited to the north part of the County that falls within the production district. In 1989, the State Mining and Geology Board changed the scope of the mineral classification studies from P-C regions to countywide studies because the counties were one of the primary users of the reports. However, the counties within the Monterey Bay P-C Region still rely on the data derived from the aggregate production district.

The California Department of Conservation, Division of Mines and Geology, last published information regarding aggregate resources for the Monterey Bay P-C region, which includes all or parts of Monterey, Santa Cruz, Santa Clara, and San Benito Counties, in 1987. Division of Mines and Geology then completed an updated assessment of aggregate resources for the Monterey Bay P-C in Open File Report 99-01 in 2000 and in 2006 the California Geology Survey compiled and updated this information in the Aggregate Availability in California Report (Map Sheet 52). In SP 146 Part IV, DMG estimated aggregate consumption in the Monterey Bay P-C region through 2030 to be 347 million tons. Nearly 24 percent or 90 million tons of the estimated total should be of Portland cement concrete grade quality. The report also identified 786 million tons of permitted reserves in the P-C region, an amount that exceeded the 50-year demand within the region by a factor of two. However, at the time of the 1986/1987 report, the surplus from the P-C region was insufficient to offset the shortfall of the South San Francisco Bay P-C region. The combined Monterey Bay/South San Francisco Bay P-C regions' expected demand through 2030 was 1,874 million tons. The combined reserves from the two regions total 1,338 million tons, or 71 percent of demand through 2030 (note: this amount relates to total reserves, not to what is actually permitted for extraction).

SP 146 Part IV identifies two Mineral Resources Zones Sectors in the County: Sectors E and F. Sector E (Holocene Stream Channel and Terrace Deposits, San Benito River and Tres Pinos Creek) is located along the channel of the San Benito River from Tres Pinos to the County line in the northwest. Total resources in Sector E are calculated as 226 million tons. All resources are considered Portland cement concrete grade. Resources in Sector E are classified as MRZ-2. Sector F (Cretaceous Hornblende Gabbro–Aromas Deposit) extends nearly five miles from Chittenden Pass to Pajaro Gap and is classified as MRZ-2 (SP 146Part IV). Resources in Sector F are considered Portland cement concrete grade, and the total resources are estimated as 395 million tons. DMG Open File Report (OFR) 99-01, prepared in 2000, provides an update of SP 146 in the Monterey Bay P-C Region. The update identifies 13 newly classified aggregate resources. Eight of these additions are located within the County.

Typically, the OFR 99-01 report does not provide estimates of resources within individual areas as was provided in SP 146, mainly due to confidentiality restrictions. However, totals from previous and newly classified areas are shown in the total for Monterey Bay P-C region.

SMARA Designation Report No. 7 identified aggregate resources in the Monterey Bay P-C region as regionally-significant based on geologic factors. Regionally-significant resources in areas that have not already been committed to other land uses are then identified for mineral resource extraction to ensure that future development of land uses are compatible with mineral extraction. For example, areas designated as regionally-significant in SMARA Designation Report No. 7 include Sectors E and F in the County.

An estimated 1,210 million tons of aggregate resources (both permitted and unpermitted, but identified) underlie the Monterey Bay P-C region (OFR 99-01). In 2000, the update of aggregate resources presented in OFR 99-01 estimated that the resources in the County classified as MRZ-2 totaled 33 million tons for sand and gravel reserves, 113 million tons for sand and gravel resources, and 386 million tons for crushed rock resources. Currently, crushed rock reserves and their locations or data on specific tonnages are not published due to confidentiality restrictions to preserve company proprietary data. In total, the Monterey Bay P-C region resources classified as MRZ-2 totaled 56 million tons for sand and gravel reserves, 387 million tons for sand and gravel resources, and 213 and 823 million tons for crushed resources. For both the County and the Monterey Bay P-C region, these totals include reclassified and newly classified reserves. Estimated permitted aggregate resources for the Monterey Bay P-C region totaled 269 million tons. According to the Division of Mines and Geology, the projected 50-year consumption demand through 2047 would be 379 million tons, and permitted reserves would satisfy 71 percent of demand (OFR 99-01). According to an updated California Geological Survey 2006 Report titled, "Aggregate Availability in California," estimated permitted aggregate resources for the Monterey Bay P-C region is 347 million tons, and the projected 50-year forecasted consumption is 383 million tons. As such, the permitted reserves equal 91 percent of projected consumption. The South San Francisco P-C regional permitted resources equaled 37 percent of projected 50-year demand.

In-stream Mining

In-stream resources are defined as resources within the area of ordinary high water flow of a stream, and the area within the 100-year floodplain. The identified resources within the high water channels of the San Benito River and Tres Pinos Creek total 88 million tons, or nearly 40 percent of the total sand and gravel identified in the Monterey Bay P-C region. The in-stream identified resources within the San Benito River and Tres Pinos Creek total nearly 62 million tons. There are also 71 million tons of aggregate resources in the San Benito River and Tres Pinos Creek within the 100-year floodplain. Reserves within the 100-year floodplain total 4.3 million tons, and are found within the San Benito River, Tres Pinos Creek, Chalone Creek, and San Lorenzo Creek. This represents 54 percent of the total sand and gravel reserves, and 8 percent of the total aggregate reserves (including crushed rock) lying within the Monterey Bay P-C region.

Other Mineral Resources

Based on consultation with the County Environmental Health Department, other than aggregate mining operations, there are no significant mining operations currently being conducted in the County. Other economically valuable mineral resources and extraction operations are discussed below.

Limestone

Limestone resources are known to exist in the Coastal Range Mountains and are found along a ten-mile wide area covering San Benito and Monterey Counties. This resource is known as the Gabilan Range District and extends 45 miles southeast from U.S. Highway 101 to Topo Valley. The District is bounded by the Salinas Valley on the west and the San Andreas Fault on the east. A total of 34 deposits are documented in Bulletin 197. These deposits are in remote locations and transportation costs limit the development of these deposits. Several kiln plants operated in the County before 1910, but due to lack of transportation to markets, were not further developed.

Gems

The County has the world's only known deposit of gem-quality Benitoite, a rare blue barium titanium gemstone found in altered serpentinite. The Benitoite mine is located in the southwest corner of the County near the Fresno County line, within the New Idria Mining District. Benitoite was designated the official gemstone of California in 1985. Benitoite deposits were mined as early as 1915.

Mercury

The County was the largest producer of mercury in the United States during the early 20th century. This included the second largest mercury mine in the United States, the New Idria Mine, which operated from 1854 to 1974.

Asbestos

As of 2010, asbestos was being mined by King City Asbestos Company at their Joe Pit in the southern part of the County. This resource is located in Sections 23 through 25 of Township 18 South and Range 12 East. The Joe Pit was listed as an AB 3098-regulated mining operation as recently as 2004.

Gypsum

There are deposits of gypsum between the Topo Valley west to the San Benito River and south to Lewis Creek, which were mined as early as 1915. A deposit has been mined in the Bitterwater area over the last decade from 2000-2010.

10.1.2 Regulatory Setting

The Background Report discussion of the regulatory setting relevant to geologic and seismic hazards and soil resources includes the following regulations:

Federal and State

- **California Government Code § 65302.** California Government Code § 65302 requires that the 2035 General Plan must address threats to human and environmental safety in a Safety Element. Hazards from seismic shaking, surface rupture, ground failure, seiche, tsunami, dam failure, slope instability leading to mudslides, and landslides, subsidence, liquefaction and other known seismic and geologic hazards, must be included in the assessment. Design requirements must be included to safeguard against risk of injury. The California Building Standards Commission is charged with regulating building standards within the state, and typically adopts and amends codes prepared by the International Code Council. No specific federal structural building standards are enforced.

- **California Building Code.** The County has adopted the 2013 edition of the CBC, Title 24 of the California Code of Regulations that builds upon the 2009 International Building Code and provides additional criteria for the sizing and design of engineered structures and buildings to withstand certain geologically induced loading (San Benito County 2013a). Structural design under the CBC requires that projects be designed according to a proposed building's intended use and seismic design category based on site location and geologic conditions.

- **The Alquist-Priolo Earthquake Fault Zoning Act (1972) and the Seismic Hazards Mapping Act (1991).** These acts were established to protect the public from the effects of ground shaking and ground failure during large earthquakes. Fault Zone Mapping, established by the State Geologist, is used to regulate most development projects within these zones. The APEFZA prohibits construction of any buildings over or within 50 feet of an active fault trace as identified by the State Geologists Fault Zone Mapping.

- **1975 Surface Mining and Reclamation Act.** This act regulates the permitting, inspection, and later remediation of mining operations, and requires the California Division of Mines and Geology to prepare a mineral resource report for the County.

- **California Office of Emergency Management.** This office evaluates the safety of dam facilities that pose a potential threat if they were to fail under a large seismic event. The Department of Water Resources (DWR) inspects these facilities annually.

- **State Water Resources Control Board.** In California, the National Pollution Discharge Elimination System (NPDES) stormwater permitting program is administered by the SWRCB through its nine Regional Water Quality Control Boards (RWQCB). The SWRCB has established a construction General Permit that can be applied to most construction activities in the state. The recently adopted NPDES California General Permit (SWRCB Order No. 2009-0009-DWQ effective July 2010) uses a risk-based approach, with increased monitoring and oversight for construction activities resulting in greater than one acre of disturbance. The new permit requires potential dischargers to develop a Storm Water Pollution Prevention Plan (SWPPP), implement Best Management Practices to prevent erosion and sedimentation, provide on-site and storm related monitoring, and design for post construction runoff reduction requirements that went into effect September 2012.

- **Assembly Bill 2140.** Assembly Bill 2140 requires the County to adopt a local Hazard Mitigation Plan as part of the General Plan Safety Element. The Hazard Mitigation Plan is to include an earthquake performance evaluation of critical public facilities, an inventory of potentially hazardous private facilities, and a plan to reduce the risk from private and public facilities in the event of flooding, a large earthquake, or other comparable disaster.

County

- **Building Division** has adopted the 2013 CBC per Title 21.01, and oversees and enforces federal, state, and County building codes through the issuance of permits.

- **Public Health Division, Health and Human Services Agency.** The County Public Health Division, Environmental Health Division (EHD) regulates the construction and operation of individual septic systems within the County.

- **1992 General Plan.** The 1992 General Plan contains goals, policies, and actions to ensure public safety and to protect infrastructure and the environment from hazards associated with geologic and seismic hazards. These include:

    - The seismic and geologic hazard avoidance and risk reduction policies found in the Seismic Safety Element (1980);

    - Policies within the Land Use Element (1992) to site development in areas free of, or with reduced levels of hazards, and to assure the adequate siting and operation of septic facilities; and

- Policies in the Open Space and Conservation Element (1995) to site development in areas free of, or with reduced levels of hazards, and to assure the adequate operation of septic facilities.

10.2 ENVIRONMENTAL EFFECTS

The geology, soil, and mineral resources analysis evaluates whether urban and other development that would occur under 2035 General Plan buildout conditions could result in significant adverse impacts.

10.2.1 Significance Criteria

As set forth in Appendix G to the State CEQA Guidelines, Section VI, Geology and Soils and Section XI, Mineral Resources, the following criteria have been established to quantify the level of significance of an adverse effect being evaluated pursuant to CEQA. The numeration of each criterion below corresponds to the questions in the checklist in Appendix G of the CEQA Guidelines (e.g., VI.a, VI.b). Implementation of the 2035 General Plan would result in a significant geological, soil, or mineral resource impact if the Plan would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, strong seismic ground shaking or seismic-related ground failure including liquefaction, or landslides. (VI.a)

- Result in substantial soil erosion or topsoil loss from heightened exposure to wind or water erosion, or result in a substantial loss of valuable mineral resources within the County. (VI.b)

- Locate development or structures 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 on expansive soils (as defined in Table 18-1-B of the 1994 Uniform Building Code), creating substantial risks to life or property. (VI.c and VI.d)

- Allow the use of septic tanks where soils are incapable of adequately supporting their use, or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater. (VI.e)

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state. (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)

The risk of dam failure is analyzed in Chapter 13, Hydrology and Water Quality.

10.2.2 Analysis Methodology

The evaluation of potential seismic hazards and soil and mineral resource impacts associated with implementation of the proposed 2035 General Plan is based, among other things, on a review of the Background Report, applicable federal, state and regional laws, regulations, codes, and guidelines, and seismic hazard maps. The evaluation also assesses whether the goals and 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 County's jurisdiction in order to help prevent or reduce potential hazards to persons or property, and minimize impacts to soil and mineral resources available for agricultural, industrial, and habitat uses.

As discussed in Section 4.5.7, Potential Growth Scenarios, this RDEIR analysis considers two possible growth scenarios: Scenario 1 and Scenario 2. At the programmatic level of analysis in this RDEIR, there will be no difference in the impacts from geologic hazards and/or to soil and mineral resources from the two growth scenarios. The County would apply 2035 General Plan policies, including additional policies from mitigation measures contained in the Final EIR, which address geologic hazards and soil and mineral resources development. Given the typically site-specific nature of these impacts, future site- and project-level analysis would be required for particular development proposals under the 2035 General Plan.

10.2.3 Environmental Impacts

The following discussion examines the potential impacts of the implementing the 2035 General Plan based on the impact threshold criteria described above. Table 10-1 summarizes 2035 General Plan policies that would mitigate environmental impacts associated with geological, soil and mineral resources, and includes an explanation of how the policies would avoid or reduce impacts.

Table 10-1 2035 General Plan Goals and Policies that Mitigated Geological, Soil, and Mineral Resource Impacts

Goals and Policies	How the Goal/Policy Avoids or Reduces Impact	Impact GEO-#
Land Use Element		
Goal LU-1: Countywide Growth and Development To maintain San Benito County's rural character and natural beauty while providing areas for needed future growth.	As policies under this goal indicate, the goal may reduce risk due to soil instability by directing future growth away from hillside and other sensitive areas.	2,3,4
Policy LU-1.6: Hillside Development Restrictions The County shall prohibit residential and urban development on hillsides with 30 percent or greater slopes.	Helps protect water quality and reduce risk by prohibiting development on very steep slopes that have a greater potential for landslides or unstable soil foundations.	2,3
Policy LU-1.8: Site Plan Environmental Content Requirements The County shall require all submitted site plans, tentative maps, and parcel maps to depict all environmentally sensitive and hazardous areas, including: 100-year floodplains, fault zones, 30 percent or greater slopes, severe erosion hazards, fire hazards, wetlands, and riparian habitats.	By requiring site plans to identify steep slopes and severe erosion hazards prior to project approval, it allows for more thoughtful avoidance, design, and construction measures to prevent erosion and soil loss during construction and longer-term operation of the site.	3
Policy LU-1.10: Development Site Suitability The County shall encourage specific development sites to avoid natural and manmade hazards, including, but not limited to, active seismic faults, landslides, slopes greater than 30 percent, and floodplains. Development sites shall also be on soil suitable for building and maintaining well and septic systems (i.e., avoid impervious soils, high percolation or high groundwater areas, and provide setbacks from creeks). The County shall require adequate mitigation for any development located on environmentally sensitive lands (e.g.,	Prohibits development on very steep slopes, and in areas of landslides or active faults, to the extent feasible, thereby reducing the risks associated with seismic shaking or slope instability. Helps protect water quality and ensures site functionality without increased potential for aggravated soil loss or groundwater contamination.by prohibiting development on	2,3,4

Goals and Policies	How the Goal/Policy Avoids or Reduces Impact	Impact GEO-#
wetlands, erodible soil, archaeological resources, important plant and animal communities).	steep slopes and unsuitable soils, and by requiring adequate mitigation for any development located on environmentally sensitive lands. Helps prevent groundwater contamination by requiring septic systems to be built in areas with adequate soils located a safe distance from creeks and groundwater resources.	
Public Facilities and Service Element		
Goal PFS-5: Wastewater Treatment and Disposal To ensure wastewater treatment facilities and septic systems are available and adequate to collect, treat, store, and safely dispose of wastewater.	Protects groundwater resources by ensuring wastewater treatment facilities and septic systems are adequately maintained. Helps to ensure integrity of wastewater and septic systems which in turn protects soil stability and prevents subsurface pollution, erosion and other subsurface problems.	4
Policy PFS-5.5: Individual Onsite Septic Systems The County shall permit onsite septic systems only when connection to an existing wastewater system or sewer system is not reasonably available. Approval, installation, and use of individual septic systems shall be consistent with Regional Water Quality Control Board regulations.	Protects water quality by not allowing septic system installation when sewer systems are reasonably available, and by requiring that design and installation be consistent with RWQCB regulations in order to protect water quality. Limiting and regulating septic systems will help protect soil resources and stability from pollution, erosion, and other impacts.	4

Goals and Policies	How the Goal/Policy Avoids or Reduces Impact	Impact GEO-#
Policy PFS-5.6: Septic System Design The County shall require individual septic systems to be properly designed, constructed, and maintained to avoid degradation of ground and surface water quality.	Enforces proper design and construction of septic systems to ensure they are located and operated without harming water quality. Protects integrity and stability of soils and other subsurface resources from erosion, pollution, and other impacts.	4
Policy PFS-5.7: Alternative Rural Wastewater Systems The County shall investigate and recommend alternative rural wastewater systems for individual homes. Alternative systems could include elevated leach fields, sand filtration systems, evapotransportation beds, osmosis units, and holding tanks. In addition, composting toilets should be considered for appropriate situations. For clusters of homes, alternative systems could include communal septic tank/leach field systems, package treatment plants, lagoon systems, and land treatment.	Helps avoid impacts to groundwater resources by considering alternative rural wastewater systems for individual homeowners. May provide superior alternatives to traditional septic systems and thus help protect soils and other subsurface resources from pollution, erosion, and other impacts.	4
Policy GOAL PFS-6: Stormwater Drainage To manage stormwater from existing and future development using methods that reduce potential flooding, maintain natural water quality, enhance percolation for groundwater recharge, and provide opportunities for reuse.	Avoids impacts to soil and mineral resources through stormwater management methods that reduce flooding and enhance percolation of groundwater recharge.	3
Policy PFS-6.8: Reduce Erosion and Sedimentation The County shall ensure that drainage systems are designed and maintained to minimize soil erosion and sedimentation and maintain natural watershed functions.	Ensures that proposed drainage designs will minimize soil erosion and sedimentation rather than aggravate it, thereby protecting water quality.	3

Goals and Policies	How the Goal/Policy Avoids or Reduces Impact	Impact GEO-#
Natural and Cultural Resources Element		
Goal NCR-4: Water Resources To protect water quantity and quality in natural water bodies and groundwater basins avoid overdraft of water resources.	Water quality protection and the avoidance of groundwater overdraft would reduce impacts to soil and mineral resources. Reduces risks to groundwater by protecting water quality and natural water bodies and groundwater basins.	3,4
Policy NCR-4.1: Mitigation for Wetland Disturbance or Removal The County shall consider implementing Regional Water Quality Control Board Basin Plan policies to improve areas of low water quality, maintain water quality on all drainage, and protect and enhance habitat for fish and other wildlife on major tributaries to the Pajaro River (San Benito River, Pacheco Creek) and the Silver Creek watershed.	Encourages cooperation with CCRWQCB water improvement efforts, including compliance with the NPDES stormwater programs, which protects soil resources in covered watersheds from pollution, erosion, and other impacts.	3
Policy NCR-4.7: Best Management Practices The County shall encourage new development to avoid significant water quality impacts and protect the quality of water resources and natural drainage systems through site design, source controls, runoff reduction measures, and best management practices (BMPs).	Protects water quality during construction and long-term operation of a site by requiring all new development to implement source controls, runoff reduction measures, and water quality BMPs. Also protects soil resources by limiting runoff-related erosion and sedimentation.	3

Goals and Policies	How the Goal/Policy Avoids or Reduces Impact	Impact GEO-#
Policy NCR-4.15: Septic Systems The County shall require septic systems to be limited to areas where sewer services are not available and where it can be demonstrated that septic systems will not contaminate groundwater.	Limits septic systems to areas not able to access existing sewer services, and requires them to be located and designed in a manner to protect water quality. Limiting and regulating septic systems will help protect soil resources and stability from pollution, erosion, and other impacts.	4
Policy NCR-4.16: Develop in Existing Areas The County shall encourage development to occur in or near existing developed areas in order to reduce the use of individual septic systems in favor of domestic wastewater treatment in an effort to protect groundwater quality.	By encouraging development in areas served by existing domestic wastewater treatment facilities, it minimizes the number of individual septic systems proposed, thereby reducing the overall number of septic systems that require County review. This will limit septic-related impacts to soil and other subterranean resources via pollution, erosion, or otherwise.	4
Goal NCR-5: Mineral Resources To protect and support economically viable mineral resource extraction while avoiding land use conflicts and environmental impacts from current and historical mining activities.	Avoids impacts related to mineral resource extraction by minimizing land use conflicts.	3
Policy NCR-5.1: Mineral Resource Preservation The County shall preserve for future use areas with potentially-important mineral resources by limiting residential or urban uses that would be incompatible with mining operations.	Prevents incompatible urban or other inappropriate encroachment into valuable mineral resource areas.	3

Goals and Policies	How the Goal/Policy Avoids or Reduces Impact	Impact GEO-#
Policy NCR-5.2: Significant Mineral Resources The County shall recognize areas classified Mineral Resource Zone 2 (MRZ-2) or Scientific Zone (SZ) pursuant to the Guidelines for Classification and Designation of Mineral Lands as mineral resources of statewide and regional significance and shall protect these mineral resources from premature development incompatible with mining.	Promotes standardized identification and designation of mineral resource areas in the County in order to protect those areas from development impacts that would be incompatible with mining.	3
Policy NCR-5.3: Notice of Nearby Mineral Resources The County shall require a notice explaining the location of important mineral resources to be recorded on any parcel within one-half mile of an MRZ 2 or SZ designation.	By recording statewide and regional significant mineral resources on parcel maps, they can be more easily identified for protection when developments in or adjacent to those areas are proposed.	3
Policy NCR-5.7: Mining Reclamation Program The County shall require mining operators to prepare reclamation plans and implement reclamation programs to restore land for alternative uses consistent with: the Land Use Diagram (Figures LU-1 and LU-2); policies for wildlife, flood, and erosion protection; and the California Surface Mining and Reclamation Act (SMARA).	Protects loss of soil resources by requiring the reclamation of inactive and disturbed mining areas in accordance with applicable laws and regulations.	3
Policy NCR-5.8: Mining Site Reclamation The County shall implement State requirements for reclamation of mining sites to occur concurrently with extraction activities rather than after extraction has been completed. Additionally, the County shall ensure that reclamation is achieved in a manner that will protect public safety and enable lands to be put to subsequent beneficial use.	Speeds up the reclamation process and prevents extended periods of soil loss from disturbed sites by requiring reclamation to occur concurrently with ongoing mining operations.	3

Goals and Policies	How the Goal/Policy Avoids or Reduces Impact	Impact GEO-#
Policy NCR-5.10: Mineral Haul Routes The County shall ensure that new mineral haul routes avoid areas with highly erodible soils, residential areas, and schools, when feasible.	Reduces soil loss by preventing large haul trucks from traveling in highly erodible or other vulnerable areas, when feasible.	3
Policy NCR-5.12: Mineral Resource Zoning The County shall continue to apply "MR" zoning to selected mineral resource areas determined by the Board of Supervisors to require a special level of protection as an additional method of avoiding land use conflicts between mineral extraction and other incompatible uses with the following criteria: a. Lands classified as MRZ-2 or SZ by the State of California Division of Mines and Geology qualify for the "MR" zoning designation and/or; b. Evidence of the location, extent, and depth, and quality of mineral resources shall be submitted as part of the MR overlay zoning application. The material shall be reviewed by a geologist selected by the County for accuracy. The County shall deny MR overlay zoning requests that do not provide evidence of significant mineral resources on site.	Applies standardized classifications via the State of California Division of Mines and Geology to mineral resources within the County to more accurately designate areas as mineral resource zones and better protect them from incompatible land uses.	3
Health and Safety Element		
Goal HS-1: Emergency Preparedness To maintain the necessary level of disaster preparedness for the protection of the health, safety, and welfare of people living, working, and residing in San Benito County.	Reduces impacts related to human safety hazards from seismic events through maintenance of a necessary level of disaster preparedness.	1

Goals and Policies	How the Goal/Policy Avoids or Reduces Impact	Impact GEO-#
Policy HS-1.7: Multi-Hazard Mitigation Plan The County shall develop, maintain, and implement a Multi-Hazard Mitigation Plan to address disasters such as earthquakes, flooding, dam or levee failure, hazardous material spills, epidemics, fires, extreme weather, major transportation accidents, and terrorism.	Requires the County to examine risks associated with earthquakes and other disaster type events, and implement protocol and measures to mitigate those risks.	1
Policy HS-1.10: Location of Critical Facilities The County shall not approve critical and emergency facilities (e.g., hospitals, health care facilities, emergency shelters, Sheriff substations, fire stations) and their access routes in hazardous areas unless it is unavoidable or designed and constructed in a manner that minimizes or eliminates potential impacts.	Requires all critical facilities to be designed and constructed in accordance with seismic safety standards.	1
Policy HS-1.13: Education Programs The County shall sponsor and support educational programs regarding emergency response, disaster preparedness protocols and procedures, and disaster risk reduction.	Educates County residents on ways to lower risk to life and property through improved disaster preparedness and emergency response.	1
Goal HS-3: Seismic and Geologic Hazards To protect lives and property from seismic and geologic hazards.	Reduces soil instability and safety hazards due to seismic events by setting an overall goal to protect the lives and property from seismic and geologic events.	1,2
Policy HS-3.1: Earthquake Resistant Design The County shall require earthquake resistant designs for all proposed critical structures such as hospitals, Sheriff substations, fire stations, emergency communication centers, private schools, high occupancy buildings, bridges, and dams.	Requires critical structures to be designed to be earthquake resistant.	1

Goals and Policies	How the Goal/Policy Avoids or Reduces Impact	Impact GEO-#
Policy HS-3.2: Subsidence or Liquefaction The County shall require that all proposed structures, utilities, or public facilities within recognized near-surface subsidence or liquefaction areas be located and constructed in a manner that minimizes or eliminates potential damage.	Requires structures to be designed and built to hold up to the occurrence of near-surface subsidence or liquefaction, or to be relocated away from such areas.	1
Policy HS-3.3: Geotechnical Database The County shall strive to maintain and improve the geotechnical database to make information on seismic hazards available to both the public and County.	Promotes continued geotechnical and seismic data collection and distribution to assist the County and its residents in making more informed decisions on locating and designing proposed developments and structures.	1
Policy HS-3.4: Abatement of Unsafe Structures The County shall identify and abate existing structures which will be hazardous during an earthquake event, especially high occupancy structures that have the greatest potential effect on public safety.	Provides an avenue for the County to determine at-risk structures, particularly high occupancy ones, and eliminate them over time in order to improve public safety.	1
Policy HS-3.6: Unstable Soils The County shall require and enforce all standards contained in the current California Building Code related to construction on unstable soils, and shall make a determination as to site suitability of all development projects during the building permit review process. The County shall not approve proposed development sited within areas of known or suspected instability until detailed area studies are completed that evaluate the extent and degree of instability and its impact on the overall development of the area.	Enforces design review to ensure adequacy of seismic measures, and full compliance with the CBC in order to protect developments proposed in unstable soils from seismic damage.	2

Goals and Policies	How the Goal/Policy Avoids or Reduces Impact	Impact GEO-#
Policy HS-3.7: Setback from Fault Traces The County shall require setback distances from fault traces to be determined by individual site specific surface rupture investigations.	Provides for individual assessment of a proposed development in order to determine adequate setback distance from a fault trace prior to project authorization.	1
Policy HS-3.8: Liquefaction Studies The County shall require proposals for development in areas with high liquefaction potential to include detailed site specific liquefaction studies.	Ensures the applicant develops an understanding of the potential hazardous conditions, and how to combat them with adequate design measures through the preparation of detailed site-specific liquefaction analysis.	2
Policy HS-3.9: Seismic Safety Evaluations The County shall require buildings three stories or higher, and locations zoned for multifamily housing, to include in development proposals measures to determine ground shaking characteristics, evaluate potential for ground failure, identify any other geologic hazards that might exist on the site, and mitigate for these hazards.	Requires identification of all geologic hazards and measures to protect against them for taller buildings.	2

Sources: San Benito County 2011, 2014; Planning Partners 2012.

Impact GEO-1: Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving: rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, strong seismic ground shaking or seismic-related ground failure including liquefaction, or in landslides (VI.a).

Level of Significance: Less than significant, no mitigation required.

Future large earthquakes could cause damage, particularly to the more populated cities of Hollister and San Juan Bautista, where almost 70 percent of the County's total population is concentrated. The remaining population is scattered throughout the more rural lands that are

predominantly used for agriculture, cattle ranching, and some mining. Potential growth of population and development under the 2035 General Plan could expand the type and number of structures and associated persons exposed to potential seismic hazards. Because of a comprehensive body of construction requirements enforced by the County, and the goals and policies set forth in the 2035 General Plan that would avoid or reduce the effect of seismic hazards, this impact would be less than significant.

With several prominent faults traversing the County, the area is considered to be seismically active. Most prominent is the well-known and historically active San Andreas Fault, a right lateral strike slip fault identified by the APEFZA that runs the length of the County north to south directly through the town of San Juan Bautista. The second most important fault is the Calaveras Fault that runs along the northern portion of the County through the City of Hollister. There are additional faults that crisscross the County that may lack a historical record but are still considered active, with displayed evidence of movement in the past 11,000 years (i.e., Holocene Period). These faults include the Quien Sabe Fault along the Diablo Range in the northeast, the Sargent Fault north of Hollister, the Paicines Fault near Paicines, and the Bear Valley Fault east of the Pinnacles National Monument (see Figure 10-2). In addition, a major earthquake in the San Francisco Bay Area to the north could cause seismic shaking, liquefaction, and ground rupture impacts to the County.

According to the California Department of Conservation (DOC)'s *Probabilistic Seismic Hazard Assessment*, the San Andreas, Calaveras, Zayante-Vergeles and Quien-Sabe Faults may result in seismic shaking expressed as Peak Ground Acceleration ranging from 30 percent to greater than 80 percent of g (g = acceleration of gravity, 32.2 ft./sec^2), with the latter presenting along the San Andreas near the northern boundary of the County (DOC 1996).

All structures and buildings associated with new development under the 2035 General Plan would be designed and constructed in adherence with the seismic standards as set forth in the 2013 CBC or most current code. Adherence with these standards would help ensure that structures would be able to withstand anticipated seismic events to the greatest practical extent, in order to help reduce significant damage or harm to the public as a result of that expected seismic activity.

Landslide risk in the County is expected to be concentrated along the steep topographic slopes and active faults that line the County. Landslide hazards could occur in the Hollister, Tres Pinos, and Paicines areas.

The potential risks of dam failure inundation are evaluated in Chapter 13, *Hydrology and Water Quality*, of this RDEIR. Please refer to that chapter for further information.

The 2035 General Plan Health and Safety Element includes policies and programs to guide the location and type of any new development or facilities in the unincorporated County to

minimize any risks from strong seismic ground shaking, liquefaction, or landslides that may result from fault ruptures to the extent feasible. Table 10-1 includes the goals and policies from the 2035 General Plan that indicate the County's approach, and methods to be implemented, in an effort to adequately protect property and human safety.

Implementation of the proposed 2035 General Plan could lead to increased development in and around the Hollister and San Juan valleys, very near the active San Andreas and Calaveras faults that are expected to result in a probable seismic event with moderate to severe ground shaking. New development also could occur in New Community Study Areas. By adhering to current federal, state, and County laws, regulations and codes, including, among others, the 2013 CBC, that prohibit construction within 50 feet of an active fault trace, and by requiring stringent design and construction methods to bolster building and structure stability under expected seismic events, the risks to persons and structures would be drastically reduced.

The continued use and dissemination of available geologic and seismic data under Policy HS3.3 and Program HS-E would facilitate the County's ability to guide the location and type of development and construction in order to minimize potential risks to the extent feasible. Additionally, strict adherence to Policies HS-1.7, HS-3.1, and HS-3.6 would significantly reduce risks by ensuring compliance with fault avoidance requirements, and ensuring that structures would be constructed to minimize seismic damage. Goal HS-1 focuses on emergency preparedness and would reduce impacts related to human safety hazards from seismic events through maintenance of a necessary level of disaster preparedness. Goal HS-3 reduces safety hazards due to seismic events by setting an overall goal to protect the lives and property from seismic and geologic events. Policy HS-3.4 identifies existing seismically at-risk structures for abatement, and Program HS-A provides updated information to the Office of Emergency Services to improve evacuation plans. These policies and programs help to reduce the impacts of geologic hazards associated with existing structures over time.

With implementation of the laws, regulations and policies cited above, potential effects from geologic hazards would be significantly reduced. By requiring the avoidance of hazard areas, the construction of structures in a manner to resist seismic damage, and the implementation of public education and emergency response plans, implementation of the proposed 2035 General Plan would result in a less than significant impact.

Impact GEO-2: Locate development or structures 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, or collapse (VI.c); or on expansive soils (as defined in Table 18-1-B of the 1994 Uniform Building Code), creating substantial risks to life or property (VI.d).

Level of Significance: Less than significant, no mitigation required.

Implementation of the proposed 2035 General Plan could lead to the construction and operation of urban and other development and related infrastructure on unstable or expansive soils, or could expose such development to other geologic hazards. Because of a comprehensive body of construction requirements enforced by the County as required under applicable federal, state and local laws and regulations, and the goals and policies set forth in the 2035 General Plan that would avoid or reduce the effect of soil and geologic hazards, this impact would be less than significant.

Development may occur on unstable soils vulnerable to liquefaction or lateral spreading, and some County areas would be vulnerable to subsidence if groundwater overdraft were to occur. Liquefaction hazards exist in the County in locations where a high water table coincides with unconsolidated sediments, although specific County areas have not yet been mapped. There are historical reports of such events during earthquakes, including areas near Hollister and San Juan Bautista, and lateral spreading and ground settlement were noted at four County locations during the 1989 Loma Prieta earthquake. The valley areas in the County are at risk of subsidence under conditions of groundwater overdraft, but there are no actual cases that have been documented at this time.

Landslides also present a risk in areas of steep topographic relief and in close proximity to one of the several active faults. Although there is the potential for landslides throughout the County outside of the valley floors, development projects implemented under the 2035 General Plan could extend urban and other land uses further into steeper topographic areas and areas adjacent to active fault lines, particularly the San Andreas and Calaveras Faults in the Hollister and San Juan valley areas, placing such development at risk from slope failure or landslides.

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). This occurrence can lead to building foundations shifting and cracking, and ultimately damaging the structures they support. There is some low level risk associated with mine collapse from the scattering of abandoned mines in the County that have not yet been remediated.

The County Building Division enforces the 2013 CBC, which includes laws and regulations for excavation, grading, and construction in unstable soils. These regulations require that engineered solutions be implemented to avoid or reduce the effects of potential soil hazards with respect to constructed buildings. The 2035 General Plan includes several policies to address these soil and geologic hazards as described in Table 10-1.

Goal HS-3 would reduce soil instability hazards by setting an overall goal to protect the lives and property from seismic and geologic events. Goal LU-1 would reduce soil hazards by balancing growth and directing it to appropriate areas. Policies HS-3.2, 3.6, 3.7, and 3.8 require new

development and construction in areas of unstable or unsuitable soils to provide detailed assessments of existing conditions to the County for review and authorization. The policies require the location and construction of such facilities in a manner that minimizes potential damage, and adherence to design standards for construction on unstable soils as set forth by the CBC. Proposed developments would be required to use the then-most recent geologic and seismic data available through the County's regularly updated geotechnical database under Program HS-3 to assess site conditions, and to adhere to the then-most current CBC code for avoidance and design measures required to bolster building and structural stability under anticipated geologic conditions. These combined measures would significantly reduce risks by ensuring that structures would be constructed to minimize seismic damage to the extent feasible. By banning any development within landslide areas or on slopes greater than 30 percent under Policy LU-1.6, the risk to persons and future structures from potential landslides would also be minimized. With implementation of the laws, regulations and policies cited above, potential effects from soil and geologic hazards would be significantly reduced. By requiring avoidance of hazardous areas, and by mandating that structures be designed and constructed to resist damage from unstable soils and geologic hazards, implementation of the proposed 2035 General Plan would result in a less than significant impact.

Impact GEO-3: Result in substantial soil erosion or topsoil loss from heightened exposure to wind or water erosion (VI.b), result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state (XI.a); or result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan (XI.b).

Level of Significance: Less than significant, no mitigation required.

Implementation of the proposed 2035 General Plan would likely lead to increased development as farmland is converted to urban and other uses with an increased potential for soil erosion and loss during construction-related soil disturbance activities. Future extraction of mineral resources may also be prevented by development if not appropriately sited. Continued agricultural activities under the 2035 General Plan may lead to increased topsoil loss from wind and water erosion of tilled soils and unplanted fields.

As discussed in the Environmental Setting section, overgrazing has already caused considerable erosion. With the comprehensive body of federal, state, and County requirements, and the goals and policies set forth in the 2035 General Plan that would avoid or reduce the effect existing of erosion hazards and the loss of mineral resources, this impact would be less than significant. Existing regulation require that a SWPPP be prepared to reduce the potential for adverse impacts from erosion or hazardous materials to surface water during construction. Regulations also require that measures be designed and implemented to protect surface water quality over the long term for all of the intended land uses Water run-off quality is regulated by the federal

NPDES program. The NPDES objective is to control and reduce pollutants to water bodies from non-point discharges. The program is administered by the RWQCB throughout the state.

Future development would be required to comply with existing federal, state, and County laws and regulations designed to protect water quality. Such laws and regulations would be applicable during the construction of residential and commercial developments and other proposed projects, and the operation of associated facilities, including designing for, monitoring, and installing temporary best management practices to minimize erosion. In particular, temporary soil erosion prevention measures are enforced by the Central Coast RWQCB under the NPDES program for active construction sites greater than one acre in area. These measures include, among others, watering for dust control, and treating exposed slopes and material stockpiles. Design efforts to reduce runoff post construction are required under the County NPDES permit, which will minimize soil loss from erosion caused by runoff waters. These waters will instead be infiltrated on-site and/or attenuated prior to release.

Mineral resources in the County are primarily sand and aggregate based; they include 33 million tons of permitted sand and gravel reserves, 113 million tons of unpermitted sand and gravel reserves, and 386 million tons of crushed rock resources in the northern portions of the County that fall within the quantified Monterey Bay P-C regional boundary. Total permitted reserves for the Monterey Bay P-C region that encompass other areas outside of the County are forecasted at 1,210 million tons of aggregate resources, and are expected to meet 91 percent of projected demand.

There are several goals and policies under the 2035 General Plan that address potential soil and mineral resource losses that could result from continued construction, agriculture, and gravel mining operations as shown in Table 10-1. In addition, there are specific zoning regulations that restrict development of land uses incompatible with identified and protected mining operations and resources.

Goal LU-1 helps to reduce risk due to soil instability by directing future growth to appropriate areas. Land Use Policies LU-1.6, LU-1.8, and LU-1.10 reduce the potential for aggravated soil erosion by identifying and planning for potential erosion hazards, and by prohibiting development on slopes steeper than 30 percent. Natural and Cultural Resource policies help reduce soil loss from wind and water erosion during development construction and operation activities by encouraging Best Management Practices during design and construction, and compliance with all NPDES stormwater programs. Goal NCR-4 and its supporting policies protect water quantity and quality in natural water bodies and groundwater basins.

Public Facilities and Services Goal PFS-6 avoids impacts to soil and mineral resources through stormwater management methods that reduce flooding and enhance percolation of groundwater recharge. PFS-6.8 requires that drainage systems are designed to minimize soil erosion and loss to protect water quality.

Natural and Cultural Resource Policies NCR-5.1, NCR-5.2, NCR-5.3, and NCR-5.13 help protect and preserve mineral resources in the County by requiring notification of purchasers of property within a half-mile of a key mineral resource, and by limiting residential and other urban development that would infringe upon or be incompatible with these resources. Goal NCR-5 avoids impacts related to mineral resource extraction by minimizing land use conflicts. Policies NCR-5.7, NCR-5.8, and NCR-5.11 would aid in preventing soil loss due to mining operations by requiring concurrent preparation and implementation of reclamation programs with ongoing mining operations in order to restore sites on a more timely basis in accordance with applicable laws and regulations. They also require mining haul routes to avoid areas with highly erodible soils and other vulnerable areas.

As discussed above, new development and construction must conform to all federal and state laws and regulations that protect water quality. Implementation of proposed 2035 General Plan goals and policies for water quality and mineral resource protection would also help to avoid or reduce potential effects from soil erosion and loss, and would permit the measured extraction of mineral resources while reducing the potential effects of mining. For these reasons, this would be a less-than-significant impact.

Impact GEO-4: Allow the use of septic tanks where soils are incapable of adequately supporting their use, or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater (VI.e).

Level of Significance: Less than significant, no mitigation required.

Installation and operation of septic tanks or similar individual wastewater disposal systems in unfit soils can lead to the degradation of groundwater quality or nearby waterways, and ultimately impact domestic groundwater and/or surface water sources. Septic systems can also create subsurface erosion and soil pollution problems. Most of the unincorporated County relies on individual septic systems for wastewater treatment, with an average of 67 new septic systems and 45 replacement permits being reviewed by the County each year. Prior to issuing a permit, the County Environmental Health Division assesses whether soil and site conditions are favorable and whether the system design can meet the operational demand with minimal maintenance. Because of County review of septic system location, design, and operational requirements prior to approval, and the goals and policies set forth in the 2035 General Plan that would discourage new septic systems and reduce the potential for pollution of groundwater and soils as well as other impacts, this impact would be less than significant.

Table 10-1 lists the policies under the 2035 General Plan to encourage and enforce water quality and other protection measures as they relate to septic system construction and operation.

Goal LU-1 helps to protect groundwater quality by directing future growth to appropriate areas. Land Use Policy 1.10 prohibits septic systems from being built into unsuitable soils. Goal PFS-5 would protect soil and groundwater resources by ensuring wastewater treatment facilities and septic systems are adequately maintained. Policies PFS-5.5 and PFS-5.6 reinforce continued oversight and design review by the County to ensure compliance with RWQCB regulations and continued water and soil quality protection. Policy PFS-5.7 avoids impacts to groundwater and soil resources by encouraging the consideration of alternative rural wastewater systems for individual homeowners. Program PFS-F updates septic system standards to comply with state regulations. Goal NCR-4 reduces risks to soil and groundwater by protecting water quality and natural water bodies and groundwater basins. Policies NCR-4.15 and NCR-4.16 encourage new developments to be located in areas where they can easily tie into existing domestic wastewater treatment systems, and only allow for new septic systems where sewer systems are unavailable and soils are adequate for protecting groundwater.

With implementation of the 2035 General Plan, the County would continue to enforce on-site sewage disposal standards. Additionally, the implementation of the 2035 General Plan policies and programs for septic design review prior to permitting and the update of the County's septic system standards to avoid unfit soils and minimize the potential for water or soil pollution would result in a reduction in the potential that the installation and operation of private septic systems would result in water or soil pollution within the County. This would be a less-than-significant impact.

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