

3.6 GEOLOGY, SOILS, AND MINERAL RESOURCES

This section describes the following within the existing City boundary:

- environmental setting (existing conditions and regulatory setting) for geology, soils, and mineral resources relating to the proposed project;
- the impacts associated with geology, soils, and mineral resources that would result from the proposed project; and
- mitigation measures that would reduce these impacts.

The setting, impacts, and mitigation measures for the future service areas are described in Chapter 4.0, "Future Service Areas." Chapter 5.0, "Alternatives to the Proposed Project," discusses the impacts of the alternatives to the proposed project.

3.6.1 Existing Conditions

This section discusses the existing conditions relating to geology, soils, and mineral resources in the City of Goleta (City), as well as federal, state, and local regulations relating to geology, soils, and mineral resources that would apply to the proposed project.

According to the mineral yearbook produced by the California Geological Survey and the USGS (2003), no major nonfuel mineral-producing areas are located in the City. In addition, the mineral land classification maps for Santa Barbara County (California Division of Mines and Geology 1989) show no known areas of significant aggregate resources in the city—most of the city is mapped as containing mineral deposits of unknown significance, and a small portion of the city is mapped as having no significant deposits.

3.6.1.1 Topography

The City of Goleta occupies a portion of the eight-mile long and three-mile wide flat alluvial plain known as the Goleta Valley. This valley is bordered on the south by the coastal plateaus that encompass the Ellwood Mesa, Isla Vista, the University of California, Santa Barbara (UCSB), and the More Mesa areas. The western portion of the City of Goleta extends to the coast and includes the Ellwood Mesa area. The northern limit of the Goleta Valley is defined by the foothills of the Santa Ynez Mountains and is roughly coincident with the northern limit of the City. To the east, the Goleta Valley extends to the hills near the western edge of the City of Santa Barbara. Most of the valley drains into the Goleta Slough, a coastal salt marsh located south of Goleta and within the City of Santa Barbara airport property. Several flat-floored stream valleys, including Glen Annie Creek, San Pedro Creek, Las Vegas Creek, San Jose Creek, and Maria Ygnacio Creek, convey water through the City of Goleta to the slough from the Santa Ynez Mountains. The Goleta Slough is connected to the Pacific Ocean at the gap in the coastal plateaus located near Goleta Beach County Park.

3.6.1.2 Geology

The geologic units exposed within the City of Goleta and the surrounding area are shown on the Dibblee (1987a, b) geologic maps reproduced as Figure 3.6-1. The character and distribution of these units (i.e., the stratigraphy) and the geologic structure that underlies the City are described below.

Stratigraphy

These descriptions of the geologic units exposed in the vicinity of the City of Goleta, from youngest to oldest, are modified from Dibblee (1987a, b).

Quaternary Units

As can be seen in Figure 3.6-1, the rocks and sediments of Quaternary age are the predominant earth materials exposed at the surface within the City of Goleta. These materials are composed of marine and nonmarine detritus, eroded off the adjacent mountains, that accumulated in the ancestral Goleta Valley. These deposits total more than 1,000 feet of section and occur throughout the City.

Younger Alluvium (Qa): The Recent Age Younger Alluvium underlies most of the Goleta Valley floor and the broad canyon bottoms of the subsidiary drainages that flow through the City and into the Goleta Slough. Most of the eastern half of the City is underlain by this unit. This unit is up to 225 feet thick and is composed of mud, silt, sand, and discontinuous gravels.

Older Alluvium (Qoa): This Pleistocene Age unit is exposed in the western part of the City on low hills and elevated terraces and can be over 200 feet thick. It unconformably overlies the older consolidated rocks that crop out in the Santa Ynez foothills to the north. This unit is composed of reddish-brown to tan, unconsolidated boulders, cobbles, sand, silt, and clay.

Quaternary Older Gravels (Qog): This Pleistocene unit, also locally referred to as the *Fanglomerate*, is a boulder and cobble conglomerate that accumulated in alluvial fans along the south flank of the Santa Ynez Mountains. Remnants of these fan deposits are found on dissected, elevated terraces in the northeastern Goleta Valley. However, this unit is not exposed within the current City boundary.

Santa Barbara Formation (Qsb): This unit is of Early Pleistocene age, about 1,000 feet thick, and consists of yellow to buff, medium to fine-grained sand with interlayered silts and clays. This marine unit is locally concretionary and fossiliferous. This unit is not exposed within the City of Goleta; however, an outcrop of this unit does about the City boundary along Cathedral Oaks Road near La Patera Lane.

Tertiary Units

Sisquoc Formation (Tsq): This Pliocene Age unit is about 1,400 feet thick and consists of thin-bedded to massive, gray to brown marine mudstones and claystones. This unit is only exposed within the City of Goleta on the face of the seacliff at Ellwood Mesa.

Monterey Formation (Tm): This marine formation is of Middle to Late Miocene age and typically consists of a white to dark brown, hard silicified shale. In some places, this unit includes soft diatomaceous shale and beds of volcanic ash. Shale beds in the Monterey Formation are commonly fractured and stained with petroleum deposits. This unit is about 1,000 feet thick in the Goleta area. The Monterey Formation is only exposed within the City of Goleta along the seacliff at Ellwood Mesa, along Glen Annie Road between Cathedral Oaks Road and US-101, and in the Las Vegas Creek area near the northeast corner of the City.

Rincon Formation (Tr): The Rincon Formation is of lower Miocene age and consists of a series of uniform, greenish-brown, fissile marine mudstones and shales with irregular, limy, ferric-stained concretions and beds. This unit is about 1,700 feet thick in the Goleta area. The Rincon Formation is known for shallow landslides that are typically restricted to depths of 15 feet or

less. These slope failures tend to occur along the weathered/unweathered interface where water has penetrated as a result of rainfall or irrigation. Many slope failures in the area of this formation are the result of a combination of high pore pressure conditions and exceedence of the shear strength of clay that has weathered from the mudstone and claystone that typify the formation. Where the topography is flat, structures constructed on the Rincon Formation have been damaged by the constant expansion and shrinkage of the soil; where slopes occur, these effects are augmented by the tendency for soil creep and landslides to occur. Radon gas, a carcinogenic health hazard, is known to emanate from the Rincon Formation. This gas is a product of the decay of the naturally occurring uranium present in this rock unit.

This geologic unit is exposed within the current City limits only in an undeveloped area along the City boundary north of Cathedral Oaks Road between Los Carneros Road and La Patera Lane.

Vaqueros Formation (Tvq): This marine unit is of Oligocene age and consists of massive, light gray to buff, medium to coarse-grained fossiliferous sandstone. It is generally less than 300 feet thick. This unit is not exposed within the current boundary of the City of Goleta.

Geologic Structure

The geologic structure that underlies the City of Goleta generally consists of a southerly dipping, east-west trending homocline (i.e., all the rock layers dip uniformly in one direction), similar to the overall structure of the Santa Ynez Mountains. In the foothills north of the City, a more complex geologic structure with folds and faults has been mapped in the exposed bedrock. These folds and faults trend from east-west to northwest-southeast and are classified as inactive.

The California Geological Survey defines *active* faults as those that show evidence of surface displacement during the Holocene (i.e., within the last 11,000 years) and *potentially active* faults as those that show evidence of displacement within the Pleistocene (i.e., between 11,000 and 1.6 million years ago). None of the faults that cross the City have been designated as active.

The homocline of older Tertiary bedrock is unconformably overlain by a southward-thickening wedge of the Quaternary alluvial sediments that fill the Goleta Valley structural depression, known as a *graben*. This accumulation of unconsolidated sediments is terminated on the south edge by the More Ranch fault. The More Ranch fault (or fault zone) is classified as Potentially Active based on evidence of Late Quaternary displacement.

The More Ranch fault zone is part of the Mission Ridge fault system, which also includes the Mission Ridge and Arroyo Parida segments (U.S. Geological Survey 2004). Dibblee (1987) had previously mapped a single fault trace of the More Ranch fault in the Goleta area. Minor et al. (2003), however, split the portion of the fault between the Santa Barbara Airport and western edge of the Goleta quadrangle into the North More Ranch fault and the South More Ranch fault. New information on the fault trace location west of the Goleta quadrangle is not yet available, but later mapping will extend into the Dos Pueblos quadrangle (U.S. Geological Survey 2004) in which the western portion of the City is located.

Figure 3.6-2 delineates the faults mapped within and adjacent to the City of Goleta and their proximately to currently vacant parcels subject to future development under the GP/CLUP.

3.6.1.3 Soils

The soils present at the ground surface within the City are described by the U.S. Department of Agriculture, Natural Resource Conservation Service (formerly the Soil Conservation Service) in the "Soil Survey of Santa Barbara County, California, South Coastal Part" (Shipman 1981). This soil survey was prepared primarily to assess the agricultural potential of property within the City, and only the soil within a few feet of the ground surface was examined.

Although some information relative to development, such as the septic effluent absorptive capacity of near surface soils, was collected in the 1981 survey, such surveys are not an assessment of the geologic hazards that the underlying earth materials pose to future urban development. In most cases, the development of structures routinely involves the removal and recompaction (or replacement) of the near-surface soils discussed in the soil survey. Therefore, the character of the underlying geologic unit and the topography of the site are the most relevant factors in assessing potential geologic impacts. No detailed discussion of soil classifications is included in this document. However, two relevant issues involving near-surface deposits are discussed below.

Due to the nature of the parent bedrock material in the foothills of the Santa Ynez Mountains, alluvial soils present in various parts of the City of Goleta (and most of the South Coast) are commonly classified as expansive. *Expansive soils* will change volume (shrink and swell) with changes in moisture content. If not adequately addressed in foundation design, buildings can be damaged by repeated swelling of the supporting soil.

Compressible soils are near-surface (uppermost 50 feet) deposits that contain a high proportion of organic material. When a load (such as a new building) is placed on these deposits, the organic matter can compress and cause localized ground subsidence. These deposits are limited to the historic extent of the Goleta Slough, as shown in Figure 3.6-3.

3.6.1.4 Mineral Resources

There are no existing or planned surface mining operations within the City of Goleta. The historic Ellwood Oil Field, located in the Ellwood Mesa area, is the only extractive industry within the City of Goleta. The Venoco support facility for offshore oil operations, also located at Ellwood Mesa, is the only existing oil and gas processing facility in the City. The Venoco plant and the facilities associated with the Ellwood Oil Field would not be affected by the adoption of the GP/CLUP.

3.6.2 Regulatory Framework

3.6.2.1 Federal and State

Clean Water Act Section 402 (National Pollutant Discharge Elimination System Program)

Section 402 of the Clean Water Act mandates that certain types of construction activity comply with the requirements of the EPA's National Pollutant Discharge Elimination System (NPDES) program. The EPA has delegated to the State Water Resources Control Board the authority for enforcement of the NPDES program in California, where it is implemented by the state's nine regional water quality control boards. Construction activity disturbing 1 acre or more must obtain

coverage under the state's General Permit for Stormwater Discharges Associated with Construction Activity (General Permit).

The Central Coast Regional Water Quality Control Board (RWQCB) administers the NPDES stormwater permit program in Santa Barbara County. Obtaining coverage under the General Permit requires that the project applicant:

- file an NOI to obtain coverage under the General Permit *before* construction begins;
- prepare and implement a Stormwater Pollution Prevention Plan (SWPPP); and
- file a notice of termination with the SWRCB when construction is complete and the construction area has been permanently stabilized.

The SWPPP describes proposed construction activities, receiving waters, stormwater discharge locations, and best management practices (BMPs) that will be used to reduce project construction effects on receiving water quality. The components of the SWPPP most relevant to geology and soils are erosion and sediment control measures. More information on the NPDES and SWPPP is provided in Section 3.9.

California Environmental Quality Act

CEQA encourages the protection of all aspects of the environment by requiring state and local agencies to prepare multidisciplinary environmental impact analyses about the environmental impacts of a proposed project and to make decisions based on the findings of those analyses. The State CEQA Guidelines require that the CEQA lead agency evaluate whether the proposed project would have a significant impact on the environment, including impacts associated with geology, soils, and mineral resources.

California Coastal Act Section 3000 et seq.

The purpose of the CCA is to provide long-term protection of California's coastline. The CCA applies to that portion of the City within the Coastal Zone. Chapter 3 of the CCA, "Coastal Resources Planning and Management Policies," requires that new development:

- minimize the risks to life and property in areas of high geologic hazard;
- ensure stability and structural integrity;
- neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area; and
- not use protective devices that would substantially alter natural landforms along bluffs and cliffs.

Alquist-Priolo Earthquake Fault Zoning Act

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act is to reduce the risk to life and property caused by one type of earthquake hazard—surface fault rupture. The act prohibits the construction of most types of structures in *earthquake fault zones*, which are regulatory zones established by the state geologist. The state geologist defines these zones by delineating the surface traces of active faults and then issues maps showing the location of these zones. The maps are distributed to the affected cities, counties, and state agencies for use in planning and controlling new or renewed construction (Hart and Bryant 1997).

Seismic Hazards Mapping Act

The purpose of the Seismic Hazards Mapping Act is to protect public safety from other types of earthquake hazards not related to surface fault rupture, including strong ground shaking,

liquefaction, and seismically induced landslides. Like the Alquist-Priolo Earthquake Fault Zoning Act, the Seismic Hazards Mapping Act mandates that the state geologist delineate zones. The locations of these zones, called *seismic hazard zones*, are shown on the Seismic Hazard Zone Maps. Cities and counties are prohibited from issuing development permits for sites within seismic hazard zones until appropriate measures have been developed and incorporated into the development plans (California Division of Mines and Geology 1997).

California Building Standards Code

California's minimum standards for structural design and construction are delineated in the CBSC (24 CCR). The CBSC is based on the Uniform Building Code (International Code Council 1997), which is widely used in the United States. The CBSC requires that the building official complete the appropriate soil classification, using borings or excavation, and that these classifications be included on the building plans. The CBSC provides standards for various construction activities based on soil characteristics.

3.6.2.2 Local

City of Goleta Ordinances

Development in the City is subject to the City's Inland Zoning Ordinance for those portions of the City outside of the Coastal Zone and the Coastal Zoning Ordinance for those portions of the City within the Coastal Zone. Following the adoption of the GP/CLUP, the existing Inland and Coastal Zoning Ordinances will be replaced by a single, unified zoning code that includes zoning regulations applicable to inland areas and the coastal zone. Existing City ordinances are not applicable in the context of this EIR because they will be replaced upon the adoption of the GP/CLUP.

3.6.3 Project Impacts and Mitigation

3.6.3.1 Thresholds of Significance

City of Goleta Environmental Thresholds and Guidelines Manual

The Geologic Constraints Guidelines adopted by the City of Goleta establish the following Threshold:

The purpose of these Guidelines is to provide preliminary criteria for determining whether a particular activity could have a potentially significant impact on the environment as described in Section 15064 of the State CEQA Guidelines. Because geologic conditions are highly variable within Santa Barbara County, these guidelines are not fixed thresholds upon which a determination of significant impact would be made. They serve to point out when further study of site-specific conditions is required in order to assess geologic impacts. The level of project geologic impacts (i.e. potentially significant, potentially significant but subject to effective mitigation, or not significant) is made by City staff (in consultation with licensed geologists and engineers as necessary) upon review of project plans, proposed mitigation measures and site specific geologic information.

CEQA Thresholds

The City of Goleta also assesses impacts based on the State CEQA Guidelines. As suggested by Appendix G of the CEQA Guidelines (14 CCR 15000 et seq.), the proposed project may have a significant impact on geology, soils, or mineral resources if it would:

- expose people or structures to potential substantial adverse effects resulting from the rupture of a known earthquake fault, seismic ground shaking, seismically induced landslides, or liquefaction;
- be located on a geologic unit or soil that is unstable or would become unstable as a result of the construction or operation of the proposed project;
- result in substantial accelerated soil erosion and/or the loss of a substantial amount of topsoil;
- be located on an expansive soil that would create substantial risks to life or property;
- have soils incapable of supporting the use of onsite wastewater disposal systems;
- result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or
- result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

3.6.3.2 Discussion of Relevant GP/CLUP Policies

The Safety Element, Land Use Element, and Coastal Act Policies of the City's General Plan contain policies to minimize the risk to humans and structures from geology or soils-related hazards. These policies are discussed below. Mineral resources are also discussed.

Safety Element

Geology and soils-related hazards policies in the Safety Element focus on protecting humans and structures from potential hazards. Geology-related hazards include seismic hazards (i.e., rupture of a known earthquake fault, seismic ground shaking, seismically induced landslides, and liquefaction), unstable geologic units, and unstable slopes. Soils-related hazards include accelerated erosion, unstable soils, and expansive soils. Policies addressing these hazards are listed below:

- Policy SE 1: Safety in General
- Policy SE 2: Bluff Erosion and Retreat
- Policy SE 3: Beach Erosion and Shoreline Hazards
- Policy SE 4: Seismic and Seismically Induced Hazards
- Policy SE 5: Soil and Slope Stability Hazards
- Policy SE 11: Emergency Preparedness

Land Use Element

Geology and soils-related hazards policies in the Land Use Element focus on siting and population densities appropriate to site constraints such as geologic hazards and slope stability and include the following:

- Policy LU 2: Residential Land Uses

Conservation Element

The City does not have a conservation policy related to the protection of mineral resources, such as aggregate or other commercial mineral resources because there are no known significant mineral resources in the City (U.S. Geological Survey 2003; California Division of

Mines and Geology 1989). However, the Conservation Element does contain several policies relating to the issues of soil conservation, erosion, and safety. These policies include the following:

- Policy CE 1: Environmentally Sensitive Habitat Area Designations and Policy
- Policy CE 10: Watershed Management and Water Quality

Open Space Element

Geology and soils-related hazard policies in the Open Space Element focus on the potential for new development or redevelopment to affect or create geologic hazards. These policies reduce impacts by allowing public access to coastal resources only in safe areas by creating or preserving open space on lands that require special management or regulation because of geologic hazards. These policies include:

- Policy OS 1: Lateral Shoreline Access
- Policy OS 2: Vertical Access to the Shoreline
- Policy OS 5: Ellwood-Devereux Open Space Area
- Policy OS 7: Adoption of Open Space Plan Map

3.6.3.3 Potential Geologic Impacts and Hazards

Seismic Hazards

Ground Rupture

The displacement of the earth's surface along a fault trace during an earthquake is termed *ground rupture*. Such an occurrence can cause severe damage to overlying buildings and injuries to any occupants. The potentially active More Ranch Fault (see Figure 3.6-2) is the only recognized source of ground rupture within the City of Goleta. Vacant land sites #89 and #95 through #116 are located in the vicinity of the trace of the More Ranch Fault according to Dibblee (1987b). All but Site #89, however, are designated as Open Space/Passive Recreation and would not involve the development of structures that could be affected by ground rupture. Site #89 is designated as Planned Residential (8 units/acre) and is located approximately 200 feet north of the inferred trace of the fault. Given the uncertainty of the fault's location, the future buildout of Site #89 is potentially subject to ground rupture.

Groundshaking

Groundshaking is a regional phenomenon that affects land areas surrounding an earthquake epicenter, with the intensity of shaking diminishing with the distance from the fault. Groundshaking within the City can be generated by an earthquake on a local onshore or offshore fault or by a major quake on a remote fault like the San Andreas. This hazard is faced by all properties in the City of Goleta as well as the entire South Coast of Santa Barbara County.

The California Geological Survey (California Geological Survey 2003; Cao et al. 2003) has estimated the probabilistic peak ground acceleration (i.e., peak groundshaking) hazard for all areas within the state. This estimate is reported as the peak acceleration (measured in units of the acceleration of gravity, or *g*) that would have a 10 percent probability of being exceeded in a given region of California in 50 years (i.e., a 0.2 percent probability in 1 year). This measure can

be used to assess the relative seismic groundshaking hazard for a given region. The California Geological Survey probabilistic seismic hazard map (2003) indicates Goleta lies in a midrange risk category for ground motion associated with an earthquake. According to the map, a ground acceleration of 0.3 to 0.5 percent g is not expected to be exceeded in the next 50 years.

Liquefaction

Liquefaction is the process in which soils and sediments lose shear strength and fail during prolonged, intense seismic ground shaking. The vibration due to an earthquake can cause an increase in pore pressure within the saturated soils. If the pore pressure is raised sufficiently to be equivalent to the load pressure, this causes a temporary loss of shear strength, allowing the material to flow as a fluid. This temporary condition can result in the severe settlement of foundations and in slope failure. The susceptibility of an area to liquefaction is determined largely by the depth to groundwater and the properties (e.g., texture and density) of the soil and sediment within and above the groundwater. The sediments most susceptible to liquefaction are saturated, poorly graded, unconsolidated sand and silt within 50 feet of the ground surface (California Division of Mines and Geology 1997).

There is no historical evidence of structures being damaged by liquefaction in the City or adjacent unincorporated areas. The geologic conditions within which liquefaction could occur (i.e. shallow groundwater and near-surface unconsolidated alluvial deposits) are present across the eastern two-thirds of the City. Liquefiable near-surface deposits were identified and addressed in the development of the multi-family dwelling complex north of Hollister Avenue and east of Los Carneros Road, and in the Phelps Road area of western Goleta (Baca, pers. comm.).

The following vacant sites designated for buildout in the GP/CLUP would be potentially subject to a liquefaction hazard: #30 through #48, #49 through #69, #72, and #77 through #81.

Tsunamis

The USGS and CGS has recently evaluated the portion of the coastline potentially affected by a tsunami generated by an earthquake on a fault located offshore of the South Coast. Wave run-up to an elevation of 12 meters (38 feet) above sea level is considered possible as indicated on Figure 3.9-2 in Section 3.9 Water Resources.

Slope Stability Hazards

Impacts related to slope stability (landslide) hazards could occur where buildout is proposed on or adjacent to steep slopes underlain by weak geologic units. Existing landslide deposits, illustrated on Figure 3.6-4, fall outside of the City of Goleta. The geologic unit generally associated with landslide hazards on the South Coast, the Rincon Formation, is not exposed within the City. Also, none of the vacant sites designated for buildout in the GP/CLUP are located in areas subject to these conditions.

Soils Hazards

Due to the nature of the parent bedrock material in the foothills of the Santa Ynez Mountains, alluvial soils present in various parts of the City of Goleta (and most of the South Coast) are commonly classified as expansive. All of the vacant sites designated for buildout are potentially subject to expansive soils. While such soils can cause damage, the effects of such materials are routinely and successfully addressed by routine engineering measures incorporated into the

building design and construction process. Specially, engineered foundation systems and site grading practices are routinely utilized and required to alleviate expansive soil hazards.

Compressible soils are also found in several vacant sites within the City. Figure 3.6-3 illustrates the area subject to compressible soils. The following vacant sites designated for buildout in the proposed GP/CLUP would be potentially subject to a compressible soils hazard: #49 through #69, #72, and #77 through #81.

Radon Gas

Radon gas, a carcinogenic health hazard, is known to emanate from the Rincon Formation. The high radon hazard area depicted on Figure 3.6-5 generally coincides with the outcrops of this geologic unit. The gas is a product of the decay of naturally occurring uranium present in this rock unit. Only a small section of the City, located north of Cathedral Oaks in northwest Goleta, is underlain by the Rincon Formation; the area is undeveloped. None of the vacant sites designated for buildout in the GP/CLUP is underlain by the Rincon Formation.

Accelerated Erosion

Construction activities on a site can temporarily increase the rate of erosion and the volume of downstream sediment transport. These effects are generally short term in nature and are alleviated with the growth of vegetation after the completion of construction.

3.6.3.4 Impact Assessment Methodology

As discussed above, impacts related to geologic processes resulting from implementation of the GP/CLUP involve only the potential effects associated with:

- a change in land use designation of existing developed parcels;
- the future development (buildout) of currently vacant parcels; or
- the adoption of policies that guide development in geologically constrained areas.

Each of these three issue areas is discussed below.

Policy Adoption

The GP/CLUP contains numerous policies that would address the potential for geologic hazards to affect or be created by new development. These policies include:

- Policy SE 1: Safety in General
- Policy SE 2: Bluff Erosion and Retreat
- Policy SE 3: Beach Erosion and Shoreline Hazards
- Policy SE 4: Seismic and Seismically Induced Hazards
- Policy SE 5: Soil and Slope Stability Hazards
- Policy SE 11: Emergency Preparedness
- Policy LU 2: Residential Land Uses

All of the above policies serve to avoid or minimize the geologic consequences of new development. None would allow or facilitate the creation of new geologic hazards or the

placement of people or structures in areas subject to such hazards to a greater degree than now exists.

Proposed Land Use Designations of Existing Developed Areas

The GP/CLUP does not include any substantial changes in the density or character of existing developed areas within the City of Goleta. As such, substantial new development in these areas that could involve geologic hazards is not reasonably foreseeable.

Future Buildout of Currently Vacant Parcels

There are 119 currently vacant parcels designated for future buildout in the GP/CLUP. The future buildout of these parcels would constitute a physical change in the environment that must be evaluated under CEQA. Presented below is a summary table that identifies the impacts associated with the proposed land use designation for each of the 119 vacant parcels based upon the discussion in Section 3.6.3.3 above.

**TABLE 3.6.1
POTENTIALLY SIGNIFICANT (LONG-TERM) IMPACT SUMMARY**

Vacant sites	Impacts				
	Ground Rupture	Groundshaking	Liquefaction	Landslide	Compressible Soils
All sites		II			
Site #89	II				
#30 through #48, #49 through #69, #72, #77 through #81			II		
#49 through #69, #72, #77 through #81					II
#14 and #15				II	
II = A potentially significant impact subject to feasible mitigation.					

3.6.3.5 Project Impacts

Class I Impacts

Implementation of the GP/CLUP would not result in any significant and unavoidable short or long-term (Class I) impacts on geologic processes.

Class II Impacts

Short-Term Impacts

Impact 3.6-1. Substantial Accelerated Soil Erosion and/or Loss of a Substantial Amount of Topsoil

Development would cause groundbreaking and vegetation removal during construction. As a result, soil would be exposed to rain and wind, potentially causing accelerated erosion and deposition of sediment into nearby drainages and/or waterways. Erosion and sedimentation could result in a short-term increase in turbidity in these waterways, potentially causing water quality degradation.

Federal and state jurisdictions require that an approved SWPPP be prepared. A SWPPP specifies BMPs that will prevent all construction pollutants from contacting stormwater with the intent of keeping all products of erosion from moving off site into receiving waters. In addition, construction projects will need to adhere to the City's grading ordinances. These ordinances and State/Federal requirements set forth the procedures, standards, and enforcement that will be used to manage soil erosion and subsequent sedimentation in order to sustain the goal of clean water. Accelerated erosion and loss of a substantial amount of topsoil resulting from buildout under the GP/CLUP would be considered a potentially significant impact.

Policies That Would Reduce Impact 3.6-1. Although construction can potentially lead to accelerated erosion, the City's policies for general safety, soil and slope stability, bluff erosion and retreat, and beach erosion, together with implementation of the SWPPP and the grading ordinances, would prevent substantial soil erosion or the loss of topsoil and reduce this risk to a less-than-significant level. The City's policies are:

- Policy SE 1: Safety in General
- Policy SE 2: Bluff Erosion and Retreat
- Policy SE 3: Beach Erosion and Shoreline Hazards
- Policy SE 5: Soil and Slope Stability Hazards

Long-Term Impacts

Impact 3.6-2. Exposure of People or Structures to Substantial Adverse Effects Resulting from the Rupture of a Known Earthquake Fault, Seismic Ground Shaking, Seismically Induced Landsliding, or Liquefaction

The City is in a seismically active region, and seismic activity could cause surface fault rupture, strong ground shaking, seismically induced landslides, and/or liquefaction. Surface fault rupture and strong ground shaking caused by local or regional earthquakes could result in severe damage to structures and utilities and pose a significant risk to public safety. Unless constructed to withstand the potential fault rupture and shaking caused by an earthquake, structures could collapse or be shifted off their foundations, roads could be damaged, and pipelines could fail. A seismic event could also trigger landsliding in unstable geologic or soil units (described in Impact 3.6-3) or on steep (i.e., greater than 20 percent) slopes. Unstable units and steep slopes occur primarily in northern portion of the City. In addition, the extensive unconsolidated deposits in the City that overlie shallow groundwater could become unstable as a result of liquefaction caused by strong ground shaking.

Policies That Would Reduce Impact 3.6-2. Although building in a seismically active region is potentially dangerous, the City's policies for seismic and seismically induced hazards reduce this risk to a less-than-significant level. The City's policies, listed below, include maintaining up-to-date geologic information, complying with the CBSC, prohibiting building within a fault trace corridor, requiring geotechnical reports, pursuing retrofitting older masonry buildings, requiring a higher level of seismic safety for critical buildings minimizes this impact, and discouraging construction with high liquefaction potential.

- Policy SE 1: Safety in General
- Policy SE 4: Seismic and Seismically Induced Hazards
- Policy SE 11: Emergency Preparedness

Impact 3.6-3. Exposure of People or Structures to Substantial Adverse Landslide Effects Resulting from Buildout on Unstable Geologic Units or Soils or Steep Slopes

Buildout in areas with moderate to steep slopes or unstable geologic units or soils could be susceptible to landslides. Landslides are most likely in very small areas in the northern portion of the City with unstable geologic or soil units or with steep slopes, or in the southern portion of the City along coastal bluffs. Buildout in these high landslide potential areas under the GP/CLUP is planned at Sites #14 and #15. Unstable geologic and soil units of particular concern are the Rincon Formation and the Ayars series, as these are known for their landslides and slope failures.

Policies That Would Reduce Impact 3.6-3. Although buildout on unstable geologic units or soils or steep slopes can be susceptible to landslides, the City's policies for general safety, soil and slope stability, bluff erosion and retreat, and beach erosion reduce this risk to a less-than-significant level.

- Policy SE 1: Safety in General
- Policy SE 2: Bluff Erosion and Retreat
- Policy SE 3: Beach Erosion and Shoreline Hazards
- Policy SE 5: Soil and Slope Stability Hazards

Impact 3.6-4. Location of Development on Expansive and/or Compressible Soil That Could Lead to Risks to People or Structures

Expansive and/or compressible soils occur in the City, and development on these soils could lead to significant damage to structures and utilities. The location of development on expansive and/or compressible soils that could lead to risks to people or structures would be a potentially significant impact.

Policies That Would Reduce Impact 3.6-4. Although expansive/compressible soils can lead to structural damage, the City's policies for general safety and soil stability related to expansive/compressible soils reduce this risk to a less-than-significant level.

- Policy SE 1: Safety in General
- Policy SE 5: Soil and Slope Stability Hazards

Class III Impacts

Short-Term Impacts

There are no short-term Class III impacts related to the implementation of the GP/CLUP.

Long-Term Impacts

Impact 3.6-5. Exposure of People to Elevated Levels of Indoor Radon

Although there are no areas of Rincon Formation capable of emanating radon gas within the City where development currently exists or is planned in the future under the GP/CLUP, areas of Rincon Formation do exist in existing/planned open space and along the City's northern border. Therefore, the potential for people to be exposed to elevated levels of indoor radon cannot be discounted entirely. The potential for such exposure is considered an adverse but less-than-significant impact.

Class IV Impacts

Implementation of the GP/CLUP would not result in any short or long-term beneficial (Class IV) impacts on geologic processes or involving exposure of people and structures to geologic hazards.

3.6.3.5 Cumulative Impacts

Impacts related to geologic processes and/or exposure of people and structures to geologic hazards are generally site-specific and do not interact to constitute a cumulative impact. Therefore, no such impacts are anticipated as a result of GP/CLUP implementation.

3.6.3.6 Mitigation and Residual Impact

Modifications to Proposed General Plan Policies

No modifications are required.

Other Mitigation

The City has included a policy subsection SE 1.9 that would address radon hazards as suggested in the DEIR. No additional mitigation is identified.

3.6.4 Residual Impacts

Residual, project specific impacts resulting from Plan implementation involving geologic processes as well as exposure of people and structures to geologic hazards would be considered less than significant.

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Acronyms

City of Goleta (City	1
University of California, Santa Barbara (UCSB.....	1
National Pollutant Discharge Elimination System (NPDES)	4
the state's General Permit for Storm Water Discharges Associated with Construction Activity (General Permit.....	5
Regional Water Quality Control Board (RWQCB).....	5
Storm Water Pollution Prevention Plan (SWPPP).....	5
Best Management Practices (BMPs).....	5

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California Geological Survey 2003; Cao et al. 2003	8
California Geological Survey probabilistic seismic hazard map (2003.....	9
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