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4.6 Geology and Soils

This section discusses the project's potential impacts relating to geologic hazards and paleontological resources. This section is partially based on the *Revised Geotechnical Engineering Report Update* included as Appendix G and the *Preliminary Drainage Design* included as Appendix H.

4.6.1 Environmental Setting

a. Geologic Setting

Regional

The City of Goleta occupies a portion of the eight-mile long and three-mile wide flat alluvial plain known as the Goleta Valley (City of Goleta 2006). The Goleta Valley is a broad, flat alluvial plain bordered on the south by the bluffs of the Pacific coastline, and on the north by foothills and terraces of the foreland of the Santa Ynez Mountain Range. It generally slopes gently into the Goleta Slough, which is located in the south central portion of the valley.

Project Site

The project site is relatively flat along the perimeter and driveway aisles, but gently sloping where vehicles would previously park on graded berms to view the movie screen when the drive-in theater was operational. Surface drainage on the project site occurs through sheet flow (Appendix G), and the project site contains two existing dewatering wells with sump pumps, located in the northeast and southwest portions of the project site. The project site is currently configured like a bowl, with drainage flows directed to the southwestern pump that discharges through the San Jose Creek Channel levee into the San Jose Creek. Ground elevations range from 7 feet at the southwestern pump to approximately 15 feet at the San Jose Creek levee. Flows in San Jose Creek generally run from north to south, out to the Pacific Ocean (Appendix H).

The project site's general subsurface profile consists of fill soils overlying alluvial soils, which were further underlain with estuary deposit soils. All of these soils exist as layered sands, or layered sands and clays. Project site sands were observed to be in a moist to wet condition with a loose consistency, and clays were moist to wet, and very soft to medium-stiff. Variable amounts of shells were observed within the project site's estuary deposit soil layers. Subsurface water was encountered at depths ranging from approximately 3 to 7.5 feet below the existing ground surface (Appendix G).

b. Seismic and Other Geologic Hazards

Seismic Hazards

Similar to much of California, the project site is located within a seismically active region. The Transverse Ranges are characterized by east-west trending structural features in contrast to the dominant northwest-southeast structural trend of California. The project site is not located in an Alquist-Priolo Fault Zone (California Geologic Survey [CGS] 2023). The closest Alquist-Priolo mapped earthquake fault to the project site is the Pitas Point—Red Mountain Fault South Strand Fault, located over 20 miles to the southeast. The nearest fault to the project site is the More Ranch Fault, part of the Mission Ridge Fault System, located approximately 690 feet from the southern limit of the project site (Appendix G). The following subsections discuss regional faults capable of generating strong

seismic shaking at the project site, and is based on information from the *Revised Geotechnical Engineering Report Update* (Appendix G).

Mission Ridge Fault System

The Mission Ridge fault system consists of an approximately 45-mile, essentially continuous fault system that extends from Goleta to Ojai along the southern flank of the Santa Ynez Mountains. The Mission Ridge fault system includes the More Ranch, Mission Ridge, Arroyo Parido, and Santa Ana faults, with the More Ranch fault located 690 feet south of the project site (Appendix G). The More Ranch Fault is a minor fault is not classified as active by the State Division of Mines and Geology or subject to an Alquist-Priolo Special Studies Zone; however, according to the Santa Barbara County Seismic Safety and Safety Element (SSSE), the More Ranch Fault is considered active based on the existence of a geologically recent fault scarp (City of Goleta 2006). This fault is estimated to be capable of a magnitude 6.9 earthquake.

Red Mountain Fault

The Red Mountain Fault is a north-dipping reverse fault with a length of approximately 10 miles. The southern branch of the Red Mountain Fault is located offshore, approximately 3.4 miles from the project site. This fault is estimated to be capable of a magnitude 7.4 earthquake.

Pitas Point Fault

The Pitas Point fault is a north-dipping reverse fault with a length of approximately 12 miles. This fault is located approximately 6.4 miles south of the project site and is estimated to be capable of a magnitude 7.2 earthquake.

Oak Ridge Fault

The Oak Ridge fault is a segmented fault with onshore and offshore segments. The offshore segment is located approximately 8.2 miles south of the project site and is estimated to be capable of a magnitude 6.9 earthquake.

Santa Ynez Fault

The Santa Ynez fault has a length of approximately 80 miles and is divided into east and west segments. This fault is a south-dipping reverse fault and forms part of the northern boundary of the Santa Ynez Mountains. This fault is located approximately 8.2 miles north of the project site and is estimated to be capable of a magnitude 7.1 earthquake.

Los Alamos Fault

The Los Alamos fault is a northwest trending fault that is approximately 17 miles long. This fault is located approximately 9.3 miles northwest of the project site and is estimated to be capable of a magnitude 6.9 earthquake.

San Andreas Fault

The San Andreas fault is considered the most active fault in the region, and is located approximately 43 miles northeast of the project site. Some segments of this fault are estimated to be capable of a magnitude 7.5 earthquake, but simultaneous rupture of more than one segment may cause a magnitude 8.0 earthquake, or greater.

Other Geologic Hazards

The project site is approximately 0.5 mile from the Pacific Ocean from the project's southern limit. According to the City's General Plan, the project site is located inside a Tsunami Hazard Area (City of Goleta 2006); however, the Tsunami Hazard Area Map for the County of Santa Barbara, updated on July 8, 2021, indicates that the project site is outside the tsunami hazard zone (County of Santa Barbara 2021). Given that the County of Santa Barbara uses more recent data than the City's General Plan, the County's determination is applied to this analysis. Tsunamis are discussed further in Section 4.8, *Hydrology and Water Quality*.

Other potential seismic hazards known to occur within the vicinity of the project site include ground rupture, groundshaking, liquefaction, and settlement, which are discussed in more detail below.

Ground Rupture

Seismically induced ground rupture occurs as the result of differential movement across a fault. An earthquake occurs when seismic stress builds to the point where rocks rupture. As the rocks rupture, one side of a fault block moves relative to the other side. The resulting shock wave is the earthquake. If the rupture plane reaches the ground surface, ground rupture occurs. Potentially active faults are those that have moved during the last 2.5 million years, but not during the last 10,000 years while active faults show evidence of movement within the last 10,000 years. No fault zones are located on the project site according to the Goleta General Plan/Coastal Land Use Plan Geologic Hazards Map (2009). Therefore, ground rupture is not a potential concern on the project site.

Groundshaking

In addition to surface rupture, fault displacement can generate seismic groundshaking, which is the greatest cause of widespread damage in an earthquake. Whereas surface rupture affects a narrow area above an active fault, groundshaking covers a wide area and is greatly influenced by the distance of the site to the seismic source, soil conditions, and depth to groundwater. Many faults are mapped in the foothills of the Santa Ynez Mountains and coastal plans of Santa Barbara County with varying types, lengths, and ages. In addition to damage to structural development, ground shaking can also cause seismic settlement and subsidence, lurch cracking, and lateral spreading. The project site may be subject to strong groundshaking due to potential fault movement from regional faults, including the Mission Ridge, Red Mountain, Pitas Point, Oak Ridge, Santa Ynez, Los Alamos, and San Andreas faults (Appendix G).

Landslides

Landslides are the mass movement of rock, debris, or earth down a slope, usually in conjunction with earthquakes, floods, or prolonged precipitation. The project site is not located in a potential landslide area as identified by the Goleta General Plan Geologic Hazards Map (City of Goleta 2009).

Liquefaction

Liquefaction is a seismic phenomenon in which loose, saturated granular and non-plastic fine-grained soils lose their structure/strength when subjected to high-intensity ground shaking. Liquefaction occurs when three general conditions exist:

1. Shallow groundwater (within the top 50 feet of the ground surface);
2. Low density non-plastic soils; and
3. High intensity ground motion.

According to the *Geotechnical Engineering Report Update*, there is a potential for liquefaction to occur on the project site. Total and differential dynamic settlement due to liquefaction may approach approximately 4 inches and 2 inches, respectively (Appendix G).

Seismically Induced Settlement

Seismically induced settlement of dry sand is caused by a substantial seismic event and may occur in lower density sand and silt soils that are not saturated by groundwater. During a major earthquake, the air-filled void spaces between the unsaturated soil particles tend to compress, which translates to a decrease in volume or settlement. According to the *Geotechnical Engineering Report Update*, there is a potential for seismically induced settlement of dry sand to occur on the project site. Total and differential seismically induced settlement of dry sand may approach 2 inches and 1 inch, respectively (Appendix G).

Lateral Spreading

Lateral spread is a pervasive type of liquefaction-induced ground failure that occurs on gentle slopes or near free-faces[1], such as river channels. Lateral spreading movement may occur when a soil mass slides laterally on liquefied soils moving downslope or towards a free-face, as the result of a liquefaction during a groundshaking event. The topographic conditions at the project site are relatively flat; however, there is a free-face along San Jose Creek, which flows parallel to and is on the southeast side of the entrance driveway. In the event of liquefaction caused by groundshaking, the project site could move laterally approximately 6 inches towards San Jose Creek (Appendix G).

Expansive Soils

Soils with relatively high clay content are expansive due to the capacity of clay minerals to take in water and swell (expand) to greater volumes. Expansive soils tend to swell with seasonal increases in soil moisture and shrink during the dry season as soil moisture decreases. According to the *Geotechnical Engineering Report Update* prepared by Earth Systems Pacific, soils on the project site within the development area are non-expansive (Appendix G).

Corrosive Soils

Corrosive soils contain chemical constituents that can react with construction materials, such as concrete and ferrous metals, which may damage underground infrastructure and building foundations over time. According to the *Geotechnical Engineering Report Update* prepared by Earth Systems Pacific, project site soils are classified as "moderately corrosive to corrosive" (Appendix G).

Erosive Soils

Soil erosion is the removal of soil by water and wind. Factors that influence erosion potential include the amount of rainfall and wind, the length and steepness of the slope, and the amount and type of vegetative cover. According to the *Geotechnical Engineering Report Update* prepared by Earth Systems Pacific, project site surface soils are highly erodible (Appendix G).

[1] A free-face is a vertical or steeply inclined layer of rock from which weathered material falls to form fragments at its base.

c. Paleontological Resources

The project site is underlain by Holocene and upper Pleistocene (Quaternary-era) alluvium and colluvium (Qac), which consists of poorly consolidated silt, sand, and gravel deposits of modern drainages and piedmont alluvial fans and floodplains (United States Geologic Survey 2007). Quaternary-era alluvial materials are assigned a low paleontological resource sensitivity due to their relatively recent age, and there are no known recorded paleontological resources found within the Qac geologic unit in Santa Barbara County (Paleobiology Database 2023).

4.6.2 Regulatory Setting

a. Federal Regulations

Clean Water Act

Please refer to Section 4.9.2, subsection (a), in Section 4.9, *Hydrology and Water Quality*, for a detailed description of how the Clean Water Act applies as a federal regulation to the proposed project.

b. State Regulations

California Coastal Act

The California Coastal Act, enacted in 1976, establishes procedures for the review of proposed developments in the Coastal Zone and policies for the protection of coastal resources and public access to the coastline. The project site is located in the Coastal Zone; therefore, Section 30253 of the California Coastal Act pertains to aesthetics of the project.

> **Section 30253**: New development shall: (1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard. (2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.

California Building Code

California law provides a minimum standard for building design through the California Building Code (CBC) (C.C.R. Title 24). Chapter 23 of the CBC contains specific requirements for seismic safety. Chapter 29 regulates excavation, foundations, and retaining walls. Chapter 33 of the CBC contains specific requirements pertaining to site demolition, excavation, and construction to protect people and property from hazards associated with excavation cave-ins and falling debris or construction materials. Chapter 70 of the CBC regulates grading activities, including drainage and erosion control. Construction activities are subject to occupational safety standards for excavation, shoring, and trenching as specified in California Division of Occupational Safety and Health (Cal/OSHA) regulations (C.C.R. Title 8). The CBC requires consideration of soil-related geotechnical hazards, such as addressing hazardous soil conditions involving removal, proper fill selection, and compaction prior to construction. The City of Goleta is responsible for enforcing the CBC.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was signed into law in 1972 (Public Resources Code § 2621, et seq.; 14 C.C.R. §§ 3600, et seq.). The purpose of this Act is to prohibit the location of most structures for human occupancy across the traces of active faults and to thereby mitigate the hazard of fault rupture. Under the Act, the State Geologist identifies "Earthquake Fault Zones" along known active faults in California (14 C.C.R. §3601). Cities and counties affected by the zones must regulate certain development projects within the zones. They must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting (14 C.C.R. §3603).

Seismic Hazards Mapping Act

The California Geologic Survey, formerly the California Department of Conservation, Division of Mines and Geology (CDMG), provides guidance with regard to seismic hazards. Under CDMG's Seismic Hazards Mapping Act (1990), seismic hazard zones are to be identified and mapped to assist local governments in land use planning (Public Resources Code §§ 2690, et seq.). The intent of these maps is to protect the public from the effects of strong ground shaking, liquefaction, landslides, ground failure, or other hazards caused by earthquakes. In addition, CDMG's Special Publications 117, "Guidelines for Evaluating and Mitigating Seismic Hazards in California," provides guidance for the evaluation and mitigation of earthquake-related hazards for projects within designated zones of required investigations.

Post-Construction Stormwater Management Requirements

Please refer to Section 4.9.2, subsection (c), in Section 4.9, *Hydrology and Water Quality*, for a detailed description of post-construction stormwater management requirements and how they apply as a local regulation for the proposed project.

California Environmental Quality Act

Paleontological resources are protected under CEQA, which states, in part, that a project will "normally" have a significant effect on the environment if it, among other things, will disrupt or adversely affect a paleontological site except as part of a scientific study. Specifically, in Appendix G of the State CEQA Guidelines the question is posed, "Will the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature." To determine the uniqueness of a given paleontological resource, it must first be identified or recovered. Therefore, mitigation of adverse impacts to the extent practicable to paleontological resources is mandated by CEQA.

c. Local Regulations

City of Goleta General Plan

The Safety Element of the Goleta General Plan contains policies intended to reduce the potential for geologic hazards to adversely affect people and property, including the following:

- **Policy SE 1.3: Site-Specific Hazards Studies.** Applications for new development shall consider exposure of the new development to coastal and other hazards. Where appropriate, an application for new development shall include a geologic/soils/geotechnical study and any other studies that identify geologic hazards affecting the proposed project site and any necessary mitigation measures. The study report shall contain a statement certifying that the project site is

suitable for the proposed development and that the development will be safe from geologic hazards. The report shall be prepared and signed by a licensed certified engineering geologist or geotechnical engineer and shall be subject to review and acceptance by the City.

- **Policy SE 1.6: Enforcement of Building Codes.** The City shall ensure through effective enforcement measures that all new construction in the city is built according to the adopted building and fire codes.
- **Policy SE 4.3: Geotechnical and Geologic Studies Required.** Where appropriate, the City shall require applications for planning entitlements for new or expanded development to address potential geologic and seismic hazards through the preparation of geotechnical and geologic reports for City review and acceptance.

Please see Section 4.10, *Land Use and Planning*, for a comprehensive discussion of applicable goals and policies.

City of Goleta Municipal Code

Development in Goleta must regulate stormwater flows during grading in accordance with Chapter 15.09, *Grading, Erosion, and Sediment Control*, of the City's Municipal Code. The requirements of Chapter 15.09 are applicable to all lands within Goleta. Pursuant to 15.09.290, an applicant must submit an erosion and sediment control plan in order to obtain grading permits which must incorporate applicable City-approved BMPs to reduce erosion. If an individual development requires preparation of an SWPPP the City may accept the SWPPP if it contains the City's required elements of an erosion and sediment control plan. Pursuant to Section 15.09.290 of the Municipal Code, the erosion and sediment control plan shall contain the following:

- A delineation and brief description of the proposed practices to retain sediment on the site, including sediment basins and silt traps, and a schedule for their maintenance;
- The location and a brief description of the surface runoff and erosion control practices to be implemented, including types and methods of applying mulches, hydro seeding, or other slope stabilization methods; construction material and waste management practices to be used, including temporary borrow and waste disposal areas, temporary debris and garbage disposal, and chemical/fuel storage areas;
- A brief description of the vegetative practices to be used, including toes of seeds and fertilizer and their application rates, dates of seeding and a schedule for maintenance and upkeep, including irrigation;
- A brief description of reasonable precautionary measures to ensure that vehicles do not track or spill earth materials into public streets and actions necessary to remove such materials if the materials are spilled or tracked; and
- Drainage, erosion and sediment control plans shall include best management practices for control of pollutants from onsite stormwater discharges and non-stormwater discharges, such as discarded building materials, litter, sanitary waste, and the washout of excess construction materials, including, but not limited to, drywall, grout, gypsum, plaster, mortar and concrete. Water contaminated with washout pollutants shall be collected and controlled and shall be removed from the site.

Furthermore, an erosion and sediment control plan is required to specify which erosion control measures necessary to control runoff shall be in place during the rainy season (November 1st through April 15th) and which measures shall be in place year-round. At a minimum, during the rainy season

no grading shall occur unless approved erosion and sediment control measures are implemented. Erosion and sediment control measures shall be in place prior to any grading on hillsides, sloping or mountainous terrain. Measures for non-stormwater construction site discharge control shall be implemented year-round. Pursuant to Section 15.09.310, the Director of the Planning and Environmental Services Department or authorized representative may implement a stop work order where there is reason to believe the requirements of Chapter 15.09 are not being upheld.

4.6.3 Impact Analysis

a. Methodology and Significance Thresholds

Methodology

Assessment of impacts is based on review of site information and conditions and the following reports prepared for the project site:

- *Revised Geotechnical Engineering Report Update, Goleta Business Center Building, 907 South Kellogg Avenue, Goleta, California*. This report was prepared by Earth Systems Pacific in 2022, peer-reviewed by Rincon Consultants, Inc. in 2023, and revised by Earth Systems Pacific in January 2023. This report is summarized and referenced herein as Appendix G.
- *Preliminary Drainage Design for Goleta Business Park*. This report was prepared by Stantec in 2022, peer-reviewed by Rincon Consultants, Inc. in 2023, and revised by Stantec in January 2023. This report is summarized and referenced herein as Appendix H.

As described in more detail in Section 4.0, *Environmental Impact Analysis,* the thresholds used for this analysis are based on the County's 2021 *Environmental Thresholds and Guidelines Manual* and Appendix G of the *State CEQA Guidelines*.

Significance Thresholds

In accordance with CEQA Guidelines Appendix G, a project would result in a significant impact if it would:

1. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
    a. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
    b. Strong seismic ground shaking;
    c. Seismic-related ground failure, including liquefaction; and
    d. Landslides.
2. Result in substantial soil erosion or the loss of topsoil;
3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
4. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property;

5. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; and/or
6. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Pursuant to the County of Santa Barbara's 2021 *Environmental Thresholds Guidelines Manual*, impacts are classified as potentially significant with regard to geology if:

a. The project site or any part of the project is located on land having substantial geologic constraints, as determined by Planning and Environmental Review or Public Works departments. Areas constrained by geology include parcels located near active or potentially active faults and property underlain by rock types associated with compressible/collapsible soils or susceptible to landslides or severe erosion. "Special Problems" areas designated by the Board of Supervisors have been established based on geologic constraints, flood hazards and other physical limitations to development;
b. The project results in potentially hazardous geologic conditions such as the construction of cut slopes exceeding a grade of 1.5 horizontal to 1 vertical;
c. The project proposes construction of a cut slope over 15 feet in height as measured from the lowest finished grade; and
d. The project is located on slopes exceeding 20 percent grade.

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.

b. Project Impacts and Mitigation Measures

Threshold 1a:	Would the project directly or indirectly cause 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 issued by the State Geologist for the area or based on other substantial evidence of a known fault?

Impact GEO-1 NO FAULTS ARE LOCATED ON THE PROJECT SITE. THE PROJECT WOULD HAVE NO IMPACT.

Based on the *Revised Geotechnical Engineering Report Update* conducted by Earth Systems Pacific in 2022 and a review of geologic hazards mapping in the Goleta General Plan, no active or potentially active faults are located on the project site. The nearest Alquist-Priolo Earthquake Fault Zone to the project site is approximately 20 miles to the southeast (CGS 2023), and the nearest known fault to the project site is the More Ranch Fault, located approximately 690 feet south of the project site. The potential for surface fault rupture to occur at the project site is low (Appendix G). There would be no impacts involving rupture of a known earthquake fault.

Mitigation Measures

No mitigation measures are required.

Threshold 1b: Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

Impact GEO-2 THE PROJECT SITE IS LOCATED IN A SEISMICALLY ACTIVE AREA AND SEISMIC ACTIVITY IN THE PROJECT SITE'S REGIONAL AREA COULD AFFECT THE PROJECT SITE. IMPLEMENTATION OF MITIGATION MEASURE GEO-1 WOULD REQUIRE INCORPORATION OF SEISMIC DESIGN RECOMMENDATIONS FROM THE PROJECT'S GEOTECHNICAL REPORT AND CALIFORNIA BUILDING CODE REQUIREMENTS INTO THE PROJECT'S STRUCTURAL DESIGN, WHICH WOULD REDUCE IMPACTS INVOLVING RUPTURE OF A KNOWN EARTHQUAKE FAULT OR SEISMIC GROUND SHAKING TO CLASS II, *LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED.*

The project site is located in a region of high seismic activity, with the potential for large seismic events that could generate strong ground shaking. Primary seismic risks at the project site would be earthquakes generated by local faults, as well as larger regional faults, such as the San Andreas fault (Appendix G). The building's structural design would consider seismic loads, as required by the CBC (Appendix G); however, in the event of an earthquake the proposed building could result in substantial adverse effects involving strong seismic ground shaking. Therefore, this impact would be potentially significant and mitigation is required.

Mitigation Measures

GEO-1 Geotechnical Design Considerations

The project design engineer shall incorporate the recommendations listed below from the *Revised Geotechnical Engineering Report Update* (Appendix G) into the project's grading and building plans. The applicant shall submit the grading and building plans to the Planning and Environmental Review Director or designee for review and approval prior to issuance of grading and building permits for the project.

GRADING

1. Following site preparation, the soil within the building and improvement areas shall be removed to a level plane to a minimum depth of 2 feet below ground surface (bgs). During construction, locally deeper removals may be recommended based on field conditions. The resulting soil surface shall then be scarified, moisture conditioned, and compacted prior to placing any fill soil.
2. Following site preparation, the soils in fill areas beyond the building and surface improvement areas shall be removed to a minimum depth of 2 feet bgs. During construction, locally deeper removals may be recommended based on field conditions. The resulting soil surface shall then be scarified, moisture conditioned, and compacted prior to placing any fill soil.
3. Voids created by dislodging cobbles and/or debris during scarification shall be backfilled and compacted, and the dislodged materials shall be removed from the area of work.
4. On-site material and approved import materials may be used as general fill and up to 4 feet below the deepest mat foundation element within the building area of the building. All imported soil shall be non-expansive. Proposed imported soils shall be evaluated by the geotechnical engineer before being used, and on an intermittent basis during placement on the site.
5. All materials used as fill shall be cleaned of any debris and rocks larger than 6 inches in diameter. No rocks larger than 3 inches in diameter shall be used within the upper 3 feet of finish grade. When fill material includes rocks, the rocks shall be placed in a sufficient soil matrix to ensure that voids caused by nesting of the rocks will not occur and that the fill can be properly compacted.

6. Under the mat foundation for the building, Tensar IX 160 triaxial geogrid or an approved equivalent shall be placed on a level plane 4 feet below the bottom of the deepest foundation element within the building area. The geogrid shall also extend vertically up the 4-foot sides of the excavation. Two feet of moisture conditioned and compacted Class 2 AB (Caltrans, 2018) shall then be placed to a level plane on top of the first geogrid within the building area. Another or second layer of Tensar TX 160 triaxial geogrid or an approved equivalent shall be placed on the top of the first layer of AB within the building area; however, it does not need to extend up the sides of the excavation. Another 2 feet of moisture conditioned and compacted AB shall then be placed to a level plane on the geogrid within the building area. The bottom layer of geogrid that was extended up the sides of the excavation shall then be folded down on top of the second layer of compacted AB such that it creates a minimum 5-foot overlap on top of the compacted AB surface. Previously excavated soil or Class 2 AB may then be placed as moisture conditioned and compacted fill back up to pad grade. The geogrid shall be placed and overlapped as recommended by the manufacturer.
7. Fill slopes shall be keyed and benched into competent soil as generally shown on the Typical Bench and Keyway Detail presented in Appendix E. The geotechnical engineer shall approve all keyways and benches. The keyway shall be a minimum of 10 feet wide.
8. Slopes under normal conditions shall be constructed at 2 to 1 (horizontal to vertical) or flatter inclinations. Slopes subject to inundation shall be constructed at 3 to 1or flatter inclinations.

FOUNDATIONS (GENERAL)

1. The allowable bearing capacity and/or modulus of subgrade reaction may be increased by one-third when transient loads, such as wind or seismicity, are included if the structural engineer determines they are allowed. The foundations shall be designed using the seismic information presented in the "Seismic Design Parameters" listed in the "Ground Motion Analyses" section of this report.
2. Foundation excavations shall be observed by the geotechnical engineer prior to rebar and PCC placement. Footing excavations shall be thoroughly moistened prior to PCC placement and no desiccation cracks shall be present.
3. The Corrosion Evaluation Report prepared by CERCO Analytical, Inc. and presented in Subappendix C of the *Revised Geotechnical Engineering Report Update* shall be used by the architect/engineer in specifying appropriate corrosion protection measures for all foundation elements.

DRAINAGE

1. Unpaved ground surfaces shall be finish graded to direct surface runoff away from foundations and other improvements at a minimum 5 percent grade for a minimum distance of 10 feet. The site shall be similarly sloped to drain away from foundation, slopes, and other improvements during construction. Where this is not practicable due to property lines, other improvements, etc., swales with improved surfaces, area drains, or other drainage facilities, shall be used to collect and discharge runoff.
2. To reduce the potential for planter drainage from gaining access to subslab areas, any raised planter boxes adjacent to foundations shall be installed with drains and sealed sides and bottoms. Drains shall also be provided for areas adjacent to the foundations that would not otherwise freely drain.

3. The building roof shall be fitted with roof gutters. Runoff from flatwork, roof gutters, downspouts, planter drains, area drains, etc. shall discharge in a nonerosive manner away from foundations and other improvements in accordance with the requirements of the governing agencies.
4. The on-site soils are highly erodible; stabilization of soils disturbed during construction by vegetation or other means during and following construction is essential to reduce erosion damage. Care shall be taken to establish and maintain vegetation. The landscaping shall be planned and installed to maintain the surface drainage recommended above. Surface drainage shall also be maintained during construction.
5. To reduce migration of surface drainage into the subgrade, maintenance of pavement areas is critical. Any cracks that develop in the pavement shall be promptly sealed.
6. The owner or site maintenance personnel shall periodically observe the areas within and around the site for indications of rodent activity and soil instability. The owner or site maintenance personnel shall also implement an aggressive program for controlling the rodent activity in the general area.

Plan Requirements and Timing. Grading and building plans shall be submitted for review and approval by the Planning and Environmental Review Director or designee before the City issues grading and building permits.

Monitoring. The project soils engineer shall observe all excavations before placement of fill and report observations to the City. The City will conduct field inspections as needed.

Significance After Mitigation

Implementation of Mitigation Measure GEO-1 would reduce potential impacts due to groundshaking on the project site to a less than significant level through incorporation of building foundation recommendations into the project, which would ultimately reduce the magnitude of future groundshaking events, should they occur.

Threshold 1c:	Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?
Threshold 3:	Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Impact GEO-3 THE *REVISED GEOTECHNICAL ENGINEERING REPORT UPDATE* DETERMINED THAT LIQUEFACTION AND SUBSIDENCE MAY DAMAGE FUTURE DEVELOPMENT ON THE PROJECT SITE. THE PROJECT SITE IS NOT AT RISK OF LANDSLIDE, LATERAL SPREADING, OR COLLAPSE. IMPLEMENTATION OF MITIGATION MEASURE GEO-1 WOULD REQUIRE INCORPORATION OF GRADING AND BUILDING FOUNDATION RECOMMENDATIONS INTO THE PROJECT DESIGN, WHICH WOULD REDUCE THIS IMPACT TO CLASS II, *LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED*.

Unstable soils may experience landslides, lateral spreading, subsidence, liquefaction, or collapse during seismic events. Lateral spreading involves the horizontal movement of soil or rock layers, subsidence (also referred to as settlement) refers to the downward sinking of the ground surface, liquefaction specifically refers to the loss of soil strength during seismic activity, and collapse refers to the sudden failure or loss of stability of a soil or rock structure. The *Revised Geotechnical Engineering Report Update* indicated both liquefaction and settlement are potential concerns for

project site soils, and did not identify the project site to be at risk of landslides, lateral spreading, or collapse (Appendix G).

Soil borings on the project site indicate that there is a potential for both liquefaction and seismically induced settlement of dry sand to occur. Total and differential dynamic settlement due to liquefaction may approach approximately 4 inches and 2 inches, respectively; and total and differential seismically induced settlement of dry sand may approach 2 inches and 1 inch, respectively. Total dynamic settlement refers to the overall vertical displacement of the ground caused by a seismic event and includes both immediate settlement during the earthquake and any subsequent settlement as the soil reconsolidates. Differential dynamic settlement refers to variations in the vertical movement of different parts of the ground surface during a seismic event. It signifies that different areas or structures may experience different degrees of settlement, leading to uneven ground surfaces and potential damage or stability issues for structures built on or within the affected area.

Thus, during an earthquake-induced liquefaction event, the total vertical movement of the ground surface could reach around 4 inches, while the variation in settlement between different areas or structures within the affected zone could be up to approximately 2 inches. Additionally, if dry sand on the project site is subjected to seismic activity, the total vertical movement of the ground surface could reach approximately 2 inches. Similarly, the variation in settlement between different areas or structures within the affected zone could be up to approximately 1 inch.

Settlement resulting from liquefaction and seismic activity may damage the building foundation and surface improvements. Therefore, this impact is potentially significant, and mitigation is required.

Mitigation Measures

Mitigation Measure GEO-1 (Refer to Impact GEO-2).

Significance After Mitigation

Implementation of Mitigation Measure GEO-1 would reduce potential impacts due to liquefaction resulting in settling of soils on the project site to a less than significant level through incorporation of grading and building foundation recommendations into the project, which would reduce the combined magnitude of both liquefaction and seismically induced settlement would be less than four inches (Appendix G).

Threshold 1d: Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

Impact GEO-4 THE PROJECT WOULD NOT CAUSE THE RISK OF LOSS, INJURY, OR DEATH INVOLVING LANDSLIDES AS THE PROJECT SITE IS NOT LOCATED IN A POTENTIAL LANDSLIDE AREA. THE PROJECT WOULD HAVE NO IMPACT.

The project site is not located in a potential landslide area as identified by the Goleta General Plan Geologic Hazards Map (City of Goleta 2009). The *Revised Geotechnical Engineering Report Update* did not identify the project site to be at risk of landslides (Appendix G). Therefore, the project would have no impact involving landslides.

Mitigation Measures

No mitigation measures are required.

Threshold 2: Would the project result in substantial soil erosion or the loss of topsoil?

Impact GEO-5 **SOILS ON THE PROJECT SITE ARE HIGHLY ERODIBLE, AND ON-SITE DEVELOPMENT MAY INCREASE SOIL EROSION DURING AND AFTER CONSTRUCTION ACTIVITIES. IMPLEMENTATION OF MITIGATION MEASURE GEO-1 WOULD INCORPORATE GRADING AND DRAINAGE RECOMMENDATIONS INTO PROJECT DESIGN, WHICH WOULD REDUCE THIS IMPACT TO CLASS II, *LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED*.**

Construction

According to the *Revised Geotechnical Engineering Report Update*, surface soils on the project site are highly erodible (Appendix G). As discussed in Section 2, *Project Description*, the project would require the excavation and export of approximately 11,400 cubic yards of soil during construction activities. Construction activities would disturb approximately 6.75 acres of land. Grading operations would increase the potential for erosion and sedimentation; if grading activities occur during the rainy season, or in the event of heavy storms, soils from the site could be entrained, eroded, and transported off-site.

As detailed in Section 4.9, *Hydrology and Water Quality*, construction projects of one or more acres are subject to the requirements of the Construction Stormwater General Permit, which requires preparation and implementation of a SWPPP to control the discharges of pollutants, including sediment, into local surface water drainages. Examples of BMPs that may be implemented during construction include the use of geotextiles and mats, temporary drains and swales, silt fences, and sediments traps. Erosion control practices may include the use of drainage controls such as down drains, detention ponds, filter berms, or infiltration pits; removal of any sediment tracked offsite within the same day that it is tracked; containment of polluted runoff onsite; use of plastic covering to minimize erosion from exposed areas; and restrictions on the washing of construction equipment.

In addition to the Construction Stormwater General Permit requirements, construction activities would be subject to the requirements of Chapter 15.09 of the City's Municipal Code which requires preparation of an erosion and sediment control plan in order to obtain a grading permit. The City accepts a SWPPP In lieu of an erosion control and sediment plan, if the SWPPP contains the requirements of the City's required elements of an erosion and sediment control plan. Accordingly, the SWPPP prepared for the proposed project would include information on proposed practices that would be used during construction to retain sediment on-site, minimize erosion, and utilize vegetation for erosion control, as well as a summary of precautionary measures to be taken to ensure vehicle use does not result in erosion.

Nonetheless, soils on the project site are highly erodible. Implementation and maintenance of proper drainage and the stabilization of surface soils, particularly those disturbed during construction, by vegetation or other means during and following construction are necessary to reduce the potential of erosion damage. Construction impacts would be potentially significant and mitigation is required.

Operation

During project operation, runoff generated from storm events may transport sediment off-site and contribute to project site erosion and the loss of topsoil. However, permanent drainage improvements and operational BMPs would direct and control stormwater runoff to minimize erosion, as described below.

As detailed in Section 4.9, *Hydrology and Water Quality*, the proposed project would utilize LID to detain, retain, and treat runoff consistent with the requirements of the Central Coast RWQCB's *Post-Construction Stormwater Management Requirements for Development Projects in the Central Coast Region* and the County's *Stormwater Technical Guide for Low Impact Development*. Furthermore, the Phase II MS4 Permit requires that a SWQMP be prepared for projects that create and/or replace 5,000 or more square feet of impervious surface. SWQMPs specify the operational BMPs that would be implemented to capture, treat, and reduce pollutants of concern in stormwater runoff.

The *Stormwater Control Plan* prepared for the proposed project (Appendix J) serves as the SWQMP and specifies LID BMPs proposed for the project. LID BMPs mimic a project site's natural hydrology by using design measures that capture, filter, store, evaporate, detain, and infiltrate runoff. Proposed LID BMPs include a drainage basin which would function as both a filtration and detention basin, a vegetated swale, and permeable asphalt which would adequately handle runoff during operation consistent with the requirements of the Central Coast RWQCB. LID BMPs would control and reduce stormwater runoff on the project site and would reduce the potential for erosion. However, soils on the project site would remain highly erodible, and implementation of long-term maintenance activities to ensure proper drainage and the stabilization of surface soils are necessary to reduce the potential of erosion damage during operation. Therefore, operational impacts would be potentially significant and mitigation is required.

Mitigation Measures

Mitigation Measure GEO-1 (Refer to Impact GEO-2)

Significance After Mitigation

Implementation of Mitigation Measure GEO-1 would reduce potential impacts involving soil erosion or loss of topsoil to a less than significant level throughout incorporation of drainage and grading recommendations into the project, which would ultimately reduce erosion on the project site.

Threshold 4:	Would the project be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Impact GEO-6 PROJECT SITE SOILS ARE NON-EXPANSIVE. THE PROJECT WOULD HAVE NO IMPACT.

According to the *Revised Geotechnical Engineering Report Update*, project site soils are non-expansive (Appendix G). Therefore, the project would not create substantial direct or indirect risks to life or property due to expansive soils and the project would have no impact.

Mitigation Measures

No mitigation measures are required.

Threshold 5:	Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

Impact GEO-7 THE PROJECT WOULD NOT REQUIRE THE USE OF SEPTIC TANKS OR ALTERNATIVE WASTEWATER DISPOSAL SYSTEMS. THE PROJECT WOULD HAVE NO IMPACT.

As stated in Section 2, *Project Description*, the project would include a new underground sewer line that would connect to an existing sewer line located underneath South Kellogg Avenue. Sewer services at the project site would be provided by the Goleta Sanitary District. As the project would connect to the existing municipal waste disposal system, and would not require the use of septic tanks or alternative wastewater disposal systems, this project would have no impact.

Mitigation Measures

No mitigation measures are required.

Threshold 6:	Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Impact GEO-8 PROJECT GRADING WOULD OCCASIONALLY EXTEND BEYOND FILL SOILS THAT UNDERLIE THE PROJECT SITE. HOWEVER, THE GEOLOGIC UNIT THAT UNDERLIES THE PROJECT SITE HAS A LOW PALEONTOLOGICAL SENSITIVITY. THEREFORE, THE PROJECT WOULD HAVE A LOW POTENTIAL TO DISTURB PALEONTOLOGICAL RESOURCES, AND THIS IMPACT WOULD BE CLASS III, *LESS THAN SIGNIFICANT*.

There are no documented paleontological resources on the project site. The project site is primarily underlain by fill soils that reach approximately 4 feet in depth (Appendix G). As indicated by cross-sections of grading plans for the project, project construction would result in the excavation of more than 4 feet of fill during over-excavation and bioretention basin and utility trench construction. However, the geologic unit that underlies the project site, Holocene and upper Pleistocene (Quaternary-era) alluvium and colluvium (Qac), has a low paleontological sensitivity. During the occurrences where project grading activities would extend beneath fill soils, the project would be unlikely to encounter previously unidentified paleontological resources. Thus, project construction would have a very low potential to encounter previously undisturbed paleontological resources. This impact would be less than significant.

Mitigation Measures

No mitigation measures are required.

4.6.4 Cumulative Impacts

Cumulative projects proposed in and around Goleta would expose additional people and property to seismic and geologic hazards that are present in the region. The magnitude of geologic hazards for individual projects would depend upon the location, type, and size of development and the specific hazards associated with individual sites. Any specific geologic hazards associated with each individual site would be limited to that site without affecting other areas. In addition, existing regulations, including compliance with CBC requirements, would reduce seismic and geologic hazards to acceptable levels. Seismic and geologic hazards would be addressed on a case-by-case basis and would not result in cumulatively considerable impacts. Cumulative geologic hazard impacts would be less than significant, and the project's contribution would not be cumulatively considerable.

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