4.5 GEOLOGY AND SOILS

This section discusses existing geologic and soils-related conditions and the natural and manmade drainage conditions within the project site. The section is based on existing published geologic and soils data and the *Engineering Geology Investigation* (Geosolutions 2011a), *Soils Engineering Report* (Geosolutions 2011c), and *Review of Proposed Visitor Center Building* (Geosolutions 2012) prepared for the project, and identifies potential geologic impacts including local geologic conditions. These reports are available for review at the County Department of Planning and Building. This section also considers erosion and sedimentation impacts resulting from the proposed project.

Aside from the proposed emergency access road and trail network to be located on the 100-acre portion of the project area, development will be primarily limited to the 30-acre site. While the analysis considers all affected areas, the geotechnical investigations focused on the areas proposed for grading and structural development. Information from these reports is incorporated by reference into the analysis below.

4.5.1 Existing Conditions

4.5.1.1 Regional Geology

The project site is located in the vicinity of the San Luis Range of the Coast Range Geomorphic Province of California. The Coast Ranges lie between the Pacific Ocean and the Sacramento-San Joaquin Valley and trend northwesterly along the California coast for approximately 600 miles between Santa Maria and the Oregon border.

The project site is situated within the Nipomo Mesa, a 33-square-mile area between the Arroyo Grande Plain to the north and the Santa Maria River Coastal Plain to the south. The eastern portion of the Mesa rises more than 400 feet and slopes westward to the Pacific Ocean. The Mesa is part of a system of elevated marine terraces between Morro Bay and the northeastern boundary of the Santa Maria Valley. Terraces in this area are buried beneath a thick mantle of eolian sand and alluvium (Geosolutions 2011a).

4.5.1.2 Local Geology

The Engineering Geology Report prepared for the project describes the project site geography as consisting of Eolian deposits of late Pleistocene to Holocene age (1.8 million years to present) and Fluvial and alluvial deposits of late Pleistocene to Holocene age. These Eolian deposits consist of unconsolidated active dune sand and slightly to weakly cemented older stabilized dune sand. Fluvial and alluvial deposits consist of undifferentiated cobbles, pebbles, sand, silt and clay in active stream channels and floodplains and in fluvial terraces inset within the margins of the stream valleys.

4.5.1.3 Site Conditions

The project site is gently to moderately sloping. No notable geologic features are present at the project site. Landslide risk and liquefaction potential are considered low to moderate and the shrink/swell potential of on-site soils is low. The closest known mapped active portion of a Holocene-age fault is the Hosgri fault, located approximately 20 miles west of the project site. The project site is not known to contain serpentine or ultramafic rock or soils.

Soil type, amount of disturbance and slopes are key aspects to analyzing potential sedimentation and erosion issues. The project would result in the disturbance of approximately

8.3 acres. The following section describes the on-site soil types and descriptions. On-site soils are considered well-drained, and as described in the U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Soil Survey, the project's soil erodibility is low to moderate.

4.5.1.4 Soils

Soil types and the boundaries of the Flood Hazard designation are shown in Figure 4.5-1 below. The soil type(s) and characteristics on the 30-acre portion of the project site include:

- 170 – Marimel silty clay loam, 0-2 percent slopes (irrigated Class 1, non-irrigated Class 3). The Marimel component makes up approximately 13 percent of the map unit. The parent material of this soil type is alluvium derived from sedimentary rock. The natural drainage class of this unit is well drained, and it is composed of silty clay loam and stratified loam to clay loam to silty clay loam. Marimel soils tend to occur on alluvial fans and in valleys. This soil unit does not have any listed hydric components or inclusions that meet the hydric soils criteria.

- 184 – Oceano sand, 0-9 percent slopes (irrigated Class 4, non-irrigated Class 6). The Oceano (0-9 percent slopes) component makes up approximately seven percent of the map unit. The parent material of this soil type is Eolian deposits. The natural drainage class of this unit is excessively drained, and it is composed entirely of sand. Oceano soils tend to occur on dunes and toeslopes. This soil unit does not have any listed hydric components or inclusions that meet the hydric soils criteria.

- 185 – Oceano sand, 9-30 percent slopes (irrigated Class 4, non-irrigated Class 6). The Oceano (9-30 percent slopes) component makes up approximately five percent of the map unit. The parent material of this soil type is Eolian deposits. The natural drainage class of this unit is excessively drained, and it is composed entirely of sand. Oceano soils tend to occur on dunes and toeslopes. This soil unit does not have any listed hydric components or inclusions that meet the hydric soils criteria.

The soil type(s) and characteristics on the 100-acre portion of the project site include:

- 129 – Diablo clay, 5-9 percent slopes (irrigated Class 2, non-irrigated Class 3). The Diablo clay component makes up approximately 10 percent of the map unit. The parent material of this soil type is residuum weathered from mudstone, sandstone, and/or shale. The natural drainage class of this unit is well drained, and it is composed of clay over weathered bedrock. Diablo clay soils tend to occur on backslopes and summits.

- 130 – Diablo and Cibo clays, 9-15 percent slopes (irrigated Class 3, non-irrigated Class 3). The Diablo and Cibo clay component makes up approximately five percent of the map unit. The parent material of this soil type is residuum weathered from mudstone, sandstone, and/or shale. The natural drainage class of this unit is well drained, and it is composed of clay over weathered bedrock. Diablo and Cibo clay soils tend to occur on backslopes and summits.

- 170 – Marimel silty clay loam, 0-2 percent slopes (irrigated Class 1, non-irrigated Class 3). The Marimel component makes up approximately 13 percent of the map unit. The parent material of this soil type is alluvium derived from sedimentary rock. The natural drainage class of this unit is well drained, and it is composed of silty clay loam and stratified loam to clay loam to silty clay loam. Marimel soils tend to occur on alluvial fans

and in valleys. This soil unit does not have any listed hydric components or inclusions that meet the hydric soils criteria.

- 218 – Tierra loam, 15-30 percent slopes (irrigated Class 6, non-irrigated Class 6). The Tierra component makes up approximately 11 percent of the map unit. The parent material of this soil type is alluvium derived from sedimentary rock. The natural drainage class of this unit is moderately well drained, and it is composed of loam, clay, and sandy clay loam. Tierra loam soils tend to occur on terraces, backslopes, summits, and toeslopes. This soil unit does not have any listed hydric components or inclusions that meet the hydric soils criteria.

- 224 – Zaca clay, 9-15 percent slopes (irrigated Class 3, non-irrigated Class 3). The Zaca component makes up approximately 49 percent of the map unit. The parent material of this soil type is residuum weathered from calcareous mudstone, sandstone, and/or shale. The natural drainage class of this unit is well drained, and it is composed of clay and silty clay over weathered bedrock. Zaca soils tend to occur on summits and backslopes.

4.5.2 Regulatory Setting

4.5.2.1 Federal and State Regulations

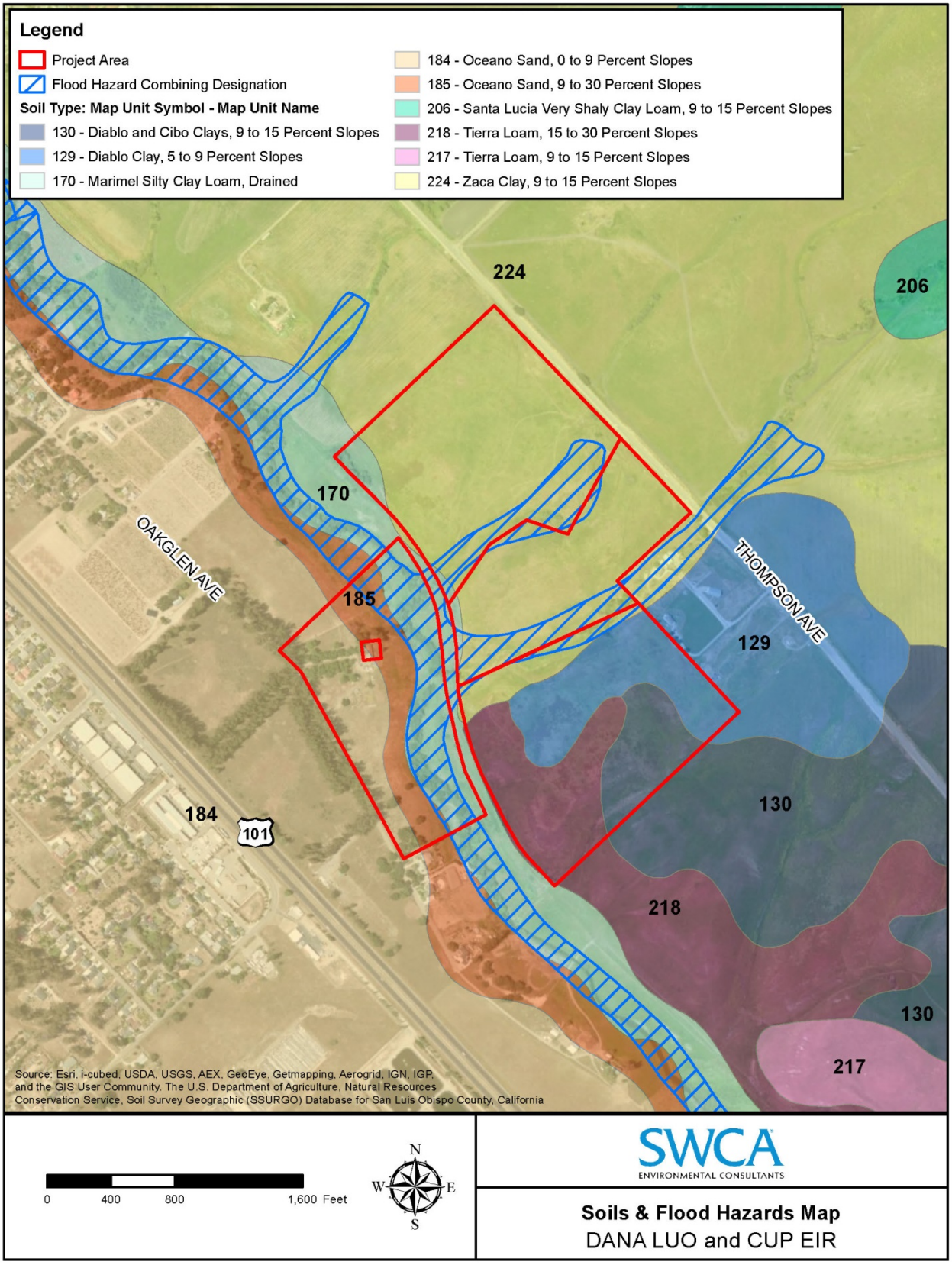
The Alquist-Priolo Earthquake Hazard Zone Act was developed by the State to regulate development near active faults and mitigate the surface fault rupture and other hazards. The Act identifies active earthquake fault zones and restricts building habitable structures over known active or potentially active faults.

Water quality protection is regulated by the Federal National Pollutant Discharge Elimination System (NPDES) Program established by the Clean Water Act. The EPA establishes stormwater permit requirements based on compliance with a NPDES permit. Discharges of stormwater associated with construction activity that results in a disturbance of one acre or more of total land area requires a NPDES General Permit for Discharges of Stormwater Associated with Construction Activity. This permit requires developers to implement Best Management Practices (BMPs) to prevent the discharge of sediment-laden or otherwise contaminated water off site. The site-specific plan to implement BMPs is called the Stormwater Pollution Prevention Plan (SWPPP). The plan must include a description of soil stabilization and sediment load control methods that would be implemented to minimize erosion and sediment loading during construction of the project. The SWPPP also includes descriptions of post-construction BMPs. The State of California administers stormwater permits through the State Water Resources Control Board (SWRCB) and its local RWQCB – Central Coast Region. A SWPPP would be required for the proposed project. The proposed project would result in the disturbance of over 1 acre; therefore, a SWPPP would be required.

4.5.2.2 Local Regulations

When highly erosive conditions exist, a sedimentation and erosion control plan is required (LUO §22.52.090) to minimize these impacts. When required, the plan is prepared by a civil engineer to address both temporary and long-term sedimentation and erosion impacts.

Figure 4.5-1. Soils and Flood Hazard Map



The two primary principles of the County Safety Element are emergency preparedness and development appropriately managed to reduce risk. The Safety Element identifies potential emergency situations and natural disaster risks within the county, and includes goals and policies for response during an emergency or natural disaster and measures for the avoidance of unnecessary risk.

4.5.3 Thresholds of Significance

The County thresholds of significance are based on the criteria set forth in Appendix G of the CEQA Guidelines. According to those criteria, a project would result in a significant geology, soils or drainage-related impact if it would:

a. Result in exposure to or production of unstable earth conditions, such as landslides, earthquakes, liquefaction, ground failure, land subsidence or other similar hazards;

b. Be within a California Geological Survey "Alquist-Priolo" Earthquake Fault Zone or other known fault zone;

c. Result in soil erosion, topographic changes, loss of topsoil or unstable soil conditions from project-related improvements, such as vegetation removal, grading, excavation, or fill;

d. Include structures located on expansive soils;

e. Be inconsistent with the goals and policies of the County's Safety Element relating to Geologic and Seismic Hazards; or

f. Preclude the future extraction of valuable mineral resources.

4.5.4 Impact Assessment and Methodology

Potential geologic, soils and drainage impacts were evaluated based upon a review of the County's Geographic Information Systems (GIS) database of local geologic and soils conditions, the *Engineering Geology Investigation, Soils Engineering Report,* and *Review of Proposed Visitor Center Building* prepared for the project and field review of the project site. The assessment considers compliance with regulations, such as the Uniform Building Code (UBC). In addition, while the County is not subject to ordinance standards, preparation of reports and plans such as drainage and erosion control plans are recommended as mitigation for future development where applicable to ensure that specific issues identified during preparation of the EIR are included in the plans.

4.5.5 Project Specific Impacts and Mitigation Measures

4.5.5.1 Land Use Ordinance Amendment

The proposed amendments do not include language that would result in an adverse effect to geology and soils. Potential impacts would be project specific, depending on location, size, and type of development, and areas proposed for disturbance. Pursuant to the amendment, future development would require a Master Plan and issuance of a CUP, which would trigger CEQA and project-specific analysis of geology and soils impacts.

In order to ensure that future projects, such as the proposed Master Plan and CUP, address project-specific geology and soils impacts, a planning area standard is recommended that

requires the project applicant to include measures to reduce erosion and sedimentation and ensure compliance with water quality standards (refer to Chapter 4, Environmental Impacts Analysis, Exhibit A).

4.5.5.2 Conditional Use Permit

Unstable Earth Conditions, such as Landslides, Earthquakes, Liquefaction, Ground Failure, Land Subsidence or other Similar Hazards

Based on County GIS data, the project site is mapped as having low to high potential for landslide hazards and low to moderate liquefaction potential. No known landslides have occurred at the project site and the potential for a landslide is considered low due to the lack of steep slopes at the site. The potential for subsidence or hydrocollapse of subsurface materials is considered low due to the presence of medium dense to dense older sand dune deposits. The project site may be affected by moderate to major earthquakes centered on one of three active faults within 40 miles of the project site. Although a significant event on these faults could result in moderate to severe ground shaking, the potential for ground failure is considered low due to the medium dense to dense subsurface material.

There is a potential for slope instability in the immediate vicinity of Nipomo Creek (where the slope of the creek bank exceeds 15%); therefore, the project incorporates a 50-foot setback from the creek bank (not including trails, emergency access drive, and associated creek crossing). No significant geologic hazards were identified.

Regarding land subsidence, the project would obtain water from the Nipomo Community Services District (NCSD), a community water provider within the Nipomo Mesa Water Conservation Area (NMWCA). Based on the *Nipomo Mesa Management Area 5th Annual Report Calendar Year 2012* "there is currently no evidence of land subsidence within the Nipomo Mesa Management Area (NMMA), although small amounts of subsidence might go undetected" (NMMA 2013). Based on the proposed water demand (1.28 acre feet/year), this amount of water use would not directly result in land subsidence.

Recommendations provided in the geology and soils engineering reports include, but are not limited to, site preparation, foundations, and slope stability, similar to those required by the UBC. Compliance with the LUO and UBC will ensure that no significant geologic impacts occur as a result of construction and operation of the project. Therefore, potential impacts would be *less than significant (Class III)*.

Alquist-Priolo Earthquake Fault Zone

The project site is not included within a designated Alquist-Priolo Earthquake Fault Zone and no known faults pass through the site. Therefore, there would be no impact. Potential impacts related to earthquake rupture and ground-shaking are discussed in Section 4.5.5.2, above.

Soil Erosion, Topographic Changes, Loss of Topsoil or Unstable Soil Conditions

As proposed, the project will result in the disturbance of approximately 8.3 acres. Construction activities, including ground disturbance and vegetation removal have the potential to result in erosion and down-gradient sedimentation. The applicant is required to comply with LUO §22.52.120 (Erosion and Sedimentation Control Plan Required) and submit an erosion control plan, and will also be required to prepare a SWPPP for review and approval by the RWQCB, pursuant to state regulations and LUO §22.52.130 (SWPPP Required). Preparation and implementation of these required plans would mitigate potential impacts to *less than significant*

(Class II). Additional measures, applicable to significant biological resources (Nipomo Creek) are identified in Section 4-3, Biological Resources, and would further minimize potential erosion impacts.

The proposed project may include a capping plan, which was preliminarily evaluated (Geosolutions 2012; Smith Structural Group, LLP 2012). Based on the engineering review, the site soils are suitable for use of the proposed foundations for the site structures, including the reinforced mat slab foundation proposed for the Visitor's Center. The applicant proposes to incorporate the engineer's recommendations for site preparation, including removal of surface vegetation, application of water, and placement of a geotextile fabric. Fill material would be placed and compacted, and may include benches on natural slopes.

Based on compliance with existing regulations and recommendations identified in the soils and geology reports, potential impacts related to soil erosion, topographic changes, and soil stability would be *less than significant (Class III)*.

Include Structures Located on Expansive Soils

Underlying soils are classified as having very low expansion potential based on laboratory testing during preparation of the project soils engineering report (Geosolutions 2011c). No impact would result.

Consistency with County's Safety Element

Geologic and seismic hazards at the project site are considered to be low as discussed above. Project developments would comply with the most recent UBC requirements and would not place structures or people in areas of high geologic or seismic risk. Impacts would be *less than significant (Class III)*.

Mineral Resources

The project site is not located within an Extractive Resource Area combining designation for mineral extraction and is not known to support valuable mineral resources. Therefore, no impacts would occur.

4.5.6 Cumulative Impacts

Additional development in the project vicinity, including the proposed project, would increase the number of people and structures exposed to a variety of geologic and soils hazards within the county, including landslides and ground shaking. Potential impacts related to geologic, soils, and seismic hazards are all site-specific, and mitigation measures are applied to each project to minimize the potential for significant geologic impacts. All development projects are required to comply with State and local regulations regarding grading and construction; therefore, no cumulative impacts related to these issues have been identified. Based on the proposed water demand (1.28 acre feet/year), this amount of water use would not result in cumulatively considerable impact related to land subsidence.

Implementation of mitigation measures identified above and compliance with existing regulations would mitigate impacts to less than significant, and no additional measures are necessary. Potential cumulative geology and soils impacts would be *less than significant (Class III)*.

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