5.6 GEOLOGY AND SOILS

The purpose of this section is to describe geological and soil conditions in the project area and to evaluate potential impacts of the proposed project on these features.

5.6.1 Setting

5.6.1.1 Geology

Review of the "Geology of California, Santa Maria Sheet," published by the California Division of Mines and Geology and dated 1958, indicates that the project site is located within the Coast Range geomorphic province of California. The project site is further located at the northern fringe of the Santa Maria Valley, which is formed by the Nipomo Mesa to the north, the San Raphael mountains to the east, and the Solomon Hills to the south. The majority of the project site is underlain by recent alluvial deposits (CDMG, 1958).

The bluff edge of the Nipomo Mesa is located along the western boundary of the project area. The Nipomo Mesa is underlain by older sand dune deposits that pre-date the last Ice Age. The dune shapes are still evident in the surface topography of the mesa. The dunes are characterized as linear ridges and intervening closed depressions. The eastern and southern boundaries of the mesa have been defined by erosional cuts by Nipomo Creek and the Santa Maria River. The mesa bluff edge consists of steep slopes that are moderately stabilized by existing vegetation.

The project site is located within the Nipomo Mesa Sub-basin of the Santa Maria Valley groundwater basin. A shallow groundwater flow/gradient is expected to follow the topography of surface elevations towards the Pacific Ocean to the west-northwest. Estimated groundwater depths may fluctuate due to groundwater pumping, rainfall, and seasonal variations. A well was completed in 1988 within the boundaries of the proposed asphalt plant site. This well is currently used to supply the process needs of the existing Portland cement batch plant, and dust control needs of the batch plant and adjacent concrete recycling facility. A second well is located approximately 350 feet east of this well, and is used by the Nipomo Community Services District to provide water to the Nipomo area. Depth to groundwater at these wells is relatively shallow, at approximately 25-40 feet below ground surface (West Coast Environmental and Engineering, 2003).

The project site is located within a 100-year floodplain and the County's Flood Hazard Combining Designation (see Figure 5.14-2), which presents special issues associated with the storage and handling of hazardous materials and wastes. Refer to Section 5.14 for a discussion of potential flood hazards/issues and Section 5.7 for a discussion of issues related to storage of hazardous materials within the Flood Hazard Combining Designation.

Historically, the project area has been used for sand and gravel pit mining operations, agricultural activity, a few homes, and excavation of soil for fill during Highway 101 construction. Currently, there is a concrete and asphalt recycling facility, a ready-mixed concrete plant, and light industrial and commercial uses at the project area. There is some residential development northwest of the project area up on the mesa.

5.6.1.2 Faults

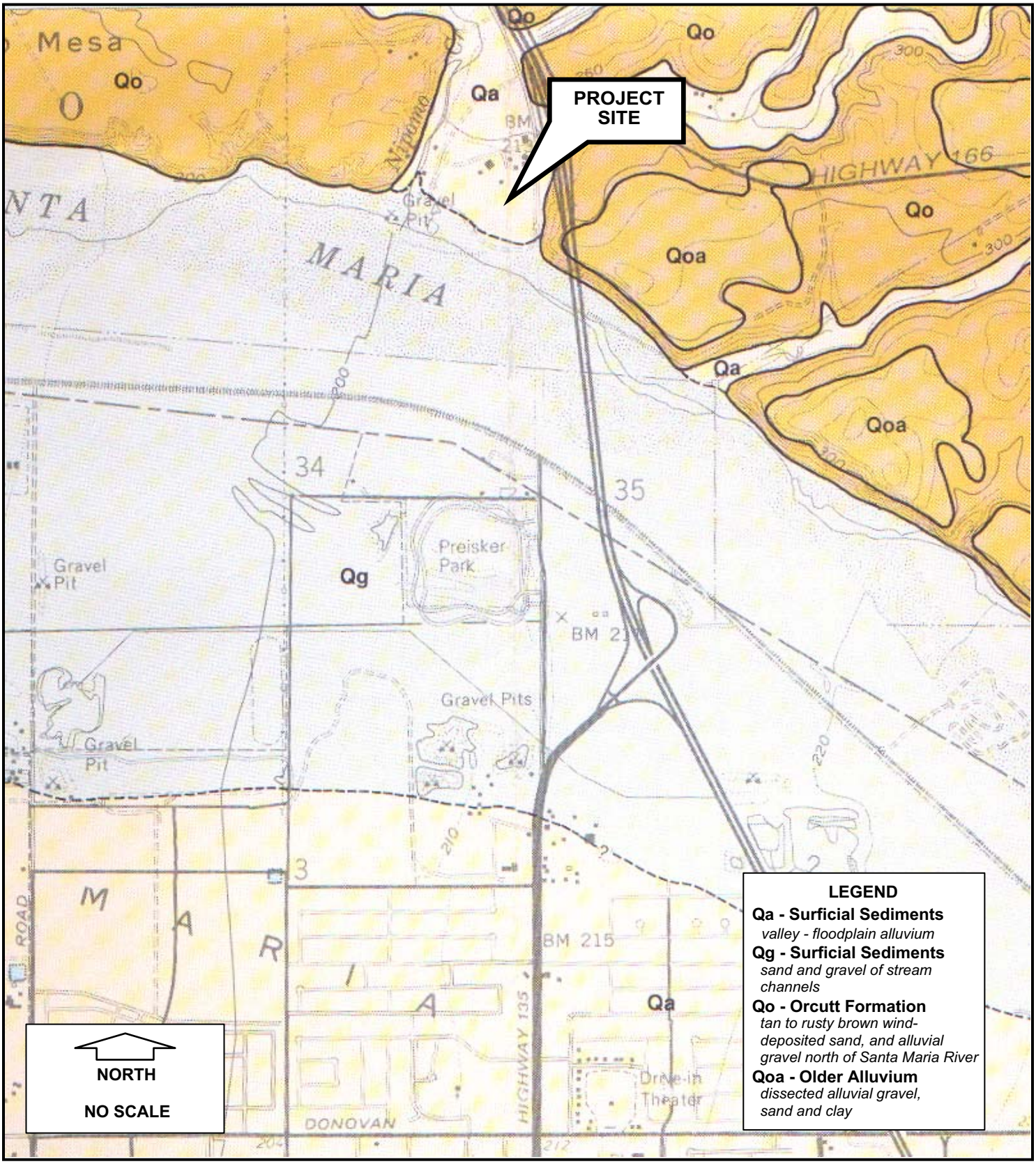
Several faults in the region of the project area are considered geologically active or potentially active and are capable of causing significant ground motion in the vicinity of the project site. The California Geological Survey (CGS, formerly the California Division of Mines and Geology [CDMG]) considers an active fault as one with surface displacement within the last 11,000 years (Holocene age). A potentially active fault is a fault with evidence of surface displacement during the last two million years (Quaternary age). Principal known active faults or fault systems near the project site include the San Andreas fault system, Hosgri fault zone, Los Alamos, Santa Lucia, and Los Osos faults. Also located near the project site are the potential active Wilmar Avenue/Santa Maria River fault, Oceano fault, Pecho fault, Oceanic-West Huasna fault, San Luis Bay fault, and the Casmalia-Orcutt-Litte Pine fault system. A review of geologic hazard zones indicate that the project site does not lie within a Alquist-Priolo Earthquake Fault Zone (County Safety Element, Map 2).

There are two magnitudes of earthquakes that are commonly used in analysis of ground motion. The Maximum Credible Earthquake (deterministic) is the largest rational and believable earthquake that can occur within the presently known tectonic framework. The Maximum Probable Earthquake (probabilistic) is the maximum earthquake that is likely to occur during a 100-year interval (CDMG, 1975). It is to be regarded as a probable occurrence, not as an assured event that will occur within a specific time period. The postulated magnitude should not be lower than the maximum that has occurred within historic time.

Table 5.6-1 Vicinity Faults, lists the known active and potentially active faults near the project site (Blake, 1996). This table also presents the distances of each fault from the project site and the maximum credible and maximum probable events that could result from each fault.

Table 5.6-1 – Active and Potentially Active Faults Within 50 Miles of the Project Site.

Fault Name	Approximate Distance (miles)	Maximum Credible Earthquake Magnitude	Maximum Probable Earthquake Magnitude
Wilmar Ave/Santa Maria River	0	6.5	4.6
Point San Luis	6	7.5	5.7
Océano	7	6.5	4.4
Black Mountain	8	7.5	6.3
Los Osos	10	7.0	5.3
Santa Lucia	15	7.5	5.6
Casmalia/Orcutt	7	7.5	5.9
Rinconada	21	7.5	5.9
Hosgri	18	7.5	6.4
La Panza	25	7.5	5.2
San Andreas	45	8.0	7.4
Big Pine	46	6.9	5.8



Basemap Source: Dibblee Geologic Map, Santa Maria Quadrangle

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SITE GEOLOGY

FIGURE 5.6-1

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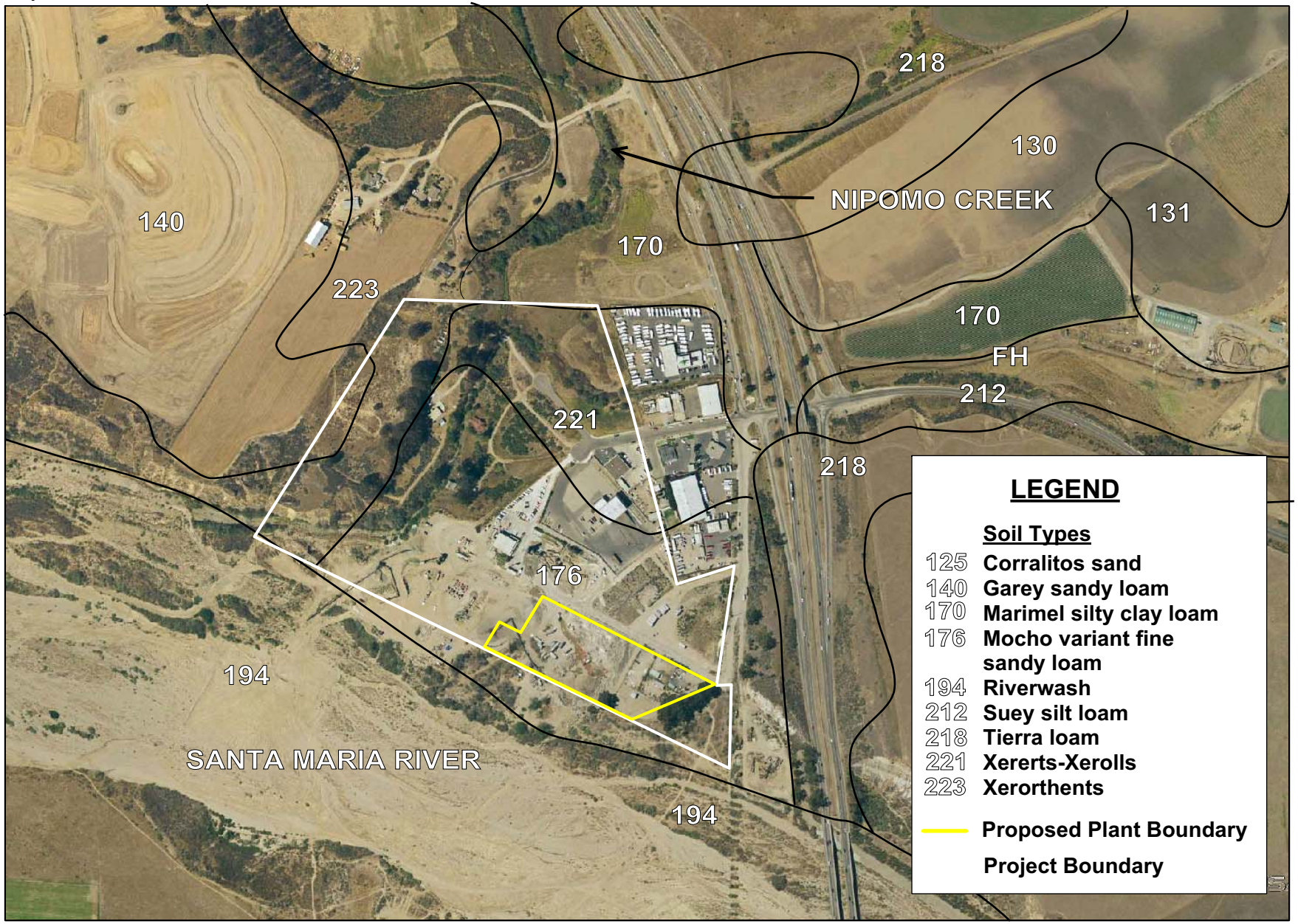

Basemap Source: County of San Luis Obispo

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SOILS MAP

FIGURE 5.6-2

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Wilmar Avenue/Santa Maria River Fault. The Wilmar Avenue/Santa Maria River fault is located along the eastern boundary of the project area, within the vicinity of the Highway 101 alignment. This fault is a northwest-trending, northeast dipping fault that has poor geomorphic expression and is exposed only at the present sea cliff at Wilmar Avenue in Pismo Beach. The Wilmar fault continues at least to Arroyo Grande and may extend along the eastern margin of the Nipomo Mesa to the northern part of the Santa Maria Valley. Lettis (1990) states that the Wilmar fault may include a part of the Santa Maria River fault. The locations of the Wilmar and Santa Maria River fault are inferred based on water and oil well data.

Hart et al (1986) describes the Santa Maria River fault as steeply dipping and may offset the mid-Pleistocene unit locally, but is largely concealed by Holocene and late Pleistocene deposits. Hart depicts the Santa Maria fault as approximately paralleling the west side of Highway 101.

5.6.1.3 Seismic Hazards

Several types of seismic hazards are associated with earthquake events. Several of these potential hazards are described below:

Liquefaction. Liquefaction is a phenomenon where unconsolidated and/or near saturated soils lose cohesion and are converted to a fluid state as a result of severe vibration. Loose, granular soils are most susceptible to these effects, while more stable silty clay and clay materials are generally somewhat less affected. Liquefaction potential for soils at the project site is considered high due to the granular materials at the southern portion of the project site and the shallow groundwater table.

Groundshaking. Seismically induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. Ground rupture is most likely along active faults.

Landslide potential. The occurrence of landslides is generally influenced by a number of factors, including slope angle, soil moisture content, vegetative cover and the physical nature of the underlying strata. Landslides can be triggered by construction-related grading activities, seismic activity and fires.

Fault rupture. Small to moderate earthquakes (magnitudes less than 5.0 on the Richter Scale) are common in San Luis Obispo County. The most significant quakes affecting the County during the last century have generally been centered outside the County itself, and have included events in excess of 7.0 (Lompoc in 1927 and Tehachapi in 1952). The most notable exception to this was the San Simeon Earthquake on December 22, 2003, which was a 6.5 magnitude earthquake centered approximately 24 miles west of Paso Robles.

Tsunamis/Seiches. Tsunamis are seismically induced waves that can cause damage in coastal areas. The project site is not located near the coast. Seiches are seismically induced waves which occur in large bodies of water. The potential for such hazards occurring at the project area is non-existent.

5.6.1.4 Topography

The project site is located on a small flood plain along the southeastern side of the Nipomo Mesa. Nipomo Creek is located east of the Nipomo Mesa and drains into the Santa Maria River, which is adjacent and south of the project site. On-site elevations range from

approximately 200 to 260 feet above mean sea level. Surface drainage at the project area generally follows surface topography. A concrete-lined drainage channel extends from Hutton Road west to Nipomo Creek at Cuyama Lane, which collects drainage from the Hutton Road/Highway 101 area.

5.6.1.5 Soils

Soils found at the project area are predominantly comprised mostly of alluvial deposits deposited from flooding events along Nipomo Creek and the Santa Maria River. As mapped by the U.S. Department of Agriculture Soil Conservation Service, soil units found within the region of influence are shown in Figure 5.6-2.

The soil types found at the project area include Marimel silty clay loam, Mocho Variant fine sandy loam, Xerets-Xerolls-Urban land complex, Xerothents-escarpment soils, and riverwash. Each soil is described further below:

Marimel silty clay loam. The Marimel silty clay loam soil is found at the northern edge of the project area. The soil found on alluvial fans and narrow valleys. The soil is formed in alluvium weathered from sedimentary rocks. The soil is typically very deep, well drained, with moderately slow permeability, slow surface runoff, and a slight erosion hazard. This soil is highly corrosive to untreated steel.

Mocho Variant fine sandy loam. The Mocho fine sandy loam is located within the southern portion of the project area at the proposed asphalt plant site. This soil is found on nearly level soil on alluvial fans and plains. The soil is formed in alluvium weathered from sedimentary rocks. The soil is very deep, well drained, with moderately rapid permeability, slow surface runoff, a slight erosion hazard, and a moderate wind erosion hazard. This soil is highly corrosive to untreated steel.

Xerets – Xerolls – Urban land complex. This soil complex is found within the central developed portions of the project area. This complex consists of nearly level soils that are covered by urban structures. The soil materials have been modified by earthmoving equipment and covered with urban development. This soil complex may have a wide range of permeability, and runoff and erosion hazards.

Xerothents – Escarpment. This soil type is located on the Nipomo Mesa bluff edges. This soil is found on steep soils at the end of terraces. The soils are fairly stabilized and vegetated. When the soil is bare, runoff is rapid and erosion hazard is high. Water runoff can cause gully erosion.

Riverwash – This soil type is found within the Santa Maria River channel at the southern boundary of the project area. This soil is composed of granular material eroded from rock materials found in the Santa Maria River-Cuyama-Sisqouc watershed area. This soil includes stratified sandy loam, sands, gravels, and cobbles. Permeability is rapid, and erosion is variable.

5.6.2 Regulatory Setting

The following state and local regulations apply to the project site and are designed for the protection of health and safety from geologic hazards:

1. *Public Resources Code, Section 2621, et seq.* The Alquist-Priolo Special Studies Zone Act of 1972 establishes criteria and policies to assist cities, counties, and state agencies in the exercise of their responsibility to prohibit the location of developments and structures for human occupancy across the trace of active faults as defined by the State Mining and Geology Board;
2. *Title 22 of the San Luis Obispo County Code.* The Land Use Ordinance (at 22.14.060) sets forth the Combining Designation Standards for Geologic Study Areas (GSAs) and Flood Hazard (FH) combining designations. GSAs are applied to areas where "geologic and soil conditions could present new developments and their users with potential hazards to life and property." The standards require preparation of a geologic report on geologic hazards and appropriate mitigation measures which must be incorporated into the project design to reduce these hazards. FH areas are areas within defined 100-year floodplains;
3. *Other Regulatory Requirements 17922, 179511-17958.7* of the State Government Code requires cities and counties to adopt and enforce the Uniform Building Code, including a grading section (Chapter 70), providing minimum protection against some geologic hazards. The County of San Luis Obispo implements these provisions; and,
4. *County Safety Element (1998)*. The 1998 Safety Element updates and replaces the original 1977 Safety Element and 1975 Seismic Safety Element to the County General Plan. The Safety Element includes a Policy Document that includes goals, policies and implementation measures for reducing potential geologic and other safety hazards.

5.6.3 Impact Analysis

5.6.3.1 Thresholds of Significance

Based on the County of San Luis Obispo's CEQA Guidelines, an impact would be significant if any of the following conditions, or potential thereof, would result with implementation of the proposed project:

1. Exposure to or production of unstable earth conditions, such as landslides, earthquakes, liquefaction, ground failure, land subsidence, or other similar hazards;
2. Location within a California Division of Mines and Geology (CDMG) Earthquake Fault Zone;
3. 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[1];
4. Change rates of soil absorption, or amount or direction of surface runoff;
5. Include structures located on expansive soils;

[1] Addressed in Section 5.14.

6. Change the drainage patterns where substantial on- or off-site sedimentation/erosion or flooding may occur;
7. Involve activities within the 100-year flood zone[1];
8. Inconsistency with the goals and policies of the County's Safety Element relating to Geologic and Seismic Hazards; and,
9. Preclude the future extraction of valuable mineral resources.

5.6.3.2 Asphalt Plant Impacts

Impact GEO-1: Construction and operation of the proposed asphalt plant could expose occupants to liquefaction, severe ground shaking, and land subsidence during an earthquake.

Discussion: The project site is located on granular soils with shallow ground water that could experience liquefaction during an earthquake. Active faults are located within the Central Coast region that could produce large magnitude earthquakes. Additionally, the Wilmar Avenue/Santa Maria River fault, located adjacent to the project site, is considered potentially active. Additionally, construction of buildings and structures at the project site will be required to conform with the California Building Code, which includes seismic safety measures. The project site is not located within a CDMG Earthquake Fault Zone. This impact is considered significant but mitigable.

Impact Category: Significant but Mitigable

Thresholds of Significance Criteria: 1, 2, 5, 8

Mitigation Measure GEO-1: The project foundation and structural design shall follow the recommendations of a design level geotechnical investigation and shall address items including groundshaking, liquefaction, expansive soils, and soil subsidence. The geotechnical investigation shall also address potential seismic hazards from the Wilmar Avenue/Santa Maria River fault.

Residual Impacts

With implementation of the above-referenced measures, residual impacts are anticipated to be less than significant.

5.6.3.3 LUO/LUE Amendment Impacts

Impact GEO-2: Industrial development along the western fringe of the LUO/LUE amendment area, located along the edge of the Nipomo Mesa, could result in significant impacts from construction on unstable slopes and improper drainage control. Significant erosion could occur if development/disturbance is allowed on it.

Discussion: The edge of the Nipomo Mesa (see Figure 4-3) is defined as the point of change in topography where slop exceeds 15 percent descending directly from the Mesa to the Santa Maria, Cienega, Los Berros and Nipomo Valleys. Erosion impacts could occur on slopes of Oceano dune sand (which typifies the Nipomo Mesa) that are steeper than 15 percent.

Impact Category: Significant but Mitigable

Thresholds of Significance Criteria: 1, 3

Mitigation Measure GEO-2: The project shall be required to comply with the County Land Use Ordinance regulations, Section 22. 112.020(B), which address development along the Nipomo Mesa bluff edge. These standards include the following:

A. **Drainage plan requirements**. Land use permit and land division applications shall include a drainage plan in compliance with Chapter 22.52. The plan shall identify the point of change to 15 percent slope, in addition to other required drainage plan contents. The drainage plan requirement may be waived through an adjustment approved in compliance with Section 22.70.040, where a development will be located a sufficient distance from the bluff top edge to be of no concern;

B. **Standards for projects requiring Zoning Clearance or Site Plan Review**. Projects requiring Zoning Clearance or Site Plan Review shall be designed in compliance with the following standards. Projects that are unable to meet these requirements may be considered through Minor Use Permit review, with the applicant paying the difference in fees.

- **Grading limitation**. Locate all grading, such as for building pads or access roads, away from slopes steeper than 15 percent on the bluff edge of the Nipomo Mesa to avoid erosion and visual impacts associated with grading, except for transmission lines and pipelines.
- **Setbacks**. All new structures shall be set back at least 50 feet from the top edge and the toe of the slope bank to prevent slope failure. Structures are not permitted on the slope of the bluff face, except for transmission lines and pipelines.
- **Drainage control**. Runoff created by new development shall be conveyed away from the bluff toward the interior of the Mesa. On-site or off-site retention/recharge basins shall be utilized for storage and infiltration of all runoff.
- **Septic system locations**. If a subsurface disposal system shall be located within 150 feet of the edge of the steeper bluff slopes (30 percent or greater), the system shall be designed to meet the Central Coast Basin Plan requirements for site suitability and the prevention of "daylighting" of effluent. This system must be approved by the Building Official prior to installation.

Residual Impacts

With implementation of the above-referenced measures, residual impacts are anticipated to be less than significant.

5.6.3.4 Cumulative Impacts

Projects that may be allowed under the proposed land use designation changes are also addressed in the discussion above. Construction of additional industrial uses within the project vicinity may cause construction-related turbidity and sedimentation of the Nipomo Creek. Multiple projects near the creek could also increase erosion and increase creek sediment load, thus, resulting in a long-term impact for the area. If this situation were to occur, engineered systems, such as sediment catch basins, would be necessary to ensure that the increased sediment did not reduce the fresh water supply or the quality of habitat in Nipomo Creek.

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