4.6 GEOLOGY

4.6.1 Existing Conditions

The Oster/Las Pilitas Quarry is located in central San Luis Obispo County, California in the vicinity of the San Luis Range of the Coast Range Geomorphic Province (Geosolutions 2009). The Coast Ranges are found between the Pacific Ocean on the west and the Central Valley to the east. The Coast Ranges extend to the northwest for approximately 600 miles to the Oregon Boarder and south for approximately 40 miles to the Santa Maria Valley area. The San Andreas Fault is a prominent geologic feature that is located approximately 26 miles to the northeast of the Site. The San Andreas is the primary structural boundary between the Pacific and North American tectonic plates.

Active faults are those that have shown movement within geologically recent time, the Holocene epoch, which includes the last 11,000 years. There are three active faults in San Luis Obispo County that are zoned under the State of California Alquist-Priolo Fault Hazards Act. The three faults are the San Andreas, the Hosgri-San Simeon, and the Los Osos faults (County of San Luis Obispo 1999). The closest of these three is the Los Osos fault zone about 12.5 miles southwest from the proposed quarry site (San Luis Obispo County: 1999: Map 2). There are at least 17 other faults in the County that are considered potentially active, meaning they have displaced geological formations of Pleistocene age (within the last two million years), but not Holocene (San Luis Obispo County 1999:52). The Rinconada fault, potentially active, is located about 1.5 miles to the southwest of the site and is the nearest mapped fault (San Luis Obispo County 1999: Map 2).

The site vicinity is underlain by Cretaceous-aged granitic rocks (Kgr) as mapped by Hart (1976) and Dibble (2004) (see Figure 4.6-1). Hart identified the Kgr as being Upper Cretaceous (99 to 65 million years before present) and Dibblee identified the Kgr as being Cretaceous (144 to 65 million years before present). The Kgr is described as a coarse grained, light medium gray granodiorite and adamellite with pink and green clasts (Hart 1976). Where weathered, Dibble described the Kgr as having equal portions quartz and plagioclase. In some locations, the Kgr is overlain by Quaternary Alluvium.

The topography of the site is rather steep and undulating with a relief of 582 feet over a distance of 4,125 feet for an overall site gradient of 14 percent. The lowest point on the site is 950 feet, located in the southwest corner of the site along the Salinas River. The highest point is a peak called “Calf No. 2” (on the USGS Santa Margarita 7.5 minute quadrangle) with an elevation of 1,532 feet. “Calf No. 2” is located in the northeast part of the site.

The project site is not in an area typically subject to liquefaction of soils (San Luis Obispo County 1999: Map 3). It is in an area with a low to moderate potential for landslides, depending on slopes (San Luis Obispo County 1999: Map 4). Although the Salinas River crosses the southwest corner of the Oster property containing the proposed quarry, the quarry

itself would be located well outside of the 100-year floodplain of the river (San Luis Obispo County 1999: Map 5).

The property containing the proposed quarry site is drained by three surface water features including Calf Canyon Creek (far northeastern corner of the property), Moreno Creek (southern portion of property), and the Salinas River (southwestern portion of the property) (See Figures 2-1, 2-2, and 2-3). The main portion of the proposed quarry (Phases 2A through 3B) is within a small unnamed drainage that leads to the Salinas River about one-half mile west of the quarry site.

A Water Supply Assessment was completed in 2012 (See Appendix F). The majority of the groundwater resource is located in the southern part of the site in the Quaternary alluvium deposits located adjacent to the Salinas River. Surface and shallow subsurface flows in the Salinas River and in Moreno Creek provide water for the project site. The Kgr is not a good source of groundwater on the site or a major source in the region.

The California Department of Conservation has classified the La Panza granitics region containing the project site as Mineral Resource Zone 2 (MRZ-2), which means that the State Geologist has identified these areas as containing significant deposits of aggregate material (San Luis Obispo County Las Pilitas Area Plan 2003: page 6-1). Additional information regarding this classification and the importance of aggregate mineral resources is provided in Section 1.3.2 of this EIR.

4.6.2 San Luis Obispo County Plans and Policies

The County of San Luis Obispo General Plan recognizes a variety of geologic and seismic hazards. As outlined in the County's Safety Element, Goal S-5 (San Luis Obispo County 1999:17), the County's plans and policies are structured to minimize the potential for loss of life and property resulting from geologic and seismic hazards. Applicable policy statements from the Safety Element are summarized in Table 4.6-1 below.

Part of the County implementation of the state MRZ-2 classification is accomplished through the EX-1 Combining Designation in the Las Pilitas Area Plan, as explained in Section 1.3.2 of this EIR.

4.6.3 Regulatory Setting

There are no federal requirements specific to seismic or ground stability issues, but there are several widespread model documents that are used or incorporated by individual states in their building codes. These include the International Building Code and the Uniform Building Code. At the state level, the California Building Code (Title 24 California Code of Regulations) governs structural and other aspects of building and permitting. With respect to earthquake loads, the California Building Code requires design and construction to resist the

TABLE 4.6-1
SUMMARY OF COUNTY AND LOCAL GEOLOGIC AND SEISMIC HAZARD MITIGATION POLICIES

Source	Policy Statement	Discussion	Preliminary Determination
Goal S-5, Policy S-17, Fault Information	Address geologic and seismic hazards and requires a CEG review of reports, technical docs, and plans (Programs S-46 and S-47).	Applicant retained Geosolutions (2009) to prepare engineering geology investigation, which was reviewed by CA Dept. of Conservation, Office of Mine Reclamation (July 16, 2010). Issues to be resolved: 1) Document preparation by CA-licensed professionals, 2) revise slope stability analysis to confirm engineering properties, address structural discontinuities, and confirm stability of backfill on areas of final 0.5H: 1V slope.	Potentially Consistent – after resolution of Office of Mine Reclamation concerns. See Impact and Mitigation Measure GEO-1
Goal S-5, Policy S-18 Fault Rupture Hazards	Locate development away from active and potentially active faults; enforce Alquist-Priolo earthquake fault zoning act regulations.	Project is not in vicinity of active or potentially active faults. Nearest is 1.5 miles to southwest.	Consistent
Goal S-5, Policy S-19 Reduce Seismic Hazards	Enforce applicable building codes relating to the seismic design of structures to reduce the potential for loss of life and reduce the amount of property damage. (Programs S-50, 51, and 52)	Building permit and compliance with applicable building codes required for scale house and office building. Structural building design parameters recommended by Geosolutions (2009:12).	Consistent
Goal S-5, Policy S-20 Liquefaction and Seismic Settlement	Require evaluation of potential for liquefaction or seismic settlement to impact structures.	Only low potential for both, due to presence of near-surface granitic rocks (Geosolutions 2009:14-15). See previous response to Policy S-19.	Consistent
Goal S-5, Policy S-21 Slope Instability.	Avoid development in areas of known slope instability or high landslide risk when possible, and continue to encourage that development on sloping ground use design and construction techniques appropriate for those areas.	Slope stability was addressed by Geosolutions (2009), and addressed as described in Policy S-17 above. See previous responses to Policies S-19 and S-20.	Potentially Consistent – after resolution of Office of Mine Reclamation concerns. See Impact and Mitigation Measure GEO-1

effects of seismic motions in accordance with standards of the American Society of Civil Engineers. The San Luis Obispo County Building Code (Title 19 of the San Luis Obispo County Code) incorporates the California Building Code standards.

The definitions of active and potentially active faults, and their mapping by state and local government, are required by the Alquist-Priolo Earthquake Fault Zoning Act of 1972 (PRC Sections 2621-2630). Updated mapping of seismic hazards from faults has been accomplished by the California Geological Survey, pursuant to the Seismic Hazards mapping Act of 1990 (PRC Section 2690-2699). Site specific geotechnical investigations are required prior to permitting most projects within defined seismic hazard zones. The proposed quarry is not in one of these zones.

4.6.4 Assessment Methodology

The detailed evaluation of geological and related risks for this project was performed by Geosolutions (2009). The assessment in this EIR is based on a review of that report, the review letter prepared by the California Department of Conservation, Office of Mine Reclamation (July 2010), and applicable County policies and procedures.

4.6.5 Significance Criteria

With appropriate consideration of the significance criteria presented in Appendix G of the CEQA Guidelines, the County of San Luis Obispo has developed and adopted the following significance criteria to determine project effects for Geology within San Luis Obispo County. Accordingly, the Las Pilitas Quarry project will have a significant impact if it will:

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

b. Be within a California Geological Survey “Alquist-Priolo” Earthquake Fault Zone”; and/or

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; and/or

d. Change rates of soil absorption, or amount or direction of surface runoff; and/or

e. Include structures located on expansive soils; and/or

f. Change the drainage patterns where substantial on- or off-site sedimentation/ erosion or flooding may occur; and/or

g. Involve activities within the 100-year flood zone; and/or

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

i. Preclude the future extraction of valuable mineral resources.

4.6.6 Project Impacts and Mitigation Measures

Potential Slope Instability

This effect considers criterion "a" in the above list, and could occur if there is an adverse relationship between a quarry slope and pattern of fractures or other discontinuities in the underlying granitic rock. If this occurs, the quarry slopes may be less stable than anticipated resulting in slope failure either during the quarry operation or after reclamation has occurred. This potential impact can be avoided through an analysis to identify and characterize fracture patters or other discontinuities present, and then through a minor re-design to adjust the direction, gradient, and/or bench pattern of quarry slopes. The review letter submitted by the California Department of Conservation, Office of Mine Reclamation (July 2010:2-3) identifies this issue, and notes that additional analysis and demonstration of slope stability will be necessary to be consistent with state standards. State law in the Surface Mine and Reclamation Act requires that the Reclamation Plan and any amendments and associated analysis be provided to the Office of Mine Reclamation prior to the County approval of the Reclamation Plan (1 PRC 2774(c), (d)). This is a potentially significant impact that can be mitigated.

Description of Impact	Mitigation Measure	Residual Impact
IMPACT GEO-1: Potential Slope Instability. The project may create unstable slopes if fracture patterns or other discontinuities in the underlying granitic rock are of a type and orientation that would adversely affect the designed slopes.	MM GEO-1: Potential Slope Instability. The applicant/quarry operator shall supplement the Engineering Geology Investigation prepared by Geosolutions (2009) to address potential fractures or other discontinuities and their effect on final slope stability. If warranted by the supplemental investigation, the applicant shall also submit a revised quarry design, Reclamation Plan and slope stability analysis consistent with requirements of the Surface Mine and Reclamation Act. Any changes shall be reflected in the final Mining Plan, prior to Notice to Proceed.	Less than significant

Exposure to Geologically Hazardous Conditions

This issue considers criteria "b," "e," and "g" in the above list, all of which concern potential hazards that are associated with specific locations. These include active earthquake fault zones, soils with expansive or "shrink-swell" properties, and 100-year flood plains associated with major drainages. None of these hazardous conditions are associated with the project site, and compliance with applicable routine building code requirements will provide an appropriate level of safety related to these issues. This potential effect is, therefore, a less than significant impact.

Description of Impact	Mitigation Measure	Residual Impact
IMPACT GEO-2: Exposure to Geologically Hazardous Conditions. The proposed quarry site may potentially be affected by an Alquist-Priolo fault zone, expansive soils, or a 100-year floodplain.	MM GEO-2: Exposure to Geologically Hazardous Conditions. Since this effect is less than significant, no mitigation is required.	Less than significant

Soil Erosion and Loss of Topsoil

This effect considers criterion "c" in the above list. The project will remove vegetation and topsoil from areas to be quarried, and during these initial construction operations within each phase of the quarry, there will be an increased potential for erosion of soil, and its discharge as sediment in stormwater runoff from the site. If it occurs, this loss of soil and sediment discharge to Moreno Creek and the Salinas River would be considered a significant impact. The measures incorporated in the proposed Reclamation Plan, and other requirements related to control of erosion and sediment discharge, will minimize the potential for this impact. The Reclamation Plan calls for the removal of vegetation and topsoil, referenced as "growth media," and their temporary storage in areas where erosion can be controlled by covering or other measures. Any runoff from these areas, and from all areas of the quarry site, will be controlled by detention basins consistent with the requirements of Section 22.36.050 (B) (1) of the County Land Use Ordinance. As the quarry proceeds, the growth media removed from one area will be used to cover and provide a revegetation surface for reclamation of previously finished slopes in a phase program. This approach will help to minimize the time during which stockpiles of topsoil and vegetation are exposed to erosive forces. This is considered a potentially significant impact that can be mitigated.

Description of Impact	Mitigation Measure	Residual Impact
IMPACT GEO-3: Soil Erosion and Loss of Topsoil. The project will create graded slopes into natural hillsides and remove natural vegetation and topsoil, which may increase soil erosion and sediment transport.	MM GEO-3: Soil Erosion and Loss of Topsoil. Vegetation and topsoil removed from the areas to be quarried shall be managed as described in the Reclamation Plan, as approved by the County. (Additional measures to minimize erosion and protect surface water form sediment discharge are described in Mitigation Measures WQ-1a and 1b).	Less than significant

Changes in Surface Runoff and Drainage Patterns

This issue considers criteria "d" and "f" in the above list. The project will involve grading and construction that will affect runoff into Moreno Creek (quarry access road and most of Phases 1A and 1B of the quarry), and runoff into a small unnamed drainage that leads to the Salinas River one-half mile to the west (Phases 2A through 3B of the quarry). The overall

drainage pattern from the property will be maintained, and the project design includes three detention basins to intercept and detain runoff from disturbed areas so that the peak flows to the downstream surface water bodies are not altered by the project. One detention basin would be at the entrance to the quarry site and would manage runoff from the access road and related disturbed areas. A second basin would be in the southern portion of the quarry, and would detain runoff from the rock processing and stockpile area and portions of the quarry draining southward. The third detention basin would be constructed in the western portion of the quarry and enlarged as the quarry proceeds to control runoff from the main portion of the project site towards the west. These basins, in conjunction with other required measures to protect surface water quality, will minimize the effects of changes in surface runoff and drainage patterns. The potential increase in runoff and erosion is a significant impact that can be mitigated.

Description of Impact	Mitigation Measure	Residual Impact
IMPACT GEO-4: Changes in Surface Runoff and Drainage Patterns. The project will grade and quarry an area of approximately 41 acres, draining towards Moreno Creek (entrance road and Phases 1A and 1B), and in the northern unnamed creek drainage towards the Salinas River. Substantial and adverse on- or off-site erosion effects may occur.	MM GEO-4: Changes in Surface Runoff and Drainage Patterns. The detention basins and other drainage control features depicted in the project plans (Sheets 12 and 13 in plans dated September 9, 2009, or equivalent sheets in final plans) shall be installed as early as practicable in their associated construction phases, and shall be maintained throughout the life of the quarry operation. (Additional measures to minimize erosion and protect surface water form sediment discharge are described in Mitigation Measures WQ-1a and WQ-1b).	Less than significant

Policy Consistency and Effects on Future Mining

This issue considers criteria “h” and “i” in the above list. As discussed above in Section 4.6.2, the project is expected to be consistent with all applicable County policies related to geological resources and hazards, with the implementation of the identified mitigation measures and compliance with requirements at the state and County level placed on surface mines and quarries. The project design also includes the preservation of about 69 acres within an open space easement intended as mitigation for the biological impacts of the project (see Section 4.5 of this EIR). The easement would extend over the portions of the Oster property west and east of the proposed quarry site (see Figure 4.5-4 in Biological Resources section). This easement would preclude future mining on this portion of the Oster property, but it would not affect the potential for mining granitic rock on nearby properties. To the extent that the easement prevents future residential uses in this area, it may tend to reduce the potential for land use conflicts with future mining on adjacent properties. The effects of the project design as proposed on future mining or on other applicable policies related to geological resources and constraints are less than significant.

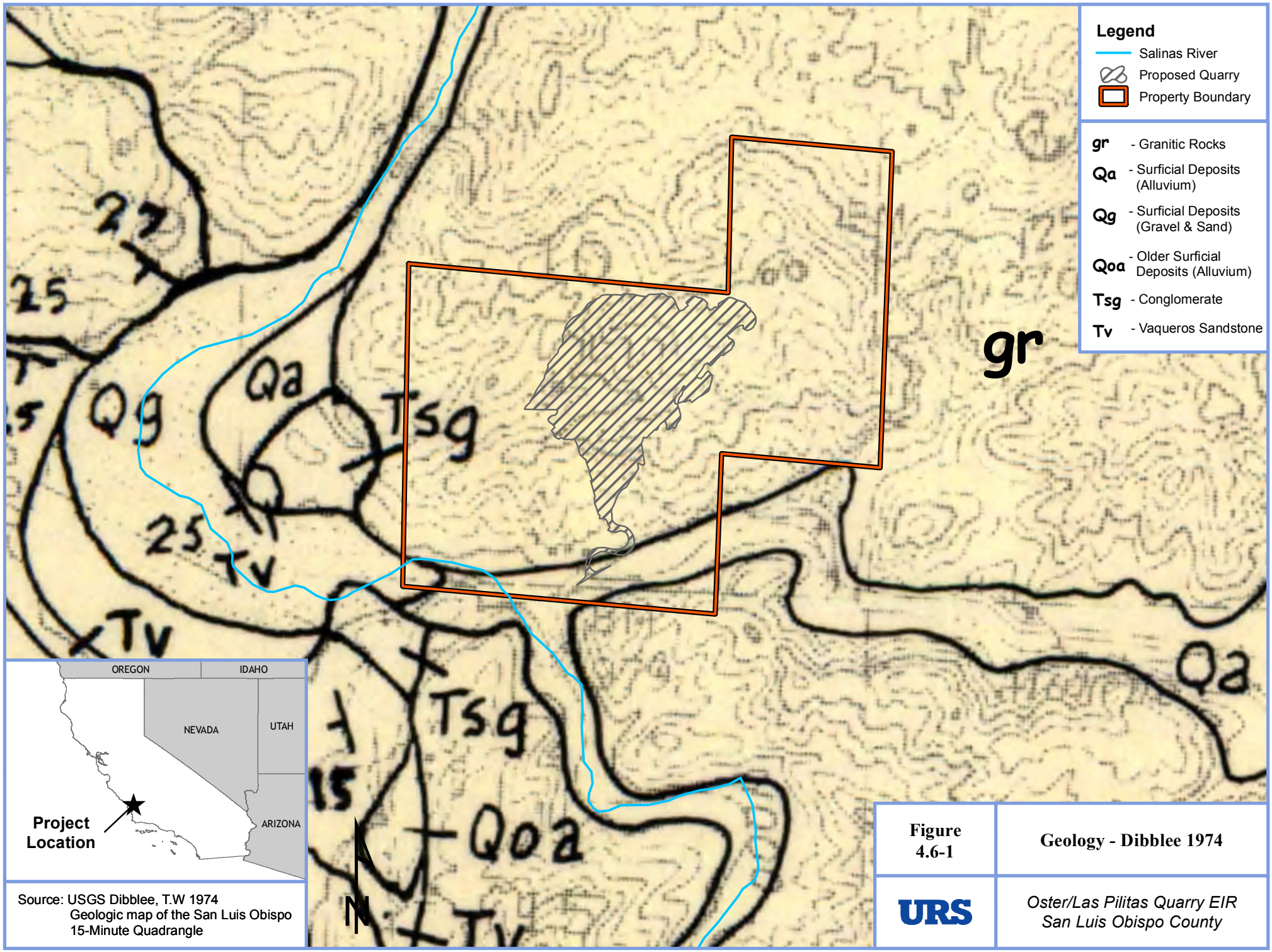
Description of Impact	Mitigation Measure	Residual Impact
IMPACT GEO-5: Policy Consistency and Effects on Future Mining. The project design may potentially preclude future mining on other portions of the Oster property, and/or potentially not affect the potential for mining granitic rock on nearby properties.	MM GEO-5: Policy Consistency and Effects on Future Mining. Since this effect is less than significant, no mitigation is required.	Less than significant

Cumulative Effects

The project is about one-half mile from the existing Hanson Santa Margarita Quarry. Both quarries are within the EX1 Extractive Resource Area Combining Designation, as shown on Figure 3-1. In this region, the EX1 Combining Designation is placed over the La Panza Granitics, a large area that is classified as MRZ-2 by the California State Geological Survey (1989:9). Since this Combining Designation is specifically intended to protect mineral resources, it is reasonable to expect that future quarries will be approved and constructed in this area.

The project as designed, and with the listed mitigation measures applied to it, will not have any significant impacts related to geological constraints or resources. For the most part, each of the geological constraints involved in the significance criteria used in this analysis is evaluated on the basis of the specific location of a project relative to the constraint or issue being analyzed. Thus, there are no additive or cumulative effects associated with a project's distance from the nearest active fault zone, or presence or absence of soils subject to expansion. Some effects, however, could be cumulative in nature. These include the loss of topsoil through erosion and the discharge of sediment into surface water courses. These effects may be associated with any proposed quarry, or with any other type of development or even with a change in agricultural activities. For these issues, permit requirements and existing statewide programs provide measures that serve to avoid or minimize the potential effects on a project-by-project basis, therefore cumulative impacts are less than significant.

Description of Impact	Mitigation Measure	Residual Impact
IMPACT GEO-6: Cumulative Effects related to Geology. Some effects related to geology could be cumulative in nature. These effects include the loss of topsoil through erosion and the discharge of sediment into surface water courses. These effects may be associated with any proposed quarry, or with any other type of development or even with a change in agricultural activities. For these issues, permit requirements and existing statewide programs provide measures that serve to avoid or minimize the potential cumulative effects on a project-by-project basis.	MM GEO-6: Cumulative Effects related to Geology. Since this effect is less than significant, no mitigation is required.	Less than Significant



Source: USGS Dibblee, T.W 1974
Geologic map of the San Luis Obispo
15-Minute Quadrangle

Figure 4.6-1	Geology - Dibblee 1974
URS	*Oster/Las Pilitas Quarry EIR* *San Luis Obispo County*