4.6 GEOLOGIC STABILITY

Agricultural Residential Cluster Subdivision. The Geologic Stability Section is based on a preliminary Geology and Geologic Hazards report prepared for the Agricultural Residential Cluster Subdivision site by Cleath & Associates in October 2003 and review of County geologic and seismic safety information. Based on these studies, the Agricultural Residential Cluster Subdivision is anticipated to result in several potentially significant but mitigable impacts. All or portions of the Agricultural Residential Cluster Subdivision site are subject to potential ground shaking, expansive soil, erosion, settlement, landsliding, liquefaction, and/or groundwater percolation impacts. Potential hazards to the Agricultural Residential Cluster Subdivision can be mitigated by proper engineering design and construction, and for some building sites, with the recommendations of site specific geotechnical investigations accomplished as part of the Building Permit process.

Future Development Program. Because no active application currently exists for the Future Development Program subsequent to the Agricultural Residential Cluster Subdivision, the assessment of geologic hazards is based on a reasonable worst case scenario with regard to the location of future land uses within anticipated development areas. Buildout of the Future Development Program would result in impacts similar to those resulting from the Agricultural Residential Cluster Subdivision individually. However, Future Development Program land uses are also subject to fault rupture hazards from the Rinconada and Nacimiento Faults. For the purposes of this report, both faults are considered active. Should future development be proposed in areas containing soils hazards, landsliding, and/or liquefaction hazards areas, impacts would be reduced through mitigation requiring avoidance of hazard areas and/or geotechnical methods to reduce the hazard to acceptable levels.

4.6.1 Setting

a. Geologic Conditions and Topography. San Luis Obispo County occupies an area of complex geology extending from the Pacific Coast on the west to the San Andreas Rift Zone on the east. The Santa Margarita Ranch property lies within the southern Coast Ranges of San Luis Obispo County, in the Coast Range Geomorphic Province. The Ranch comprises a central alluvial valley complex with low lying hills, bordered on the west by the Santa Lucia Range of higher bedrock mountains, and on the east by the Salinas River. Geologic structure, formed by millions of years of folding and faulting, is oriented predominantly in a northwesterly direction; the northwest draining Yerba Buena, Santa Margarita and Trout Creeks follow this trend.

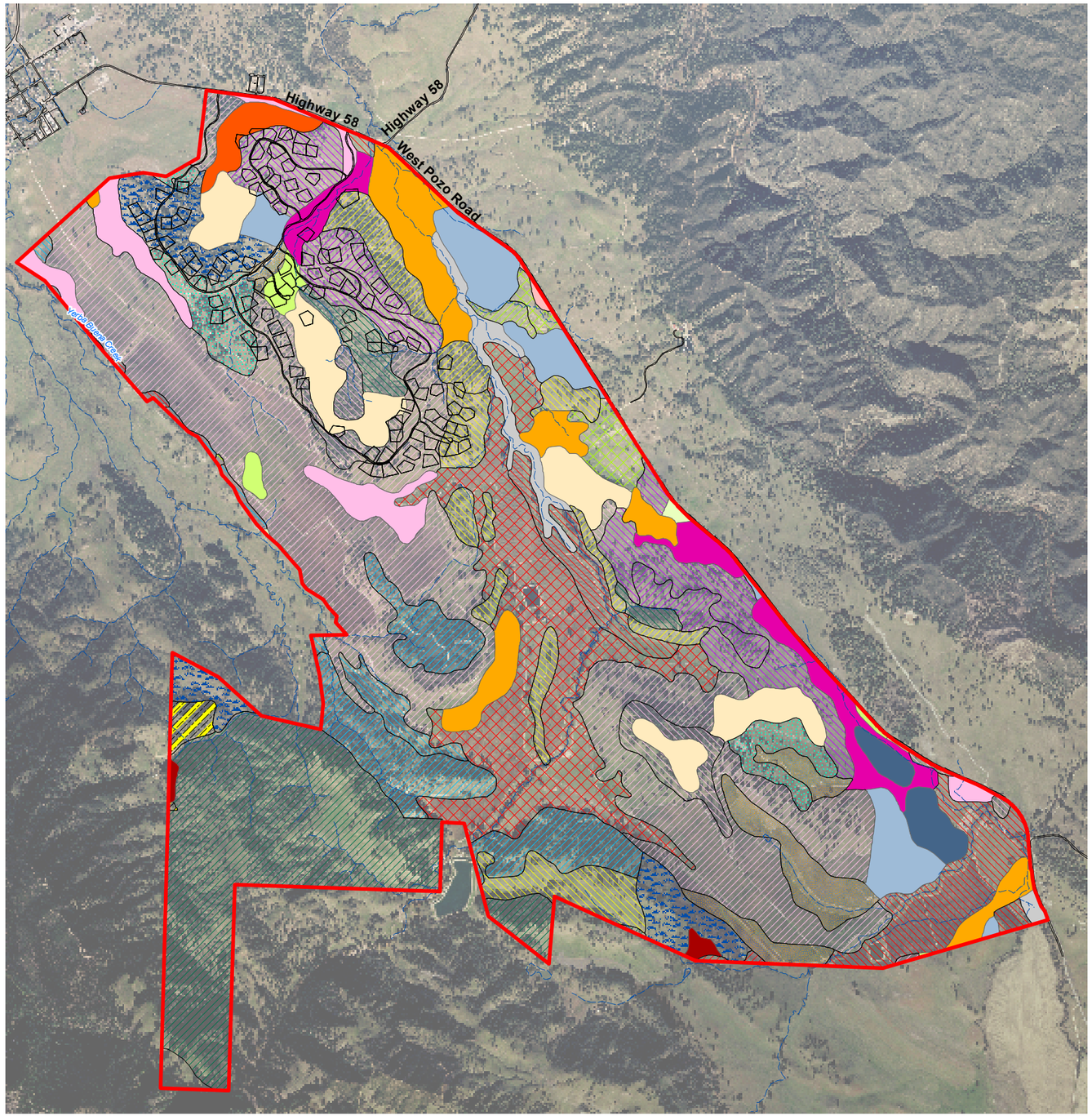
Thirty-four active and potentially active earthquake producing faults lie within 100 miles of the center of the Santa Margarita Ranch property. Individual earthquakes as large as Magnitude 7.9 have occurred within this distance. Fault rupture of the ground surface is possible on any of these faults with a large enough earthquake and secondary effects such as ground settlement, liquefaction and landsliding can occur.

The Santa Margarita Ranch property consists of varied terrain with the mountainous area on the west side of the Ranch containing the Santa Lucia Mountain ridge and slopes of 50 percent and greater. The predominant interior valleys of the Ranch are sloped at 1 to 9 percent while the Santa Margarita Creek lowlands typically contain slopes less than 5 percent. Elevations across the site range from a high of 1,276 feet along the Santa Lucia ridgeline to 1,020 feet at the north end of the property. At that location, the primary on-site tributary (Trout Creek) drains to the Salinas River, located approximately 1.25 miles north of the Ranch property.

b. Local Geology. The 14,000-acre Ranch property includes ten geologic units, ranging in age from the Jurassic Franciscan Formation (mélange) through Pliocene Paso Robles Formation (Hart, 1976). On-site units include the Franciscan mélange, granitic rocks, Toro and Atascadero Formations, Simmler and Vaqueros Formations, Monterey and Santa Margarita Formations, Paso Robles Formation, and older and younger alluvium. These units have a wide range of physical properties with older basement rocks found in the higher elevations being generally more resistant to weathering and degradation; they are also more highly fractured, and structurally more complex. The intermediate-aged bedrock units flank the ranges and border the alluvial valleys. These units are softer and weather into smoother low lying hills with fewer fractures and exhibit a gentler folding.

Alluvium occupies the lower portions of the valleys and ranges from older uplifted, dissected river terraces and alluvial fans to the most recent stream deposits in the lower elevation flood plains and active river channels. Structurally simple and relatively undisturbed by faulting, these units are semi-consolidated to loose, and generally comprise mixtures of gravel and sand.

c. Soils. As mapped by the Natural Resource Conservation Service (NRCS), 54 soil types are located on the Santa Margarita Ranch property. Of these 54 soil types, development under the Agricultural Residential Cluster Subdivision and Future Development Program could occur on 40 soil types (refer to Figures 4.6-1 and 4.6-2; specific soils hazards are shown on Figure 4.6-3). These 40 soil types and selected properties are summarized in Table 4.6-1. Agricultural Residential Cluster Subdivision soils followed by an asterisk (*) also occur in areas envisioned for development under the Future Development Program.



Note: Please refer to Table 4.6-1 for soil properties

- TENTATIVE TRACT 2586 BOUNDARY
- PROPOSED LOT LINES FOR TENTATIVE TRACT 2586 RESIDENTIAL CLUSTER SUBDIVISION
- ARBUCKLE FINE SANDY LOAM, 2-9
- ARBUCKLE-POSITAS COMPLEX, 15-30
- ARBUCKLE-POSITAS COMPLEX, 9-15
- ARBUCKLE-POSITAS COMPLEX, 30-50
- ARNOLD-SAN ANDREAS COMPLEX, 30-75
- AYAR AND DIABLO SOILS, 9-15
- AYAR AND DIABLO SOILS, 15-30
- BOTELLA SANDY LOAM, 2-9
- CLEAR LAKE CLAY, NA
- CROPLEY CLAY, 2-9
- DIBBLE CLAY LOAM, 9-15
- ELDER LOAM, 2-9
- GAZOS SHALY CLAY LOAM, 9-30
- GAZOS SHALY CLAY LOAM, 30-50
- HANFORD AND GREENFIELD FINE SANDY LOAMS, 2-9
- HANFORD AND GREENFIELD GRAVELLY SANDY LOAMS, 0-2
- HANFORD AND GREENFIELD GRAVELLY SANDY LOAMS, 2-9
- LINNE-CALODO COMPLEX, 30-50
- LOMPICO-MCMULLIN COMPLEX, 50-75
- MILLSHOLM-DIBBLE CLAY LOAMS, 30-50
- OCEANO LOAMY SAND, 2-9
- RYER CLAY LOAM, 2-9
- SAN ANDREAS SANDY LOAM, 15-30
- SAN ANDREAS-ARUJO SANDY LOAMS, 9-15
- SANTA LUCIA-LOPEZ COMPLEX, 15-50
- SANTA LUCIA-GAZOS COMPLEX, 50-75
- SHIMMON LOAM, 30-50
- SHIMMON-DIBBLE ASSOCIATION, 30-50
- STILL CLAY LOAM, 0-2
- STILL CLAY LOAM, 2-9
- STILL GRAVELLY LOAM, 0-2
- XEROFLUVENTS-RIVERWASH ASSOCIATION, NA

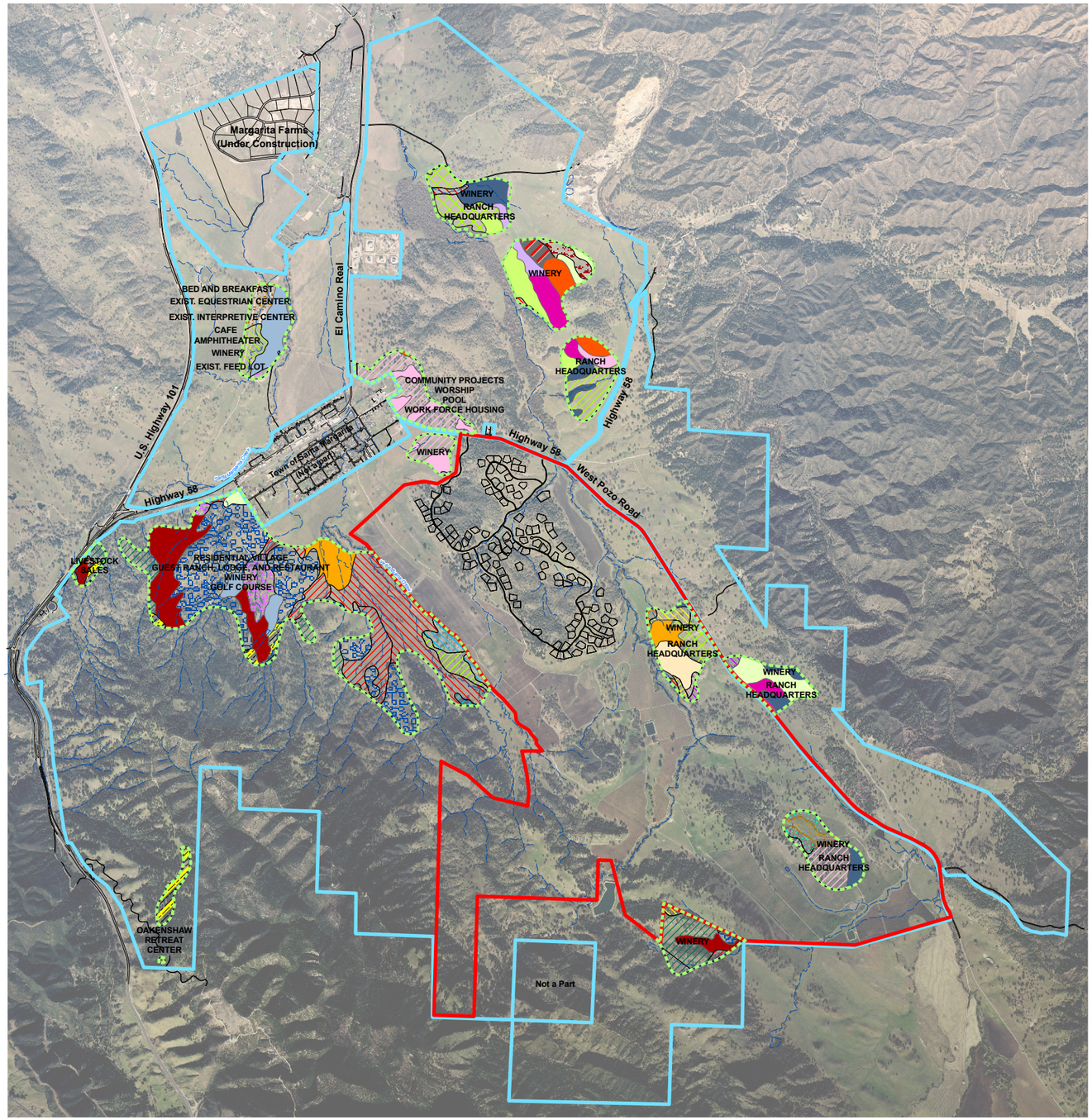
N

0 2,500 5,000 Feet

Proposed Agricultural
Residential Cluster Subdivision Soils

Source: SSURGO, 2004, EDA Design Professionals, 2005.

Figure 4.6-1



Note: Please refer to Table 4.6-1 for soil properties.
No NRCS soil data is available for Oakenshaw Retreat Center or southernmost winery locations. Soil types obtained from 2006 site reconnaissance.

- TENTATIVE TRACT 2586 BOUNDARY
- PROPOSED LOT LINES FOR TENTATIVE TRACT 2586 RESIDENTIAL CLUSTER SUBDIVISION
- RANCH PROPERTY BOUNDARY
- FUTURE DEVELOPMENT PROGRAM LAND USE LOCATIONS
- ARBUCKLE FINE SANDY LOAM, 2-9
- ARBUCKLE-POSITAS COMPLEX, 15-30
- ARBUCKLE-SAN YSIDRO COMPLEX, 2-9
- ARBUCKLE-POSITAS COMPLEX, 9-15
- ARNOLD-SAN ANDREAS COMPLEX, 30-75
- AYAR AND DIABLO SOILS, 9-15
- BOTELLA SANDY LOAM, 2-9
- CLEAR LAKE CLAY, NA
- CROPLEY CLAY, 2-9
- DIBBLE CLAY LOAM, 9-15
- ELDER LOAM, FLOODED, 0-5
- ELDER LOAM, 2-9
- GAZOS SHALY CLAY LOAM, 9-30
- GAZOS SHALY CLAY LOAM, 30-50
- HANFORD AND GREENFIELD FINE SANDY LOAMS, 0-2
- HANFORD AND GREENFIELD FINE SANDY LOAMS, 2-9
- HANFORD AND GREENFIELD GRAVELLY SANDY LOAMS, 2-9
- LINNE-CALODO COMPLEX, 9-30
- LINNE-CALODO COMPLEX, 30-50
- LOMPICO-MCMULLIN COMPLEX, 50-75
- LOPEZ-SANTA LUCIA FAMILIES ASSOCIATION, 10-70
- MILLSHOLM-DIBBLE CLAY LOAMS, 15-30
- MILLSHOLM-DIBBLE CLAY LOAMS, 30-50
- MILLSHOM-EXCHEQUER-STONYFORD FAM COMPLEX, 30-75
- NACIMIENTO-AYAR COMPLEX, 9-30
- OCEANO LOAMY SAND, 2-9
- PITS, NA
- RINCON CLAY LOAM, 2-9
- SAN ANDREAS SANDY LOAM, 15-30
- SAN ANDREAS-ARUJO SANDY LOAMS, 9-15
- SANTA LUCIA-LOPEZ COMPLEX, 15-50
- SANTA LUCIA-GAZOS COMPLEX, 50-75
- SHIMMON-DIBBLE ASSOCIATION, 30-50
- STILL CLAY LOAM, 0-2
- STILL CLAY LOAM, 2-9
- STILL GRAVELLY LOAM, 0-2
- XEROFLUVENTS-RIVERWASH ASSOCIATION, NA

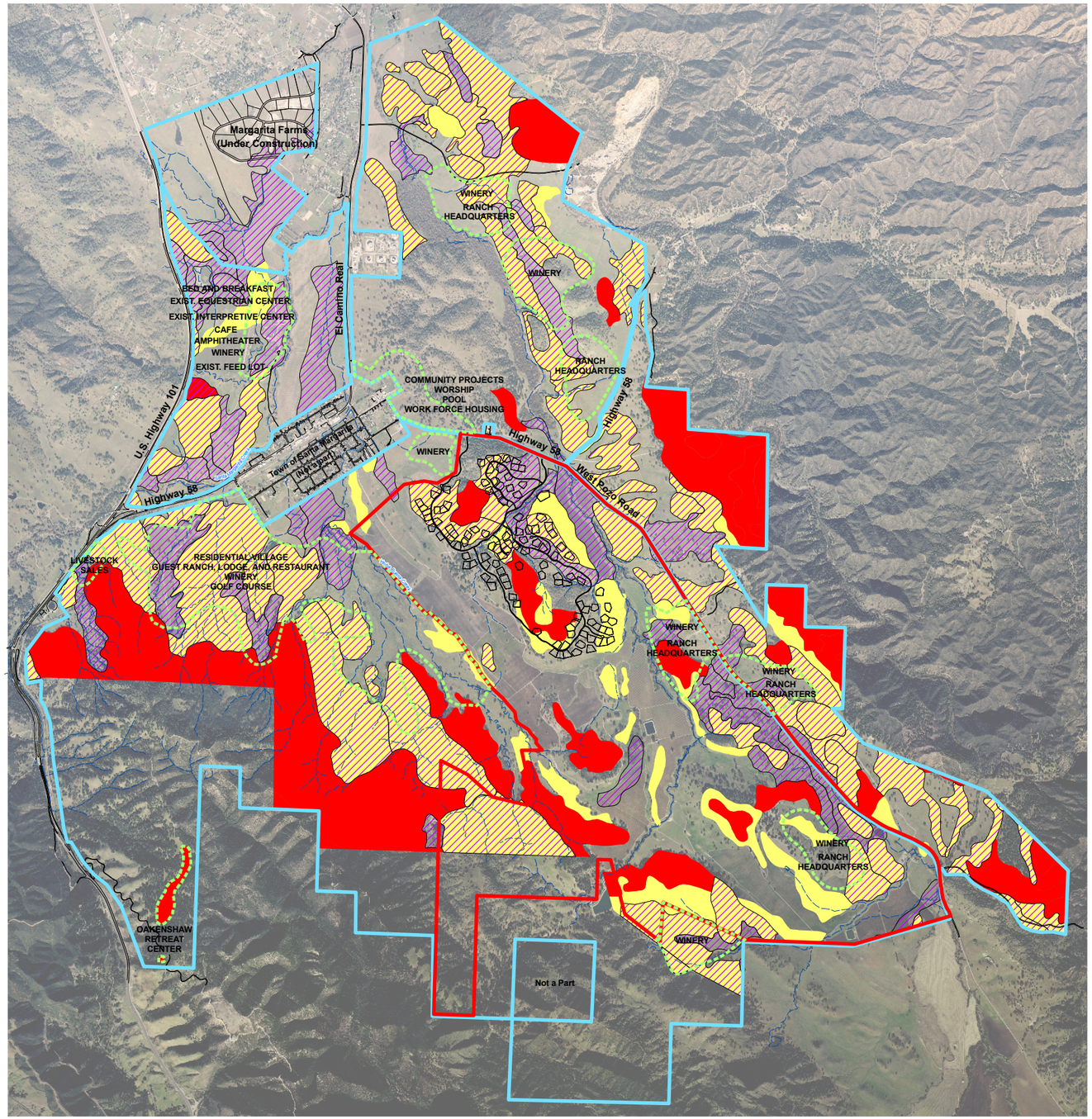
N

0 2,500 5,000 10,000 Feet

Future Development Program
Soils

Source: SSURGO, 2004, EDA Design Professionals, June 2006, and Orrin Sage, Site Reconnaissance, 2006.

Figure 4.6-2



Note: No NRCS soil data is available for Oakenshaw Retreat Center or southernmost winery locations. Soil types obtained from 2006 site reconnaissance.

- TENTATIVE TRACT 2586 BOUNDARY
- PROPOSED LOT LINES FOR TENTATIVE TRACT 2586 RESIDENTIAL CLUSTER SUBDIVISION
- RANCH PROPERTY BOUNDARY
- FUTURE DEVELOPMENT PROGRAM LAND USE LOCATIONS
- VERY HIGH EROSION HAZARD
- HIGH EROSION HAZARD
- HIGH SHRINK-SWELL POTENTIAL

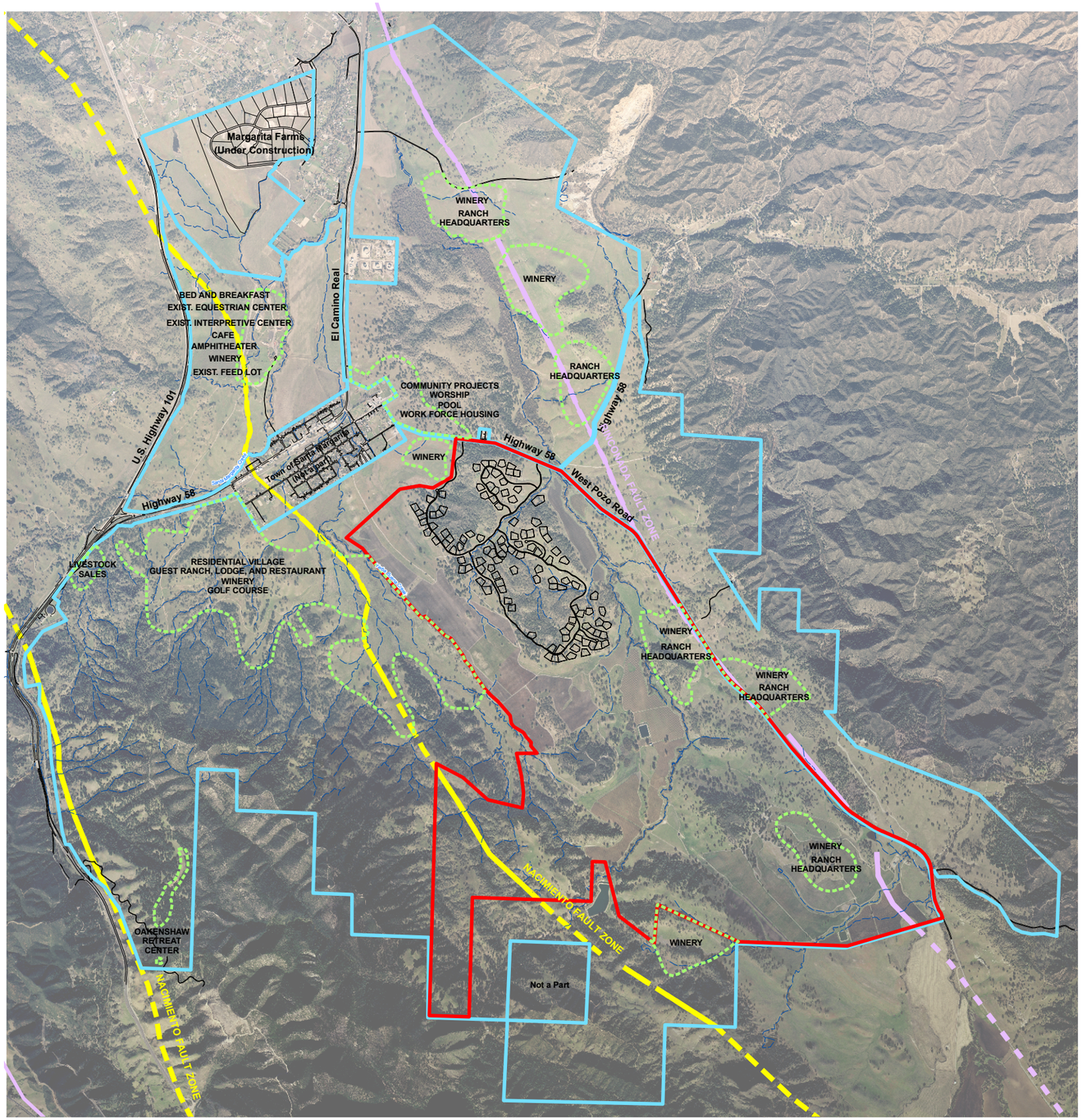
N

0 2,500 5,000 10,000 Feet

Soil-Related Hazards

Source: SSURGO, 2004, EDA Design Professionals, June 2006, and Orrin Sage, Site Reconnaissance, 2006.

Figure 4.6-3



Note: fault zones dashed where inferred

- TENTATIVE TRACT 2586 BOUNDARY
- PROPOSED LOT LINES FOR TENTATIVE TRACT 2586 RESIDENTIAL CLUSTER SUBDIVISION
- RANCH PROPERTY BOUNDARY
- FUTURE DEVELOPMENT PROGRAM LAND USE LOCATIONS
- NACIMIENTO FAULT ZONE
- RINCONADA FAULT ZONE

N

0 2,500 5,000 10,000 Feet

Fault Hazards

Figure 4.6-4

Source: SSURGO, 2004, EDA Design Professionals, June 2006.

Table 4.6-1. Agricultural Residential Cluster Subdivision and Future Development Program Soil Parameters

Name	Water Holding Capacity	Permeability	Shrink-Swell Potential	Rate of Surface Runoff	Erosion Hazard
Agricultural Residential Cluster Subdivision Soils					
Arbuckle fine sandy loam (2-9% slopes)*	Moderate to High	Moderately Slow	Moderate	Medium	Moderate
Arbuckle-Positas complex (9-15% slopes)*	Moderate to High	Very Slow to Moderately Slow	High	Medium	Moderate
Arbuckle-Positas complex (15-30% slopes)*	Moderate to High	Very Slow to Moderately Slow	High	Rapid	High
Arbuckle-Positas complex (30-50% slopes)	Moderate to High	Moderately Slow	NA	Rapid	High
Arnold-San Andreas complex (30-75% slopes)*	Very Low to Moderate	Moderately Rapid to Rapid	NA	Very Rapid	Very High
Ayar and Diablo soils (9-15% slopes)*	Moderate to Very High	Slow	High	Medium	Moderate
Ayar and Diablo soils (15-30% slopes)	Moderate to Very High	Slow	High	Rapid	High
Botella Sandy loam (2-9% slopes)*	High	Moderately Slow	Moderate	Medium	Moderate
Clear Lake Clay*	Moderate to High	Slow	High	ND	ND
Cropely clay (2-9% slopes)*	High to Very High	Slow	High	Medium	Moderate
Dibble clay loam (9-15% slopes)*	Low to Moderate	Slow	High	Medium	Moderate
Elder loam (2-9% slopes)*	Moderate to High	Moderate	None	Slow	High
Gazos shaly clay loam (9-30% slopes)*	Low to Moderate	Moderately Slow	NA	Rapid	High
Gazos shaly clay loam (30-50% slopes)*	Low to Moderate	Moderately Slow	NA	Rapid	High
Hanford and Greenfield fine sandy loams (2-9% slopes)*	Moderate to High	Moderately Rapid	NA	Medium	Moderate
Hanford and Greenfield gravelly sandy loams (0-2% slopes)*	Low to Moderate	Moderately Rapid	NA	Slow	Slight
Hanford and Greenfield gravelly sandy loams (2-9% slopes)*	Low to Moderate	Moderately Rapid	NA	Medium	Moderate
Linne-Calodo complex (30-50% slopes)*	Very Low to Moderate	Moderately Slow	None	Rapid	High
Lompico-McMullin complex (50-75% slopes)*	Very Low to Moderate	Moderate	NA	Very Rapid	Very High
Millsholm-Dibble clay loams (30-50% slopes)*	Very Low to Moderate	Slow to Moderate	High	Rapid	High
Oceano loamy sand (2-9% slopes)*	Low	Rapid	None	Medium	Moderate
Ryer clay loam (2-9% slopes)	High to Very High	Slow	High	Medium	Moderate
San Andreas sandy loam (15-30% slopes)*	Very Low to Moderate	Moderately Rapid	None	Rapid	High

Table 4.6-1. Agricultural Residential Cluster Subdivision and Future Development Program Soil Parameters

Name	Water Holding Capacity	Permeability	Shrink-Swell Potential	Rate of Surface Runoff	Erosion Hazard
San Andreas-Arujo sandy loams (9-15% slopes)*	Very Low to High	Moderately Slow to Moderately Rapid	Moderate	Medium	Moderate
Santa Lucia-Lopez complex (15-30% slopes)*	Very Low to Low	Moderate	NA	Rapid	High
Santa Lucia-Gazos complex (50-75% slopes)*	Very Low to Moderate	Moderately Slow to Moderate	NA	Very Rapid	Very High
Shimmon loam (30-50% slopes)	Low to Moderate	Moderately Slow	None	Rapid	High
Shimmon-Dibble association, steep (30-50% slopes)*	Low to Moderate	Slow to Moderately Slow	High	Rapid	High
Still gravelly loam (0-2% slopes)*	Moderate to High	Moderate	Moderate	Slow	Slight
Still clay loam (0-2% slopes)*	High to Very High	Moderately Slow	Moderate	Slow	Slight
Still clay loam (2-9% slopes)*	High to Very High	Moderately Slow	Moderate	Medium	Moderate
Xerofluvents-Riverwash association*	Very Low	Variable	NA	Medium	Very High
Remaining Future Development Program Soils					
Arbuckle-San Ysidro complex (2-9% slopes)	Moderate to High	Very Slow to Moderately Slow	High	Medium	Moderate
Elder loam, flooded (0-5% slopes)	Moderate to High	Moderate	NA	Slow	Slight
Hanford and Greenfield fine sandy loams (0-2% slopes)	Moderate to High	Moderately Rapid	NA	Slow	Slight
Linne-Calodo complex (9-30% slopes)	Very Low to Moderate	Moderately Slow	NA	Rapid	High
Millsholm-Dibble clay loams (15-30% slopes)	Very Low to Moderate	Slow to Moderate	High	Rapid	High
Nacimiento-Ayar complex (9-30% slopes)	Low to Very High	Slow to Moderately Slow	High	Rapid	High
Pits**	NA	NA	NA	NA	NA
Rincon clay loam (2-9% slopes)	High to Very High	Slow	High	Medium	Moderate

Source: U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS), Soil Survey of San Luis Obispo County, California, Paso Robles Area, May 1983.
** Soil also occurs in the areas envisioned for development under the Future Development Program.*
** *Pits are excavations from which soil and underlying material have been removed, together with areas of uneven accumulations of waste materials.*

d. Geologic and Seismic Hazards. Similar to much of California, the Santa Margarita Ranch property is located within a seismically active region. The geologic and seismic hazards relevant to the Agricultural Residential Cluster Subdivision and Future Development Program are described in the impact assessment below.

Faulting. The U.S. Geological Survey (USGS) defines active faults as those that have had surface displacement within Holocene time (about the last 11,000 years). Surface displacement

can be recognized by the existence of cliffs in alluvium, terraces, offset stream courses, fault troughs and saddles, the alignment of depressions, sag ponds, and the existence of steep mountain fronts. Potentially active faults are faults that have had surface displacement during the last 1.6 million years. Inactive faults have not had surface displacement within the last 1.6 million years. Several faults are located in the vicinity of the Santa Margarita Ranch (refer to Figure 4.6-4), and are described in the paragraphs below:

Nacimiento Fault Zone. Trending northwest to southeast, the Nacimiento Fault is located in the center of the Ranch property, bisecting the community of Santa Margarita (refer to Figure 4.6-4). The Nacimiento Fault Zone separates the soft rocks of the Coastal Franciscan domain on the west from the primary granitic rocks of the Salinian domain on the east. Although the California Geological Survey (CGS) and the County of San Luis Obispo Safety Element consider the Nacimiento Fault inactive, landforms in the Santa Margarita Ranch vicinity suggest geologically young faulting (Lew Rosenberg, County Geologist, Personal Communication, June 16, 2006). In addition, its proximity to the active Oceanic Fault Zone, the source of the 2003 San Simeon earthquake (refer to *West Huasna/Oceanic Fault Zone* discussion below) suggests that the Nacimiento Fault Zone is possibly active (Lew Rosenberg, County Geologist, Personal Communication, June 20, 2006). Therefore, for the purposes of this analysis, the Nacimiento Fault is considered active.

Rinconada Fault Zone. Trending northwest to southeast, the Rinconada Fault is located on the eastern edge of the Ranch property, following West Pozo Road south of SR 58 (refer to Figure 4.6-4). The Rinconada Fault is zoned as potentially active under the California Alquist-Priolo Earthquake Fault Zoning Act. However, according to the San Luis Obispo County Geologist, studies for the Santa Ysabel Ranch (Paso Robles) and the Chicago Grade landfill (Templeton) show features that suggest Holocene (last 11,000 years) movement on the Rinconada Fault (Lew Rosenberg, County Geologist, Personal Communication, June 20, 2006). In addition, the fault is a seismic source in the U.S. Geological Survey/California Geological Survey Probabilistic Seismic Hazard Model and is estimated to be capable of generating a maximum credible earthquake (MCE) of approximately 7.5. Therefore, for the purposes of this analysis, the Rinconada Fault is considered active.

San Andreas Fault. The San Andreas Fault, which is the most likely source of a major earthquake in California, is located 29 miles east of the Santa Margarita Ranch, along the eastern border of San Luis Obispo County. The San Andreas Fault is the primary surface boundary between the Pacific and the North American plates. There have been numerous historic earthquakes along the San Andreas Fault, and it generally poses the greatest earthquake risk to California. The San Andreas Fault is likely capable of producing a Maximum Credible Earthquake (MCE) of magnitude Mw 8.25.

West Huasna/Oceanic Fault Zone. The West Huasna/Oceanic Fault Zone trends north-northwest for approximately 100 kilometers along coastal central California. The fault extends from approximately the Santa Maria River on the south to San Simeon on the north. Seismologists have agreed that this fault zone was the source of the earthquake that shook the area on December 22, 2003.

The December 2003 earthquake, commonly known as the San Simeon earthquake, measured 6.5 on the Richter scale. The event was located 11 kilometers northeast of San Simeon, and 39

kilometers west-northwest of Paso Robles, where the brunt of the damage occurred. The strong shaking during the main-shock reached 47% of the force of gravity at the Templeton Hospital grounds. The shallow but powerful earthquake uplifted the Santa Lucia Mountains and triggered a vigorous aftershock sequence.

Los Osos Fault. The Los Osos Fault is located approximately 10 miles southwest of the Ranch property. The Los Osos Fault is generally northwest trending and exhibits a complex history of both strike-slip and reverse displacement. The Los Osos Fault Zone is divided into four distinct segments based upon differences in behavioral characteristics (recency of activity and slip rate), spatial coincidence with topographic sub-blocks of the San Luis Range, separation of fault traces, intersection with structures, and geomorphic expression. The segments are, from the northwest to the southeast, the Estero Bay, Irish Hills, Lopez Reservoir, and Newsom Ridge segments. The Irish Hills segment is active and is included in the Alquist-Priolo zoning by the State of California.

Hosgri Fault. The Hosgri Fault extends from San Simeon to an ocean shelf two miles west of Point Buchon, and then trends toward the Point Sal area. The Hosgri Fault is located approximately 22 miles southwest of the site. The fault is active. A Maximum Credible Earthquake of magnitude 7.5 and a Maximum Probable Earthquake of magnitude 6.4 are associated with the fault.

Ground Shaking and Surface Rupture. Faults generally produce damage in two ways: ground shaking and surface rupture. Seismically induced ground shaking covers a wide area and is greatly influenced by the distance of the site to the seismic source, soil conditions, and depth to groundwater. Surface rupture is limited to very near the fault. The Rinconada Fault and the southern extension of the Nacimiento Fault are located on the Ranch property (refer to Figure 4.6-4). The Future Development Program envisions several land uses on or adjacent to these mapped fault traces. Both faults are considered active for the purpose of this analysis, and therefore pose a high fault rupture hazard to potential future land uses. Other hazards associated with seismically induced ground shaking include earthquake-triggered landslides and tsunamis. Tsunamis and seiches are associated with ocean surges and inland water bodies, respectively. Neither of these hazards would affect the Agricultural Residential Cluster Subdivision or Future Development Program.

Expansive Soils. Agricultural Residential Cluster Subdivision and Future Development Program soils generally have high clay content (refer to Table 4.6-1). During periods of water saturation, these soils tend to expand. During dry periods, the soils tend to shrink. These volume changes with moisture content can cause cracking of structures built on expansive soils. As described by the NRCS (1983), the expansion potential (shrink-swell potential) of on-site soils ranges from low to high. Therefore, areas characterized by high shrink-swell potential would be a geologic hazard on the Ranch property. As shown in Figure 4.6-3, these areas occur throughout the Ranch, particularly along the eastern and western edges of the property.

Erosive Soils. Soil erosion is the removal of soil by water and wind. The rate of erosion is estimated from four soil properties: texture, organic matter content, soil structure, and permeability. Other 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. The soil types mapped for the Santa Margarita Ranch range from low to very high erosiveness.

Areas with high or very high erosion hazards are generally located in steeper areas of the Ranch, including the eastern and western edges of the property (refer to Figure 4.6-3).

Subsidence and Settlement. Subsidence involves deep seated settlement due to the withdrawal of fluid (oil, natural gas, or water). Settlement is the downward movement of the land surface resulting from the compression of void space in underlying soils. Seismically induced settlement occurs in loose to medium dense unconsolidated soil above groundwater. These soils compress (settle) when subject to seismic shaking. The settlement can be exacerbated by increased loading, such as from the construction of buildings. Settlement can also result solely from human activities including improperly placed artificial fill, and structures built on soils or bedrock materials with differential settlement rates.

Slope Stability and Landslides. Landslides result when the driving forces that act on a slope (i.e., the weight of the slope material, and the weight of objects placed on it) are greater than the slope's natural resisting forces (i.e., the shear strength of the slope material). Slope instability may result from natural processes, such as the erosion of the toe of a slope by a stream, or by ground shaking caused by an earthquake. Slopes can also be modified artificially by grading, or by the addition of water or structures to a slope. Development that occurs on a slope can substantially increase the frequency and extent of potential slope stability hazards. Areas susceptible to landslides are typically characterized by steep, unstable slopes in weak soil/bedrock units which have a record of previous slope failure. There are numerous factors that effect the stability of the slope, including: slope height and steepness, type of materials, material strength, structural geologic relationships, ground water level, and level of seismic shaking. According to the San Luis Obispo County Safety Element, landslide risk ranges from low to high throughout the Santa Margarita Ranch. Due to gentler slopes that occur north of SR 58/El Camino Real, landslide potential is generally low throughout the northern portions of the Future Development Program. Low landslide risk also occurs east of the community of Santa Margarita and west of West Pozo Road. The majority of the Agricultural Residential Cluster Subdivision site is located in this low hazard area, although portions of the site are categorized with a moderate landslide potential due to the presence of unstable formations and relatively steep topography. Within the portion of the Ranch property west of the Agricultural Residential Cluster Subdivision area and southwest of the community of Santa Margarita, the landslide hazard is generally high (refer to Figure 4.6-5).

Due to the presence of unstable formations and relatively steep topography in portions of the Agricultural Residential Cluster Subdivision and Future Development Program sites, landslides are a potential hazard for both the Agricultural Residential Cluster Subdivision and Future Development Program.

Liquefaction. Liquefaction is defined as the sudden loss of soil strength due to a rapid increase in soil pore water pressure resulting from seismic ground shaking. Liquefaction potential is dependent on such factors as soil type, depth to ground water, degree of seismic shaking, and the relative density of the soil. When liquefaction of the soil occurs, buildings and other objects on the ground surface may tilt or sink, and lightweight buried structures (such as pipelines) may float toward the ground surface. Liquefied soil may be unable to support its own weight or that of structures, which could result in loss of foundation bearing or differential settlement. Liquefaction may also result in cracks in the ground surface followed by the emergence of a sand-water mixture.

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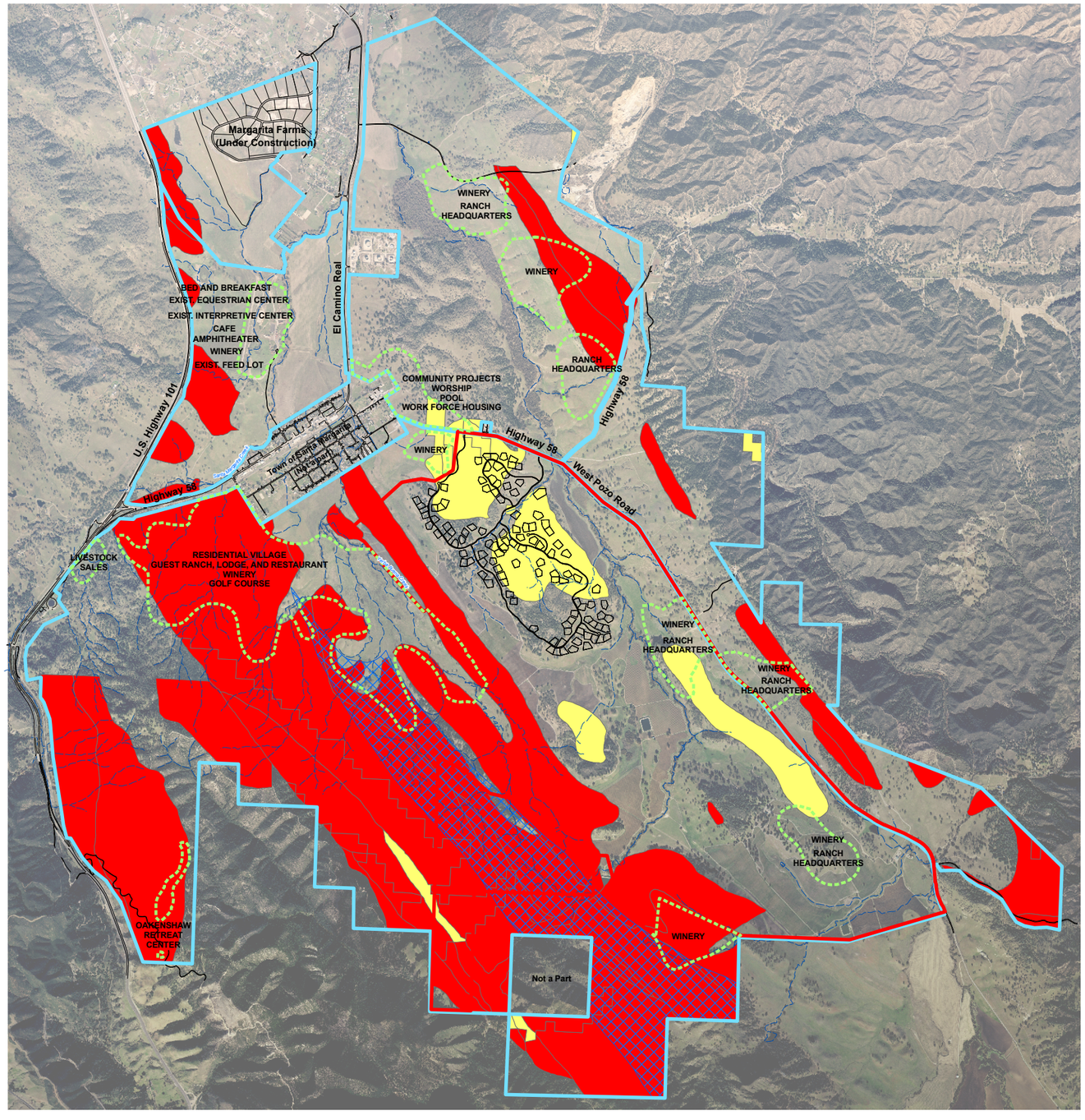

Note: No NRCS soil data is available for Oakenshaw Retreat Center or southernmost winery locations. Soil types obtained from 2006 site reconnaissance.

- TENTATIVE TRACT 2586 BOUNDARY
- PROPOSED LOT LINES FOR TENTATIVE TRACT 2586 RESIDENTIAL CLUSTER SUBDIVISION
- RANCH PROPERTY BOUNDARY
- FUTURE DEVELOPMENT PROGRAM LAND USE LOCATIONS
- HIGH LANDSLIDE POTENTIAL
- MODERATE LANDSLIDE POTENTIAL
- GEOLOGIC STUDY AREA COMBINING DESIGNATION

N

0 2,500 5,000 10,000 Feet

Landslide Potential

Source: SSURGO, 2004, EDA Design Professionals, June 2006, and Orrin Sage, Site Reconnaissance, 2006.

Figure 4.6-5

According to the San Luis Obispo County Safety Element, the majority of the Santa Margarita Ranch property maintains a low potential for liquefaction. However, portions of the Agricultural Residential Cluster Subdivision and Future Development Program sites are underlain by sediments with a moderate to high liquefaction potential (refer to Figure 4.6-6). Due to the presence of unconsolidated alluvial material and shallow groundwater, liquefaction is a geologic hazard throughout the Ranch property.

Geologic Study Area. Portions of the Ranch property are designated as a Geologic Study Area (GSA) under the Salinas River Area Plan. The Geologic Study Area (GSA) combining designation is applied to areas where geologic and soil conditions could present new developments and their users with potential hazards to life and property (San Luis Obispo County Code, Section 22.14.070). The designation applies to a northwesterly trending band that extends from the southern boundary of the Future Development Program to approximately ½ mile south of the community of Santa Margarita (refer to Figure 4.6-5). The designation does not apply to any portion of the Agricultural Residential Cluster Subdivision site. Development located within the GSA combining designation would require compliance with Section 22.14.070 of the San Luis Obispo County Code (Geologic Study Area Standards), including the preparation of a Geology and Soils Report and recommended building techniques, site preparation measures, or setbacks necessary to reduce risks to life and property from seismic damage, landslide, groundwater and liquefaction to insignificant levels.

4.6.2 Impact Analysis

a. Methodology and Significance Thresholds. In accordance with Appendix G of the State CEQA Guidelines, impacts would be significant if development under the Agricultural Residential Cluster Subdivision or the Future Development Program would result in any of the following:

- *Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, including liquefaction, or landslides;*
- *Result in substantial soil erosion or the loss of topsoil;*
- *Be located on a geologic unit or soil that is unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;*
- *Be located on expansive soil, as defined in Table 1-B of the Uniform Building Code, creating substantial risks to life or property; or*
- *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.*

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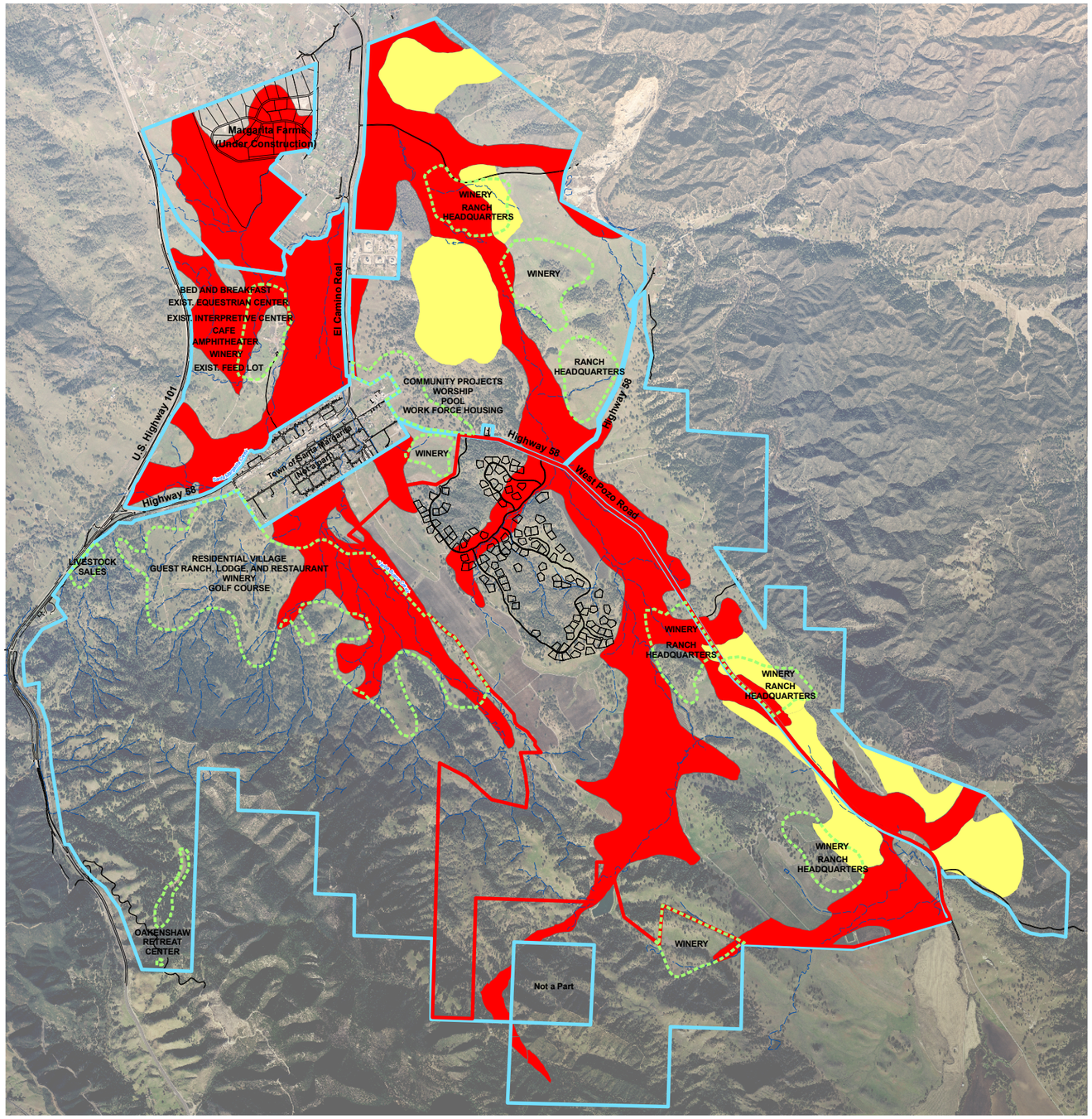

Liquefaction Potential

Source: SSURGO, 2004, and EDA Design Professionals, June 2006.

Figure 4.6-6

b. Agricultural Residential Cluster Subdivision Impacts and Mitigation Measures.

Agricultural Residential Cluster Subdivision Impact G-1	**Due to the presence of active and potentially active faults in the vicinity of the proposed Agricultural Residential Cluster Subdivision, the site and surrounding area is subject to strong ground shaking. Ground shaking has the potential to cause fill material to settle, destabilize slopes, and cause physical damage to structures, property, utilities and road access. This is a Class II, *significant but mitigable* impact.**

The proposed Agricultural Residential Cluster Subdivision is located directly between the Rinconada and Nacimiento Fault Zones, and approximately 29 miles from the San Andreas Fault. The Los Osos Fault is located within 10 miles of the Agricultural Residential Cluster Subdivision site.

The Rinconada Fault is located approximately 2,100 feet east of the proposed residential development, and the southern reaches of the Nacimiento Fault pass approximately 3,100 feet west of the nearest proposed home site (refer to Figure 4.6-4). Both faults are considered active for the purposes of this analysis. Although both of these faults are located near the Santa Margarita Ranch, surface rupture hazard on the Agricultural Residential Cluster Subdivision site (defined as the physical displacement of surface deposits in response to an earthquake's seismic waves) would be unlikely. It is estimated that the maximum surface displacement that may result from seismic activity on the Rinconada or Nacimiento Fault Zones would be 3 feet and 1 foot wide, respectively (San Luis Obispo County Seismic Safety Element, 1974). No development is proposed within this distance to the fault zones. However, due to the proximity of these and other fault zones, the proposed Agricultural Residential Cluster Subdivision development could experience strong ground motion from future local and regional earthquake events.

Besides the direct physical damage to structures caused by ground shaking, marginally stable landslides, slopes, and inadequately compacted fill material could move and cause additional damage. Gas, water, and electrical lines could be ruptured due to groundshaking, or broken during movement of earth caused by the earthquake, which could affect public safety. Impacts related to seismic ground shaking would be potentially significant.

Mitigation Measures. The philosophy in the Uniform Building Code is to prevent structural collapse and thereby mitigate safety issues. By definition, significant structural damage is acceptable in Code-conforming structures; although it has been found by experience that single-family, wood-frame structures properly built to the latest building codes generally perform well in response to strong ground shaking where ground failure is not involved. The following mitigation measure is required:

Agricultural Residential Cluster Subdivision G-1(a)	**UBC Compliance**. Above-ground structures shall be designed and built according to the latest UBC Seismic Zone 4 standards. **Plan Requirements and Timing.** Final project plans submitted to Planning and Building shall have a note printed on the plans which specify UBC Seismic Zone 4 standards for all above-

ground structures. Building plans submitted in an application for a Building Permit shall include documentation that these standards are met. Final project plans shall be submitted that include the required design specifications prior to approval of the Land Use Permit. Building plans that meet UBC Zone 4 standards shall be provided to the Building Division prior to issuance of Building Permits. **Monitoring.** Prior to issuance of grading permits, Planning and Building staff shall review project plans and verify that the UBC Seismic Zone 4 requirements are printed on the plans. Building Division staff shall verify that UBC standards are met prior to issuance of Building Permits. Building inspectors shall conduct site inspections to assure that construction occurs consistent with approved plans.

Residual Impacts. Through Code-conformance and proper engineering design and construction as monitored by Planning and Building, ground shaking hazards would be less than significant.

Agricultural Residential Cluster Subdivision Impact G-2

Soils on the Agricultural Residential Cluster Subdivision site have the potential to present soil-related hazards (expansive soils, erosive soils, settlement) to structures, utilities, and roadways on the Agricultural Residential Cluster Subdivision site. This is a Class II, *significant but mitigable* impact.

Expansive Soils. Expansive soils have a clay content and mineralogy that renders them susceptible to volume increase upon absorption of water and volume decrease upon drying. Repeated cycles of wetting and drying of expansive soils can cause severe distress to roadways, foundations, and concrete flatwork.

Of the 32 soils mapped on the Agricultural Residential Cluster Subdivision site, 10 have high shrink-swell potential: Arbuckle Positas Complex (9-15% and 30-50% slopes); Ayar and Diablo soils (9-15% and 15-30% slopes); Clear Lake clay; Cropely clay (2-9% slopes); Dibble clay loam (9-15% slopes); Millsholm-Dibble clay loams (30-50% slopes); Ryer clay loam (2-9% slopes); and Shimmon-Dibble association, steep (30-50% slopes). Proposed lots that may be located on these soils include: Lots 1 through 24, 26 through 28, 30 through 40, 43 through 57, 63 through 67, and 69 through 71 (refer to Figure 4.6-3). Structures and facilities constructed on these soils, as well as occupants of the proposed structures, could be exposed to hazards related to expansive soils. Impacts related to expansive soils would be potentially significant.

Erosive Soils. According to the NRCS soils mapping for the Agricultural Residential Cluster Subdivision site, the areas proposed for development are underlain by 16 soils which are characterized with high to very high erosion potential: Arbuckle-Positas complex (15-30% and 30-50% slopes); Arnold-San Andreas complex (30-75% slopes); Ayar and Diablo soils (15-30% slopes); Elder loam (2-9% slopes); Gazos shaly clay loam (9-30% and 30-50% slopes); Linne-Calodo complex (30-50% slopes); Lompico-McMullin complex (50-75% slopes); Millsholm-Dibble clay loams (30-50% slopes); San Andreas sandy loam (15-30% slopes); Santa Lucia-Lopez complex (15-30% slopes); Santa Lucia-Gazos complex (50-75% slopes); Shimmon loam (30-50% slopes); Shimmon-Dibble association, steep (30-50% slopes); and Xerofluvents-Riverwash

association. Proposed lots that may be located on these soils include: Lots 1, 9 through 17, 19 through 24, 26 through 28, 30 through 40, 46 and 47, 50 through 54, 64 through 71, 79, 87, 89 through 91, 94, 97 through 101, 104 through 106, 111, 112, and 115 (refer to Figure 4.6-3). Structures and facilities constructed on these soils, as well as occupants of the proposed structures, could be exposed to hazards related to erosion. Impacts related to erosion would be potentially significant.

Settlement. The San Luis Obispo County Safety Element states that seismic-related settlement may be a hazard for structures located on alluvium in low-lying areas. Younger alluvium occurs on low-lying areas near Yerba Buena, Santa Margarita and Trout Creeks. Lots located near these streams, including Lots 1, 21, 43, 44, 56 through 61, 63 through 66, 71 through 73, 81, 83, 87 and 88, may be subject to potential settlement hazards.

Mitigation Measures. The following mitigation measures are required:

Agricultural Residential Cluster Subdivision G-2(a)

Soils/Foundation Report. Upon implementation of the proposed Agricultural Residential Cluster Subdivision, individual property developers proposing development within the areas identified as having a high shrink-swell potential, high to very high erosion hazard and/or potential for settlement shall submit a soils/foundation report as part of the application for any proposed Building Permit(s). To reduce the potential for foundation cracking, one or more of the following shall be implemented and/or as recommended by a qualified engineer:

1. Use continuous deep footings (i.e., embedment depth of 3 feet or more) and concrete slabs on grade with increased steel reinforcement together with a pre-wetting and long-term moisture control program within the active zone.
2. Removal and recompaction of loose soils.
3. Removal of the highly expansive material and replacement with non-expansive compacted import fill material.
4. The use of specifically designed drilled pier and grade beam system incorporating a structural concrete slab on grade supported approximately 6 inches above the expansive soils.
5. Chemical treatment with hydrated lime to reduce the expansion characteristics of the soils.
6. Where necessary, construction on transitional lots shall include over excavation to expose firm sub-grade, use of post tension slabs in future structures, or other geologically acceptable method.

Plan Requirements and Timing. The required report shall be provided along with any future building plans and shall evaluate soil engineering properties and provide foundation design recommendations. Any future project applicant shall notify the Building Department prior to commencement of grading. The soils/foundation report shall be provided to the Planning and

Building Department for review and approval prior to issuance of Building Permits. **Monitoring.** Engineering staff shall review and approve the required report (and the foundation design) prior to issuance of a Building Permit. Building inspectors shall make site inspections to assure implementation of approved plans. Grading inspectors shall monitor technical aspects of any grading activities.

Agricultural Residential Cluster Subdivision G-2(b)

Grading and Erosion Control Plan. A grading and erosion control plan that minimizes erosion, sedimentation and unstable slopes shall be prepared and implemented by the applicant or representative thereof, prior to issuance of tract-wide Grading Permits. It must include the following:

a. Methods such as retention basins, drainage diversion structures, spot grading, silt fencing/coordinated sediment trapping, straw bales, and sand bags shall be used to minimize erosion on slopes and siltation into Yerba Buena, Santa Margarita and Trout Creeks (including the unnamed tributary to Trout Creek) during grading and construction activities.
b. Grading shall be prohibited within 100 feet of Trout Creek and within 50-feet of the unnamed tributary to Trout Creek, wetlands, and waters of the U.S. [refer to Agricultural Residential Cluster Subdivision measure B-4(a) (Wetland and Riparian Protection) in Section 4.3, *Biological Resources*].
c. Graded areas shall be revegetated within 4 weeks of grading activities with deep-rooted, native, drought-tolerant species to minimize slope failure and erosion potential. If determined necessary by Planning and Building, irrigation shall be provided. Geotextile binding fabrics shall be used if necessary to hold slope soils until vegetation is established.
d. Temporary storage of construction equipment and equipment washing areas shall be limited to a minimum of 100 feet from Trout Creek and 50-feet from the unnamed tributary to Trout Creek, wetlands, and waters of the U.S.
e. After construction of tract improvements, exposed areas shall be stabilized to prevent wind and water erosion, using methods approved by the Planning and Building Department Grading Division and the Air Pollution Control District (APCD). These methods may include the importation of topsoil to be spread on the ground surface in areas having soils that can be transported by the wind and/or the mixing of the highly erosive sand with finer-grained materials (silt or clay) in sufficient quantities to prevent its ability to be transported by wind. The topsoil or silt/clay mixture is to be used to stabilize the existing soil to

prevent its ability to be transported by wind. At a minimum, six inches of topsoil or silt/clay/sand mixture is to be used to stabilize the wind-erodable soils.

f. Landscaped areas adjacent to structures shall be graded so that drainage is away from structures.
g. Irrigation shall be controlled so that overwatering does not occur. An irrigation schedule shall be reviewed and approved by Planning and Building prior to issuance of grading permits.
h. Grading on slopes steeper than 5:1 shall be designed to minimize surface water runoff.
i. Fills placed on slopes steeper than 5:1 shall be properly benched prior to placement of fill.
j. Brow ditches and/or berms shall be constructed and maintained above all cut and fill slopes, respectively.
k. Cut and fill benches shall be constructed at regular intervals.
l. Retaining walls shall be installed to stabilize slopes where there is a 10-foot or greater difference in elevation between buildable lots.
m. The applicant shall limit excavation and grading to the dry season of the year (typically April 15 to November 1, allowing for variations in weather) unless a Planning and Building Department approved erosion control plan is in place and all measures therein are in effect.
n. The applicant shall post a bond with the County and hire a Planning and Building -qualified geologist or soils engineer prior to issuance of grading permits, and to ensure that erosion is controlled and mitigation measures are properly implemented.

Plan Requirements and Timing. The grading and erosion control plan shall be submitted for review and approval to Planning and Building prior to issuance of grading permits for tract improvements. This condition shall be noted on grading plans. The applicant shall notify Planning and Building prior to commencement of grading. Components of the grading and erosion control plan shall be implemented throughout all grading activities. Components of the grading and erosion plans shall be implemented prior to issuance of grading permits.
Monitoring. Building inspectors shall make site inspections to assure implementation of approved plans. Grading inspectors shall monitor technical aspects of the grading activities.

Residual Impacts. Properly designed and constructed foundations and implementation of a grading and erosion control plan would adequately mitigate the potential for structural problems caused by soil-related hazards, thereby reducing impacts to a less than significant level.

Agricultural Residential Cluster Subdivision Impact G-3

The Agricultural Residential Cluster Subdivision area contains several steep slopes and is subject to moderate landslide potential. Landsliding has the potential to damage and destroy structures, roadways and other improvements as well as to alter or block drainage channels, causing further damage and erosion. Soil slumping can damage or destroy structures and lead to erosion problems. These are Class II, *significant but mitigable* impacts.

The Agricultural Residential Cluster Subdivision area is hilly with the ridges trending north-south and reaching elevations of 1,276 feet with dissecting valleys draining out to Trout Creek at an elevation of about 1,020 feet. Steeper slopes are present near the center of the proposed Agricultural Residential Cluster Subdivision site. As discussed in Section 4.6.1(d) above, landslide risk is generally low throughout the Agricultural Residential Cluster Subdivision site. However, a moderate landslide hazard designation is identified for those areas near the center of the site where steeper slopes occur (Figure 4.6-5). Landsliding has the potential to damage and destroy structures, roadways and other improvements as well as to deflect and block drainage channels, causing further damage and erosion. Proposed lots that may be located in moderate landslide hazard areas include: Lots 1, 5 through 19, 36 through 38, 40, 43 through 70, 74 through 78, and 87 (refer to Figure 4.6-5). These impacts would be potentially significant.

Debris flows typically form in response to local intense rainfall in steep swale areas that are filled with saturated, fine-grained soils. Portions of the Agricultural Residential Cluster Subdivision site, because of relatively steep topography, have a moderate debris flow potential. These impacts would be potentially significant.

Overall, impacts related to slope stability would be potentially significant.

Mitigation Measures. Mitigation Measure D-2(c) in Section 4.5, *Drainage, Erosion, and Sedimentation,* which prohibits grading on slopes greater than 30%, would reduce impacts related to slope stability. The following mitigation measure is required:

Agricultural Residential Cluster Subdivision G-3(a)

Agricultural Residential Cluster Subdivision Lot Geotechnical Investigations and Practices. Each Agricultural Residential Cluster Subdivision lot shall be inspected to ensure a low risk of landslides or soil slumping. Geotechnical engineering measures, such as shoring soils of any landslide areas shall be required to ensure that the slope will not be destabilized during the grading activity. Remedial measures during grading may include the removal of the slump or debris slide from the top to the toe of slope.

In accordance with the applicable building codes, Agricultural Residential Cluster Subdivision lot investigations shall be performed prior to construction in areas determined to have a moderate or higher landslide hazard (as seen in Figure 4.6-5). Investigations and practices shall include the following:

a) Prior to issuance of any building permits, a qualified geotechnical engineer and/or engineering geologist shall prepare thorough Agricultural Residential Cluster Subdivision lot geologic/geotechnical studies, and a slope stability analysis which shall incorporate lot-specific recommendations. The slope stability analysis shall at a minimum meet the requirements of CDMG 1997 (Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117). In addition, the stability analysis shall meet the requirements of the County Planning and Building Department.

b) During grading, engineering geologists and geotechnical engineers shall confirm preliminary findings reported in the preliminary studies.

c) All applicable recommendations of final geologic and geotechnical investigations prepared for the Agricultural Residential Cluster Subdivision shall be implemented. These recommendations may include: avoidance of or setbacks from historic landslide deposits or areas susceptible to a potential for landslides; the restriction of grading in areas with landslide hazards; drainage improvements to ensure potential landslide areas do not become saturated; excavating standard keyways and benches in a stair-step configuration; water addition or drying-out as needed to bring soils to an acceptable moisture content; limitations on cut and fill slope gradients; and/or removal and backfilling or potential landslide areas.

Plan Requirements and Timing. Preliminary geologic and geotechnical reports shall be submitted for review and approval by Planning and Building prior to approval of building permits. During construction, a County geologist shall review and field-verify preliminary geologic and geotechnical reports. Final geologic and geotechnical reports shall be submitted for review and approval by Planning and Building prior to issuance of grading permits. Grading and building plans shall be submitted for review and approval by Planning and Building prior to issuance of grading and building permits. **Monitoring.** Building inspectors shall site inspect during grading and prior to occupancy clearance to ensure compliance with approved plans.

Residual Impacts. Implementation of the above mitigation measure would reduce impacts from potential landsliding and debris flows to less than significant levels.

Agricultural Residential Cluster Subdivision Impact G-4

Seismic activity could produce sufficient ground shaking which may result in liquefaction of soils near on-site streams. Agricultural Residential Cluster Subdivision lots located in these areas could be subject to high liquefaction hazards. This is a Class II, *significant but mitigable*, impact.

According to the San Luis Obispo County Safety Element, the potential for liquefaction in most of the proposed Agricultural Residential Cluster Subdivision site is low due to the presence of near-surface bedrock material. However, the soil and groundwater characteristics near on-site streams could create a liquefaction hazard that could damage structures. Yerba Buena Creek flanks the area proposed for residential development to the west, while Trout Creek flanks the Agricultural Residential Cluster Subdivision property to east. An unnamed tributary to Trout Creek flows east-west through the center of the Agricultural Residential Cluster Subdivision, between proposed Phase I and Phase II development. Proposed lots that may be located near these streams and therefore be subject to high liquefaction potential include: Lots 2 through 7, 19 through 21, 23 through 25, 35, 43, 44, 66, 71, 72 and 82 through 84 (refer to Figure 4.6-6). Impacts are significant but mitigable (Class II).

Mitigation Measures. The following mitigation measure is required:

Agricultural Residential Cluster Subdivision G-4(a)

Reduction of Liquefaction Potential. Appropriate techniques to minimize liquefaction potential shall be prescribed by an engineering geologist and implemented by the applicant prior to issuance of Building Permits. Suitable measures to reduce liquefaction impacts shall include one or more of the following as recommended by a qualified engineer: specialized design of foundations by a structural engineer, removal or treatment of liquefiable soils to reduce the potential for liquefaction, drainage to lower the groundwater table to below the level of liquefiable soils, in-situ densification of soils, or other alterations to the ground characteristics. All on-site structures shall comply with applicable methods of the Uniform Building Code [refer to Agricultural Residential Cluster Subdivision measure G-1(a) (UBC Compliance).

Plan Requirements and Timing. The applicant shall notify Planning and Building of specific methods to reduce liquefaction potential, as recommended by a qualified engineering geologist, prior to commencement of grading. Measures to reduce liquefaction shall be implemented prior to issuance of Building Permits. **Monitoring.** Planning and Building staff shall review and approve the required report prior to issuance of the Building Permit. Building inspectors shall make site inspections to assure implementation of approved plans. Grading inspectors shall monitor technical aspects of the grading activities.

Residual Impacts. Implementation of the above mitigation measure would reduce impacts from potential liquefaction to a less than significant level.

Agricultural Residential Cluster Subdivision Impact G-5 **The surface materials in the central portion of the Agricultural Residential Cluster Subdivision site allow for percolation of groundwater and may result in seepage into building foundations. This is a Class II, *significant but mitigable*, impact.**

Of the 32 soils mapped on the Agricultural Residential Cluster Subdivision site, seven have moderately rapid to rapid permeability: Arnold-San Andreas complex (30-75% slopes), Hanford and Greenfield fine sandy loams (2-9% slopes), Hanford and Greenfield gravelly sandy loams (0-2% slopes and 2-9% slopes), Oceano loamy sand (2-9% slopes), San Andreas sandy loam (15-30% slopes), and San Andreas-Arujo sandy loams (9-15% slopes). Highly permeable soils allow percolation of surface water to the surface material-bedrock contact, which can accumulate and flow along the contact until it surfaces in locations where the surface material is either very shallow or nonexistent. This has the potential to cause seepage into foundations, which can cause damage to structures. Ponding water and surficial water flow can cause erosion on the Agricultural Residential Cluster Subdivision site. In addition, as mentioned under Agricultural Residential Cluster Subdivision Impact G-3, percolation of leach fields can reduce the compaction in the soil which could increase the potential for a landslide. Development on Lots 17, 24 through 26, 29, 30, 40, 58, 68, 72 through 84, 88, 91 through 97, and 101 through 115 would be located on these permeable soils. Impacts related to groundwater percolation would be potentially significant.

Mitigation Measures. The following mitigation measure is required:

Agricultural Residential Cluster Subdivision G-5(a) **Subdrains.** An engineering geologist or a soils engineer shall observe construction activities to review the potential for subsurface water on Lots 17, 24 through 26, 29, 30, 40, 58, 68, 72 through 84, 88, 91 through 97, and 101 through 115. As determined necessary by a qualified engineer, subdrains shall be installed within foundations, soft soils, or roadways, to alleviate ponding of water.

Plan Requirements and Timing. An engineering geologist or soils engineer shall review subsurface water during construction and report to Planning and Building. Subdrains shall be installed as necessary prior to occupancy clearance. **Monitoring.** During and following construction, Planning and Building staff shall review installation of subdrains and surface water on proposed lots.

Residual Impacts. Implementation of the above mitigation measure would reduce impacts from subsurface water to a less than significant level.

c. Future Development Program Impacts and Mitigation Measures. The Future Development Program represents potential future buildout of the Santa Margarita Ranch, including the proposed Agricultural Residential Cluster Subdivision. Refer to Section 4.6.2(b)

for a discussion of geologic stability impacts resulting from the Agricultural Residential Cluster Subdivision independently.

Future Development Program Impact G-1	**Due to the presence of active faults in the vicinity of the property and the active Rinconada and Nacimiento Faults located on the Ranch property, the Future Development Program is subject to strong ground shaking and fault rupture hazards. This is a Class II, *significant but mitigable* impact.**

The Rinconada Fault is located approximately 2,100 feet east of the proposed Agricultural Residential Cluster Subdivision development, running along the eastern edge of the Ranch property. Land uses envisioned for this area include four wineries and four Ranch headquarters (refer to Figure 4.6-4). Associated structures, utilities, and roadways could potentially be located directly atop the Rinconada Fault trace. Each winery may include an on-site tasting room, gift shop, and Bed & Breakfast. Each Ranch headquarter could include a two-story, 5,000 square foot residence on a 2.5-acre lot. A total of 60 farm support residential units would be split between the five headquarter sites. The Rinconada Fault is considered active for the purpose of this analysis and is capable of generating a maximum credible earthquake (MCE) of approximately 7.5. Impacts related to surface rupture from the Rinconada Fault Zone would be potentially significant.

The Nacimiento Fault Zone is located approximately 3,100 feet west of the Agricultural Residential Cluster Subdivision development, bisecting the community of Santa Margarita in the west-central portion of the Ranch property. Land uses envisioned for location near the Nacimiento Fault trace include: a 12-room Bed and Breakfast, 6,000 square foot café, 600 seat amphitheater and 40,000 square foot winery near the existing Ranch headquarters location; and a residential village, 250-unit guest ranch and lodge with a 24,000 square foot restaurant, 40,000 square foot winery, and 36-hole golf course on 280 acres, including a 25,000 square foot clubhouse and shop southwest of the community of Santa Margarita (refer to Figure 4.6-4). Because no application has been filed for the Future Development Program subsequent to the Agricultural Residential Cluster Subdivision, any of these uses could be located directly atop or immediately adjacent to the Nacimiento Fault trace, which is considered active for the purpose of this analysis. Impacts related to surface rupture from the Nacimiento Fault Zone would be potentially significant.

In addition to the potential for surface rupture, Future Development Program land uses could experience strong ground motion from future local and regional earthquake events due to the proximity of the on- and off-site fault zones [refer to Section 4.6.1(d)]. Besides the direct physical damage to structures caused by ground shaking, marginally stable landslides, slopes, and inadequately compacted fill material could move and cause additional damage. Gas, water, and electrical lines could be ruptured due to groundshaking, or broken during movement of earth caused by the earthquake, which could affect public safety. Impacts related to seismic groundshaking would be potentially significant.

Mitigation Measures. Agricultural Residential Cluster Subdivision measure G-1(a) (UBC Compliance) would apply to all above-ground structures. The following additional mitigation measures are also required to reduce surface rupture hazards:

Future Development Program G-1(a)

Fault Location Investigations. Prior to site plan approval for any land use located near a mapped fault trace, a subsurface geologic or geotechnical investigation shall be conducted by a qualified engineer in the area proposed for development. As part of the investigation, a special fault investigation shall be initiated in accordance with the State Alquist-Priolo Special Studies Zone Guidelines, to determine and/or confirm exact locations of the Rinconada or Nacimiento Faults.

Plan Requirements and Timing. The special fault investigation shall be performed prior to site plan approval. **Monitoring.** Planning and Building shall review the special fault investigation prior to site plan approval.

Future Development Program G-1(b)

Building Envelope Setbacks. Based on the results of the special fault investigation, all habitable structures and utilities shall be located at least 50 feet from the Rinconada or Nacimiento Fault trace.

Plan Requirements and Timing. The setbacks shall be included within the building plans for future habitable structures. Planning and Building shall review these plans prior to approval. **Monitoring.** Planning and Building shall be responsible for ensuring that all structures meet the setback requirement.

Residual Impacts. Through Code-conformance, implementation of setbacks, and proper engineering design and construction, ground shaking and surface rupture hazards would be less than significant.

Future Development Program Impact G-2

Soils within the Ranch property have the potential to present soil-related hazards (expansive soils, erosive soils, settlement) to Future Development Program structures, utilities, and roadways. This is a Class II, *significant but mitigable* impact.

Expansive Soils. As shown in Figure 4.6-3, portions of the Ranch property are underlain with soils with a high shrink-swell potential. Of the soils mapped in areas envisioned for development, 11 have high shrink-swell potential. In addition to those discussed under Agricultural Residential Cluster Subdivision Impact G-2, these include: Arbuckle-San Ysidro complex (2 – 9% slopes); Millsholm-Dibble Clay loams (15-30% slopes); Nacimiento-Ayar complex (9-30% slopes); and Rincon clay loam (2-9% slopes). Future Development Program land uses that may be located on these soils include: a 12-room Bed and Breakfast, 6,000 square foot café, 600 seat amphitheater and 40,000 square foot winery near the existing Ranch headquarters location; a residential village, 250-unit guest ranch and lodge with a 24,000 square foot restaurant, 40,000 square foot winery, and 36-hole golf course on 280 acres, including a 25,000 square foot clubhouse and shop, southwest of the community of Santa Margarita; six wineries and five ranch headquarters located along the eastern portion of the Ranch property; and a livestock sales yard (refer to Figure 4.6-3). Each winery could include a 40,000 square foot structure and an additional 6,000 square foot retail component. The winery located west of

West Pozo Road, south of the proposed Agricultural Residential Cluster Subdivision lots, could include an 80,000 square foot structure. Each ranch headquarter could include a two-story, 5,000 square foot residence on a 2.5-acre lot. A total of 60 farm support residential units would be split between all five headquarter sites. Structures and facilities constructed in these locations, as well as occupants and patrons of the structures, could be exposed to hazards related to expansive soils. Impacts related to expansive soils would be potentially significant.

Erosive Soils. As shown in Figure 4.6-3, portions of the Ranch property are underlain with soils with a high to very high erosion hazard. Of the soils mapped in areas envisioned for development, 15 have high or very high erosion hazard. In addition to those discussed under Agricultural Residential Cluster Subdivision Impact G-2, these include: Linne-Calodo complex (9-30% slopes); Millsholm-Dibble clay loams (15-30% slopes); and Nacimiento-Ayar complex (9-30% slopes). Future Development Program land uses that may be located on these soils include: a 12-room Bed and Breakfast, 6,000 square foot café, 600 seat amphitheater and 40,000 square foot winery near the existing Ranch headquarters location; a residential village, 250-unit guest ranch and lodge with a 24,000 square foot restaurant, 40,000 square foot winery, and 36-hole golf course on 280 acres, including a 25,000 square foot clubhouse and shop, southwest of the community of Santa Margarita; six wineries and five ranch headquarters located along the eastern portion of the Ranch property; a livestock sales yard; and a retreat center (refer to Figure 4.6-3). Each winery could include a 40,000 square foot structure and an additional 6,000 square foot retail component. The winery located west of West Pozo Road, south of the proposed Agricultural Residential Cluster Subdivision lots, could include an 80,000 square foot structure. Each Ranch headquarter could include a two-story, 5,000 square foot residence on a 2.5-acre lot. A total of 60 farm support residential units would be split between all five headquarter sites. Structures and facilities constructed on these soils, as well as occupants of the proposed facilities, could be exposed to hazards related to erosion. Impacts related to erosion would be potentially significant.

Settlement. The San Luis Obispo County Safety Element states that seismic-related settlement may be a hazard for structures located on alluvium in low-lying areas. Younger alluvium occurs on low-lying areas near Yerba Buena, Santa Margarita and Trout Creeks. Future Development Program land uses that may be located in these areas include: a 12-room Bed and Breakfast, 6,000 square foot café, 600 seat amphitheater and 40,000 square foot winery near the existing Ranch headquarters location; a residential village, 250-unit guest ranch and lodge with a 24,000 square foot restaurant, 40,000 square foot winery, and 36-hole golf course on 280 acres, including a 25,000 square foot clubhouse and shop, southwest of the community of Santa Margarita; two Ranch headquarters and two wineries located in the northeastern corner of the Future Development Program property; and one winery/ranch headquarter located west of West Pozo Road, south of the proposed Agricultural Residential Cluster Subdivision lots. Impacts related to settlement would be potentially significant.

Mitigation Measures. The following mitigation measure is required:

Future Development Program G-2(a) **Avoidance of Soil Hazards**. Preferred locations for Future Development Program components shall be in areas of low to moderate soil-related hazards. This may require restricted building envelopes for all Future Development Program land uses except the winery located adjacent to the southeast edge of

the community of Santa Margarita and the park and community pool, worship centers, and work force housing envisioned east of the community of Santa Margarita. If future development is proposed in areas containing expansive soils, a high or very high erosion hazard, and/or potential for settlement, Agricultural Residential Cluster Subdivision measures G-2(a) (Soils/Foundation Report) and G-2(b) (Grading and Erosion Control Plan) shall apply.

Plan Requirements and Timing. Soil hazards shall be included on building plans for future habitable structures and utilities. Planning and Building shall review these plans prior to approval. **Monitoring.** Planning and Building shall be responsible for ensuring that all structures are outside high soil hazard areas or are otherwise mitigated. If structures are proposed for location in areas containing expansive soils and/or a high erosion hazard, Planning and Building shall ensure that Agricultural Residential Cluster Subdivision measures G-2(a) (Soils/Foundation Report) and G-2(b) (Grading and Erosion Control Plan) are applied.

Residual Impacts. Avoidance of soil-related hazards would ensure less than significant impacts. Should avoidance be infeasible, properly designed and constructed foundations and implementation of a grading and erosion control plan would adequately mitigate the potential for structural problems caused by soil-related hazards, thereby reducing impacts to a less than significant level.

Future Development Program Impact G-3

The Ranch property contains many steep slopes and is subject to moderate to high landslide potential. Landsliding has the potential to damage and destroy structures, roadways and other improvements, as well as to alter or block drainage channels, causing further damage and erosion. Soil slumping can damage or destroy structures and lead to erosion problems. This is a Class II, *significant but mitigable* impact.

Slopes vary throughout the Santa Margarita Ranch. The mountainous area on the west side of the property contains the Santa Lucia Mountain ridge with slopes of 50 percent and greater while the foothills exhibit slopes of 25 percent to 50 percent. The predominant interior valleys of the property have slopes of 1 to 9 percent while the Santa Margarita Creek lowlands typically contain slopes less than 5 percent. Debris flow is a concern where alluvial or thick colluvial units are on slopes greater than 10 percent. These flows often begin at the heads of gullies where greater thicknesses are present on steeper slopes, and local perched groundwater may collect.

Due to gentler slopes that occur north of SR 58/El Camino Real, landslide potential is generally low throughout the northern reaches of the Santa Margarita Ranch. However, as shown in Figure 4.6-5, portions of the Ranch property experience a moderate to high landslide potential. West of the Agricultural Residential Cluster Subdivision, southwest of the community of Santa Margarita, landslide hazard is generally high. In addition, some moderate to high landslide

potential occurs throughout the eastern and southern reaches of the Ranch property. Future Development Program land uses that may be located in areas of moderate landslide potential include: three wineries and two ranch headquarters located along the eastern portion of the Ranch property near West Pozo Road; and a 5-acre park and community pool, three 20,000 square foot worship centers, and 50 units of work force housing east of the community of Santa Margarita (refer to Figure 4.6-5). Future Development Program land uses that may be located in areas of high landslide potential include: a residential village, 250-unit guest ranch and lodge with a 24,000 square foot restaurant, 40,000 square foot winery, and 36-hole golf course on 280 acres, including a 25,000 square foot clubhouse and shop, southwest of the community of Santa Margarita; four wineries and three ranch headquarters located along the eastern and southern portions of the Ranch property; and a retreat center. Each winery could include a 40,000 square foot structure and an additional 6,000 square foot retail component. The winery located west of West Pozo Road, south of the proposed Agricultural Residential Cluster Subdivision lots, could include an 80,000 square foot structure. Each Ranch headquarter could include a two-story, 5,000 square foot residence on a 2.5-acre lot. A total of 60 farm support residential units would be split between all five headquarter sites. Due to the presence of unstable formations and relatively steep topography in portions of the property, landslides are a potential hazard.

Debris flows typically form in response to local intense rainfall in steep swale areas that are filled with saturated, fine-grained soils. Portions of the southern half of the Ranch, because of relatively steep topography, have a moderate debris flow potential. These impacts would be potentially significant.

Overall, impacts related to landslides and debris flows would be potentially significant.

Mitigation Measure. The following mitigation is required:

Future Development Program G-3(a)

Avoidance of Landslide Hazards. Preferred locations for Future Development Program land uses shall be in areas of low landslide potential. If development is proposed in areas with moderate or high landslide potential, Agricultural Residential Cluster Subdivision measure G-3(a) (Agricultural Residential Cluster Subdivision Lot Geotechnical Investigations and Practices) shall apply.

Plan Requirements and Timing. Landsliding hazard areas shall be included on building plans for future habitable structures and utilities. Planning and Building shall review these plans prior to approval. **Monitoring.** Planning and Building shall be responsible for ensuring that all structures are located outside landslide hazard areas or are otherwise mitigated. If structures are proposed for location in areas containing moderate to high landslide potential, Planning and Building shall ensure that Agricultural Residential Cluster Subdivision measure G-3(a) (Agricultural Residential Cluster Subdivision Lot Geotechnical Investigations and Practices) is applied.

Residual Impacts. With implementation of the above measure, impacts from potential slope stability hazards would be less than significant.

Future Development Program Impact G-4 — **Seismic activity could produce sufficient ground shaking which may result in liquefaction of soils near streams on the Ranch property. Future development located in these areas could be subject to high liquefaction hazards. This is a Class II, *significant but mitigable*, impact.**

According to the San Luis Obispo County Safety Element, the potential for liquefaction on most of the Ranch property is low due to the presence of near-surface bedrock material. However, the soil and groundwater characteristics near streams throughout the Ranch property could create a liquefaction hazard that could damage structures. Streams located on the Ranch property include: Trout Creek (northeastern portion of the Ranch property); an unnamed tributary to Trout Creek (between Phase 1 and Phase 2 of the Agricultural Residential Cluster Subdivision); Yerba Buena Creek (near the center of the Ranch property, west of the Agricultural Residential Cluster Subdivision); and Rinconada Creek (southeastern portion of the Ranch property).

As shown in Figure 4.6-6, portions of the Ranch property experience a moderate to high liquefaction potential. Future Development Program land uses that may be located in areas of moderate to high liquefaction potential include: a 12-room Bed and Breakfast, 6,000 square foot café, 600 seat amphitheater and 40,000 square foot winery near the existing Ranch headquarters location; a residential village, 250-unit guest ranch and lodge with a 24,000 square foot restaurant, 40,000 square foot winery, and 36-hole golf course on 280 acres, including a 25,000 square foot clubhouse and shop, southwest of the community of Santa Margarita; and six wineries and four ranch headquarters located throughout the Ranch property. Each winery could include a 40,000 square foot structure and an additional 6,000 square foot retail component. The winery located west of West Pozo Road, south of the proposed Agricultural Residential Cluster Subdivision lots, could include an 80,000 square foot structure. Each Ranch headquarter could include a two-story, 5,000 square foot residence on a 2.5-acre lot. A total of 60 farm support residential units would be split between all five headquarter sites. In addition, the extreme western edge of the area envisioned for development of a 5-acre park and community pool, three worship centers, and work force housing east of the community of Santa Margarita; and the extreme western edge of the winery envisioned north of the Agricultural Residential Cluster Subdivision contain high liquefaction potential.

Due to the presence of unconsolidated alluvial material and shallow groundwater, liquefaction is a potentially significant hazard.

Mitigation Measures. The following mitigation measure is required:

Future Development Program G-4(a) — **Avoidance of Liquefaction Hazards**. Preferred locations for Future Development Program land uses shall be in areas of low liquefaction potential. Should development be proposed within this area, Agricultural Residential Cluster Subdivision measure G-4(a) (Reduction of Liquefaction Potential) shall apply.

Plan Requirements and Timing. Liquefaction potential shall be included on building plans for future habitable structures and utilities. Planning and Building shall review these plans prior to approval. **Monitoring.** Planning and Building shall be responsible for ensuring that all structures are located outside liquefaction hazard areas or are otherwise mitigated. If structures are proposed for location in areas containing moderate to high liquefaction potential, Planning and Building shall ensure

that Agricultural Residential Cluster Subdivision measure G-5(a) (Reduction of Liquefaction Potential) is applied.

Residual Impacts. With implementation of the above measure, impacts from potential liquefaction would be less than significant.

Future Development Program Impact G-5 **Future Development Program land uses could be located on surface materials which allow for percolation of groundwater, resulting in seepage into building foundations. This is a Class II, *significant but mitigable*, impact.**

As discussed under Agricultural Residential Cluster Subdivision Impact G-5, highly permeable surface deposits which allow percolation of surface water to the surface material-bedrock contact may cause seepage into foundations. Should any of the Future Development Program land uses be located on highly permeable surface deposits, the damage caused to structures would be potentially significant.

Mitigation Measures. Agricultural Residential Cluster Subdivision measure G-5(a) (Subdrains) would apply to all future land uses. No additional mitigation is required.

Residual Impacts. With implementation of the required measure, impacts related to subsurface water would be less than significant.

d. Cumulative Impacts. The evaluation of the Future Development Program, which includes the Agricultural Residential Cluster Subdivision, in this EIR accounts for all of the expected growth in the Santa Margarita area, as it represents buildout of the major landholding that surrounds the existing community, consistent with the Salinas River Area Plan. Therefore, cumulative geologic impacts from buildout of the Agricultural Residential Cluster Subdivision in combination with buildout of the Future Development Program were addressed in the Future Development Program impact analysis above. As future applications for individual Future Development Program projects are submitted at a project level of detail, the precise evaluation of future project cumulative impacts would be coordinated through the required Specific Plan and associated environmental review, or through individual project-level environmental review, as applicable.