3.7
GEOLOGY AND SOILS

This section of the Draft EIR provides a discussion of the project site's geologic, seismic, and soil conditions. The project's potential impacts related to existing geologic, seismic and soil conditions are evaluated and feasible mitigation measures are proposed where applicable.

The following analysis is based on the Combined Geotechnical Fault Investigation prepared by Terratech, Inc. (November 1989) (Refer to Appendix C), and an updated Geotechnical Investigation prepared by Terrasearch, Inc. (January 2008) (Refer to Appendix D). These investigations included: research and review of relevant geologic literature, including studies previously conducted, stereoscopic aerial photographs, geologic maps, Alquist-Priolo maps, seismic hazard maps, and a probabilistic earthquake study; performance of geologic field reconnaissance, including sampling and soil borings at the site, laboratory testing of selected soil samples, and analysis of the collected data.

3.7.1 ENVIRONMENTAL SETTING

Regional Geologic Setting

The project site is located in the California Coast Range Geomorphic Province near the City of Hollister. The primary local geologic feature is the Hollister Valley, which is bounded on the southwest by the San Andreas fault zone and the Gabilan Mountain Range, which is composed of granitic and Tertiary marine, as well as volcanic rocks. To the north and east, the valley is bounded by the Diablo Mountain Range, which is composed of metamorphosed marine sedimentary and igneous rocks of the Franciscan Formation and Great Valley Sequence.

Regional Fault Setting

Regionally, the Hollister area is considered an area of high seismicity with earthquakes strong enough to cause damage. The active San Andreas fault lies approximately 8 miles southwest of the project site. The Calaveras fault, a branch of the San Andreas fault, bisects the City of Hollister and lies about 1.25 miles southwest of the project site.

The California Geological Survey divides the Calaveras fault into northern and southern sections, with an estimated earthquake recurrence interval for the southern section at 33 years and an estimated recurrence interval for the northern section at 146 years. Current data estimates that there is a 62 percent probability of a large magnitude (6.7 or greater) earthquake in the San Francisco Bay Area as a whole in the 30-year period ending in 2032. For a large earthquake along specific faults, percentage estimates are 21 percent for the San Andreas Fault and 11 percent for the Calaveras fault (PMC 2008).

Intensity Criteria for Earthquakes

Earthquake magnitude is a measure of the total amount of energy released in an earthquake. With increasing magnitude (i.e., larger earthquakes), ground motions are stronger, last longer, and are felt over larger areas. Earthquake intensity is a measure of the effects of earthquake ground motions on people and buildings. Earthquake intensity is often more useful than magnitude when discussing the damaging effects of earthquakes. The most common intensity scale is the Modified Mercalli Intensity Scale, which ranges from I to XII. Table 17, Modified Mercalli Intensity Scale for Earthquakes, describes the effects of earthquakes and compares the Richter Scale (magnitude) to the Modified Mercalli Scale (intensity).

Classification of Faults

In addition to the Modified Mercalli Scale that classifies the intensity of the event, faults are classified according to criteria provided by the Uniform Building Code, as identified in Table 18, Uniform Building Code Fault Classifications.

Project Site Setting

The project site is situated in an alluvial valley underlain by the marine sediments of the Pliocene Purisma Formation, primarily recent alluvium and uplifted, older alluvial deposits (i.e., Plio-Pleistocene river terraces). The surficial materials consist of young and old alluvium and terrace deposits, which are unconsolidated layers of sand, gravel, silt and clay.

Table 17 Modified Mercalli Intensity Scale for Earthquakes

Richter Magnitude Scale	Modified Mercalli Scale	Effects of Intensity
0.1-3.0	I	Earthquake shaking not felt.
0.1-3.0	II	Shaking felt by those at rest.
3.0-4.0	III	Felt by most people indoors; some can estimate duration of shaking.
4.0-5.0	IV	Felt by most people indoors. Hanging objects rattle, wooden walls, frames creak.
4.0-5.0	V	Felt by everyone indoors; many estimate duration of shaking. Standing autos rock. Crockery clashes, dishes and glasses rattle. Doors open, close and swing.
5.0-6.0	VI	Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
6.0	VII	People frightened and walls unsteady. Pictures and books thrown, dishes/glass is broken. Weak chimneys break. Plaster, loose bricks and parapets fall.
6.0-7.0	VIII	Difficult to stand, waves on ponds, cohesionless soils slump. Stucco and masonry walls fall. Chimneys, stacks, towers, elevated tanks twist and fall.
7.0	IX	General fright as people are thrown down. Hard to drive, trees broken, damage to foundations and frames. Reservoirs damaged, underground pipelines break.
7.0-8.0	X	General panic, ground cracks, masonry and frame buildings destroyed. Bridges destroyed, dams, dikes and embankments damaged. Railroads bent.
8.0	XI	Large landslides, water thrown, general destruction of buildings; pipelines destroyed; railroads bent.
8.0+	XII	Total nearby damage, rock masses displaced. Lines of sight/level distorted. Objects thrown into air.

***Source*:** California Geologic Survey, 2002

Table 18 Uniform Building Code Fault Classifications

Fault Type	Characteristics
A	Faults that have a Richter magnitude potential of 7.0 and a slip rate equal to or greater than 5 millimeters/year. These types of faults are considered to be active and capable of producing large magnitude events. Most segments of the San Andreas Fault are classified as a Type A fault.
B	All faults that are not Type A or Type C. Includes most of the active faults in California.
C	Faults that have a Richter magnitude potential of less than 6.5 and a slip rate of less than or equal to 2 millimeters/year. These faults are considered to be sufficiently inactive and not capable of producing large magnitude events, such that potential near-source ground shaking effects can be ignored. Most faults outside of California are Type C.

***Source*:** Uniform Building Code, 2010

Topography

The project site's topography consists of undulating hills with an overall gradual elevation change of about 45 feet from east to west. The highest elevation is a crest of a hill near the center of the site and the lowest points are in the southwest corner near Fairview Road and in the northeast corner in the vicinity of the former stock pond. The site rises from Fairview Road to the crest of the hill located approximately 1,100 feet east of Fairview Road. Slopes on the site vary from zero to about 10 percent, as illustrated by Figure 5, Site Photographs, and inferred from the information presented in Figure 6, Topography and Proposed Earthquake Fault Building Exclusion Zone.

There are no drainage courses on the site due to the relatively flat topography. Existing drainage patterns on the site follow the topography and generally flow in three directions: west of the crest of the hill, the site drains toward Fairview Road; to the east, the site drains to a low point in the site's northeastern corner (near the former stock pond); and along the project site's southern boundary, the crest of the hill is interrupted by a saddle, which causes drainage to flow southward toward the adjacent property. (Refer to Figure 7, Existing Drainage).

Soil Characteristics

According to the Soil Survey of San Benito County (1965), soils on the project site consist of three types: Rincon silty clay loam, nine to 15 percent slopes (RsC); Antioch loam, two to five

percent slopes (AnB); and San Benito clay loam, 15 to 30 percent slopes, eroded (SbE2). All three of these soil series have moderate to high erosion potential based on the topography where they are found. On-site soils consist primarily of Rincon silty clay loam (refer to Figure 27, Soil Map).

Antioch loam, 2 to 5 percent slopes. This soil series consists of moderately well-drained soils that formed in alluvium derived from a wide range of sedimentary rocks. These soils have a loamy surface and clayey subsoil. These soils are found on long terraces and fans, and nearly level to strongly sloping. Runoff is slow, and the hazard of erosion is slight. As illustrated by Figure 27, Soil Map, these soils are limited on the site and are generally located in two small areas, one in the southeastern corner of the site and the other near the southwestern corner of the site.

Rincon silty clay loam, 9 to 15 percent slopes. Soils in this series consist of well-drained soils that formed in alluvium derived from sandstone and shale. These soils have a loamy surface layer and a clayey subsoil and occur on benches, terraces or fans. Included in this mapping are some small areas where there is less clay than normal in the subsoil and areas where the substratum is very firm. Also included are areas where erosion is only slight. Runoff is medium to rapid and the hazard of erosion is moderate to high. As indicated by Figure 27, Soil Map, soils of this series is the most prevalent on the project site.

San Benito clay loam, 15 to 30 percent slopes. This soil occurs on moderately steep rounded hills or on ridge tops. Soils in this series consist of well-drained loamy soils. Permeability is moderately slow, runoff is rapid and the hazard of erosion is severe. As indicated by Figure 27, Soil Map, these soils are generally present on the project site along the eastern perimeter and in the northeast corner.

Surface and near-surface soils observed during seismic trenching on the site consist of clays of medium to high plasticity. Shrinkage cracks were observed in some portions of the project site, although surface soils also include deep areas of sandy clay and gravel (Terratech, 1989). These soils are moderate to highly expansive soils, but are not considered susceptible to liquefaction. The 1989 geotechnical fault investigation report determined that on the project site, these soils consist of stiff to hard clays and medium dense to very dense sands and gravel, which are not conducive to seismically-induced differential settlement, liquefaction and landslides. Soil borings conducted as part of the 2008 geological investigation confirmed the expansiveness of these soils. Both reports include design recommendations for construction on expansive soils.

Faulting and Seismicity

The project site is located within an Alquist-Priolo Special Study Zone and a Seismic Hazard Zone. Of the numerous faults known to exist in the Hollister area, the San Andreas, Quien Sabe,

and Calaveras faults, along with small segments of the Tres Pinos fault, are classified by the California Geologic Survey as active or potentially active locally. The active San Andreas fault lies approximately eight miles southwest of the project site. The Calaveras fault, a branch of the San Andreas fault, bisects the City of Hollister and lies about 1.75 miles southwest of the project site. The Quien Sabe fault crosses the edge of the Hollister Valley at the base of the Diablo mountain range, about 4 miles north of the site (PMC 2010). The Bolado Park fault, an inactive fault, has also been mapped to the southeast of the project site.

The eastern portion of the project site is located within the Alquist-Priolo Earthquake Fault Zone due to the proximity of the Tres Pinos fault (Terratech 1989), a branch of the Calaveras fault that is generally considered to be potentially active. The background literature review conducted during the 1989 fault investigation revealed several mapped traces of the Tres Pinos fault: one across the eastern portion of the property, one mapped about 500 feet southwest of the Gavilan College San Benito Campus site, and one about 800 feet to the northeast of the site.

Extensive trenching and subsurface investigation of the Tres Pinos fault trace was conducted in 1974 on the Ridgemark Estates property, south of the project site. Additional trenching and subsurface investigation was conducted on the project site in 1989, to verify the previously mapped traces of the Tres Pinos fault. During the course of trenching to expose subsurface soils, the location of the trace was more thoroughly identified, which led to the new mapping of the trace of the active Tres Pinos fault on the eastern portion of the project site, and a recommendation for the establishment of a "building exclusion zone" along the trace. No evidence of the other previously mapped Tres Pinos fault traces were found on the site during the trenching and subsurface investigations conducted on the project site (Terratech 1989). A subsequent geotechnical report, which also included the adjoining Gavilan College San Benito Campus site to the south, was prepared in 2008 by Terrasearch to provide a current evaluation of surface and subsurface soil conditions and to establish criteria for grading and construction.

According to the 2008 Terrasearch report, very intense ground shaking would occur at the project site if a large magnitude earthquake were to occur on one of the branches of the Calaveras fault or the San Andreas fault. If the maximum earthquake occurs with an epicenter very near the project site, maximum bedrock acceleration could approach or exceed 1g (g=force of gravity) (Terrasearch 2008).

Landslides

According to the California Division of Mines and Geology landslide map for the Tres Pinos quadrangle (1994), portions of the project site are listed as "generally susceptible" to landslides (rating 3 out of a scale of 1-4, with 1 being the least susceptible).

The topography of the project site consists of undulating hills with a relative elevation change of about 45 feet. Slopes on the site are less than 10 percent. The highest elevation of the site is the crest of the hill near the center of the site and the lowest points are in the southwest corner near Fairview Road and in the northeast corner in the vicinity of the former stock pond. (Refer to Figure 6, Topography and Earthquake Fault Building Exclusion Zone). The gradual slopes of the site are not prone to landslide or erosion activity. As noted in the soil descriptions, above, on-site soils consist primarily of soils in the Rincon series, which are associated with moderate to high erosion hazards. However, the site-specific investigations (Terratech 1989, Terrasearch 2008) determined that the risk of landslides on the site is low based upon the relatively flat topography of the site combined with subsurface soil conditions as described above.

Liquefaction

Soil liquefaction occurs where saturated, cohesion-less or granular soils undergo a substantial loss in strength due to excess build-up of water pressure within the pores during cyclic loading such as earthquakes. Due to the loss of strength, soils gain mobility that can result in significant deformation, including both horizontal and vertical movement where the liquefied soil is not confined. Intensity and duration of seismic shaking, soil characteristics, overburden pressure, and depth to water are all primary factors affecting the occurrence of liquefaction. Soils most susceptible to liquefaction are saturated, loose, clean, uniformly graded, Holocene age, and fine grained sand deposits. Silts and silty sands have also proven susceptible to liquefaction or partial liquefaction. The occurrence of liquefaction is generally limited to soils within 50 feet of the ground surface. As noted above, on-site soils are moderate to highly expansive, but are not considered susceptible to liquefaction (Terratech 1989). Based on the nature of the subsurface material encountered in exploratory drill holes at the project site, the potential for liquefaction to occur on-site is low (Terratech 1989, p. 7).

Seismically-Induced Settlement

Seismic densification is the densification of unsaturated, loose granular soils due to strong vibrations such as that resulting from earthquake shaking. Granular soils and loose fills above groundwater may be subject to this phenomenon. The subsurface soils encountered during the on-site soils investigation consisted of medium dense to dense sand and gravel layers. These materials generally have low susceptibility to seismically-induced settlement (Terratech 1989, p. 7).

Expansive Soils

As noted previously, subsurface soils consist of layers of clay, unconsolidated sand, silt and gravel, which are not present uniformly across the site. Surface and near-surface soils on some

portions of the project site have moderate to high expansion potential (Terratech 1989, Terrasearch 2008). These soils expand when wet and contract when dry. This shrink-swell characteristic of expansive soils can cause distress and damage to structures supported by the soil. Proper design and construction in accordance with building code requirements would mitigate the effects of expansive soils. The fault and geological investigation reports for the proposed project include recommended design criteria and performance standards for construction on expansive soils.

3.7.2 REGULATORY SETTING

General Plan Policies

The San Benito County General Plan contains the following policies with regard to geologic hazards:

Land Use Element

> **Policy 32.** Specific development sites shall be free from the hazards identified within the Open Space and Conservation Element Maps (e.g., faults, landslides, hillsides over 30% slope, flood plains). The site shall also be on soil suitable for building and maintaining well and septic systems (i.e., avoid impervious soils, high percolation or high groundwater areas, set back from creeks). Absent adequate mitigation, development shall not be located on environmentally sensitive lands (wetlands, erodible soil, archaeological resources, important plant and animal communities).
>
> **Policy 33.** Specific development sites shall avoid, when possible, locating in an environmentally sensitive area (wetlands, erodible soils, important plant and animal communities, archaeological resources).

Open Space and Conservation Element

> **Policy 37: Development policy for hazardous areas.** It will be the policy of the County to limit densities in areas that are environmentally hazardous (fault, landslides/erosion, hillsides over 30% slope, flood plains) to levels that are acceptable for public health and safety for citizens and property. It is the County's policy to apply zoning categories and scenic easements for the protection of environmentally hazardous or aesthetically valuable resources.

Policy 39: Restrict creation of new lots in hazardous areas. It is the policy of the County to prohibit new subdivisions or lot-line adjustments that will create new lots located entirely within hazardous areas (slopes greater than or equal to 30%, 100-year flood plain, landslide/erosion hazard, fault zone).

State Law

California and Uniform Building Codes

The California Building Code (Title 24 of the California Code of Regulations) and the Uniform Building Code provide standards for testing and building construction as well as safety measures for development within earthquake prone areas. The project site is located within Seismic Zone 4, which is expected to experience the greatest effects from earthquakes, and which requires the most stringent standards for seismic design.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Pub. Res. Code Division 2, Chapter 7.5, commencing with Section 2621) was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The Act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards.

As noted above, the project site is located within the Earthquake Fault Zone defined for a trace of the Calaveras fault by the State Geologist pursuant to the Alquist-Priolo Act.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (Pub. Res. Code Division 2, Chapter 7.8, commencing with Section 2690) (1990) requires the State Geologist to designate Seismic Hazard Zones. These zones assist cities and counties in fulfilling their responsibilities for protecting the public from the effects of non-surface fault rupture earthquake hazards such as strong ground shaking, earthquake-induced landslides, liquefaction, or other ground failures. The California Geological Survey has not issued a Seismic Hazards Map for the Hollister area, which includes the project site.

3.7.3 STANDARDS OF SIGNIFICANCE

The following thresholds for measuring a project's environmental impacts are based on the CEQA Guidelines and generally accepted standards for environmental documents prepared pursuant to CEQA. For the purposes of this Draft EIR, impacts are considered to be significant if any of the following would result from implementation of the proposed project:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. Refer to Division of Mines and Geology Special Publications 42
    - Strong seismic ground shaking
    - Seismic-related ground failure including liquefaction
    - Landslides
- Result in substantial soil erosion or the loss of topsoil
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse
- Be located on an expansive soil, as defined in the Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste disposal systems where sewers are not available for the disposal of wastewater

3.7.4 PROJECT IMPACTS AND MITIGATION MEASURES

Fault Rupture and Other Seismic Hazards

Impact GEO-1: Implementation of the project could expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving rupture of a known earthquake fault. This is a **potentially significant impact**.

The project site is located within the Alquist-Priolo Earthquake Fault Zone delineated for a trace of the Tres Pinos fault, a branch of the Calaveras fault that is generally considered to be potentially active. A 35-foot wide trace of the Tres Pinos fault has been mapped on the site. The trace and the area immediately adjacent to the trace could be subject to ground rupture and displacement during a strong seismic event, which could expose people and structures to substantial adverse effects from seismic activity. However, the fault investigation report prepared in connection with the project site indicates that any future ground rupture would likely be confined to an area very close to the mapped trace.

Based on this technical analysis, the proposed project includes a 135-foot wide Building Exclusion Zone that follows the Tres Pinos fault trace through the site, which would provide for a 50-foot wide building setback on each side of the trace, as recommended by Terratech in their 1989 report and in accordance with the Alquist-Priolo Act (Refer to Figure 6, Topography and Earthquake Fault Building Exclusion Zone). Both technical reports prepared for the project include design specifications and performance standards for the construction of buildings and infrastructure on the project site to reduce hazards of seismically-induced human harm or property damage. These recommendations include:

1. Preparation by a qualified geotechnical consultant of a project-specific geotechnical report for the County's approval, as part of the application process for the project's first tentative subdivision map, which shall cover the entire project site. This site-specific report shall incorporate the recommendations of both the Terratech (1989) geotechnical fault investigation and the Terrasearch (2008) geotechnical investigation relative to the proposed project, to ensure that all geotechnical and soils conditions are adequately mitigated.

2. The project-specific geotechnical report shall also confirm that the proposed 135-foot Building Exclusion Zone is sufficient to adequately mitigate risks associated with ground rupture based on then-current site conditions, or make recommendations to modify the Building Exclusion Zone as determined necessary to adequately mitigate ground rupture impacts.

3. The project shall be designed in accordance with the recommendations of the project-specific report, and shall also incorporate the recommendations set forth in the 1989 fault investigation and in the 2008 geotechnical investigation to the extent determined appropriate by the County and the geotechnical consultant.

The Fairview Corners Residential Specific Plan also includes the following policies that are designed to further reduce the effects of development in proximity to the known fault.

> **Policy LU-2.1.** Recognize the fault line and potential habitat constraints on the property and designate land to provide a mix of residential uses

and product types, and recreation and open space amenities to meet the needs of residents.

Policy RM-2.1. Protect habitats and structures in the vicinity of known fault zones.

1. Ensure a 135-foot "building exclusion zone" in all plan sets as illustrated in the Constraints Diagram (Figure 7).

2. Limit future use of the "building exclusion zone" to non-habitable improvements (e.g. roadway improvements, park, open space, buffers, trails, etc.).

Future uses within the Building Exclusion Zone would be limited to non-habitable improvements (e.g., roadway improvements, park, open space, buffers, trails, etc.).

Implementation of the above Specific Plan policies would reduce the project's impacts associated with ground rupture. However, to ensure these impacts are reduced to a less than significant level, the following mitigation measure is recommended:

MM GEO-1: Development of the project site shall comply with the then most recent California Building Code guidelines for Seismic Zone 4 to avoid or minimize potential damage from seismic ground shaking. All plan sets shall include a 135-foot Building Exclusion Zone as illustrated in Figure 7 of the Specific Plan (Constraints Diagram), with future uses within the Building Exclusion Zone limited to non-habitable improvements (e.g., roadway improvements, parks, open space, buffers, trails, etc.) and all recommendations included in the 1989 fault investigation and in the 2008 geotechnical investigation prepared by Terrasearch, Inc. will be incorporated into the project design to the extent determined appropriate by the County, in consultation with the geotechnical consultant.

Therefore, impacts related to ground rupture would be **less than significant with mitigation incorporated.**

Impact GEO-2: Strong ground shaking occurring on the project site during a major earthquake may cause severe damage to future buildings and other improvements constructed as part of the project, and therefore may expose people and structures to substantial adverse effects. This is considered a **potentially significant impact**.

Historically, major earthquakes centered on the Calaveras and San Andreas faults have resulted in moderate to severe ground shaking in the project vicinity. As noted above, it is expected that a major earthquake will result in severe ground shaking on the project site during the life of the project.

Strong ground shaking will cause dynamic loading, resulting in stress to buildings and other improvements. Both the fault rupture investigation (Terratech 1989) and the subsequent geotechnical report (Terrasearch 2008) determined that structures designed and built in accordance with the California and Uniform Building Codes should respond well except under the most severe circumstances.

To reduce seismic shaking impacts to a less than significant level, the following mitigation measure is recommended:

MM GEO-2: Development of the project shall comply with the then-current California Building Code standards and requirements for Seismic Zone 4 to avoid or minimize potential damage from seismic ground shaking, as well as recommendations set forth in the site-specific geotechnical report required under MM GEO-1. Design plans shall be subject to review and approval by the appropriate design professional (i.e. geotechnical engineer, structural engineer) and the County as required.

Therefore, impacts related to seismic ground shaking would be **less than significant with mitigation incorporated.**

Impact GEO-3: There is a low risk of seismic-related ground failure, including liquefaction and seismically-induced differential settlement, due to the on-site soil conditions. Accordingly, there is a low risk of potential substantial adverse effects to people or structures as a result of seismic-related ground failure, and this is a **less than significant impact**.

Seismically-induced liquefaction is a potential concern where there are loose, uniformly graded, saturated, fine-grained soils that lie close to the ground surface. The technical analyses found that the soils on the project site are not considered susceptible to liquefaction or seismically-induced differential settlement. Furthermore, data indicate that these soils are not saturated, given that the depth of groundwater is more than 50 feet below ground surface. Accordingly, the risk of seismically-induced liquefaction and settlement is low, and the project's impacts would be **less than significant**.

No mitigation is required.

Landslides and Other Related Hazards

Impact GEO-4: Given the project site's topography and its soil characteristics, and that no landslide or landslide-related features have been identified or mapped on the project site, the risk of landslides is considered low. This is a **less than significant impact**.

The topography of the project site consists of undulating hills with a relative elevation change of about 45 feet. Slopes on the site are less than 10 percent. As indicated by Figure 6, Topography and Proposed Earthquake Fault Building Exclusion Zone, the highest elevation of the site is the crest of the hill near the center of the site and the lowest points are in the southwest corner near Fairview Road and in the northeast corner in the vicinity of the former stock pond. The gradual slopes of the site topography are not prone to landslide or erosion activity. As noted in the soil descriptions, above, on-site soils consist primarily of soils in the Rincon series, which are associated with moderate to high erosion hazards. However, the site-specific investigations (Terratech 1989, Terrasearch 2008) determined that the risk of landslides on the site is low based upon the relatively flat topography of the site combined with subsurface soil conditions as described above. Accordingly, the project's impacts regarding landslide risk is **less than significant**.

No mitigation is required.

Impact GEO-5: The project site is not located on a geologic unit that is unstable, or that would become unstable as a result of the project. This is a **less than significant impact**.

Surface and near-surface soils observed during seismic trenching on the site consist of clays of medium to high plasticity. Shrinkage cracks were observed in some portions of the property although surface soils also include deep areas of sandy clay and gravel (Terratech 1989). These soils are moderate to highly expansive soils, but are not considered susceptible to liquefaction. The 1989 geotechnical fault investigation report determined that on the project site, these soils consist of stiff to hard clays and medium dense to very dense sands and gravel, which are not conducive to seismically-induced differential settlement, liquefaction and landslides. Subsidence is the gradual lowering of the ground surface with little or no horizontal motion. Subsidence results from settlement over small or large areas as the consequence of compaction or loss of subsurface materials. The exception is tectonic subsidence, which occurs suddenly and is the compaction of soils due to ground shaking during earthquakes. Subsidence is usually the result of groundwater, gas or oil extraction, and hydro-compaction or the oxidation of organic soils. Soil borings conducted as part of the 2008 geological investigation did not reveal conditions that might lead to subsidence, but confirmed the expansiveness of these soils. Both reports include design recommendations for construction on expansive soils.

No mitigation is required.

Impacts Related to On-Site Soils

Impact GEO-6: Project grading and removal of vegetation may result in soil exposure, increased erosion and sedimentation of downstream water bodies. This is considered a **potentially significant impact**.

Grading, removal of vegetation, and other construction-related activities would disturb the soil, which could increase soil erosion rates. The proposed project includes altering the topography and contouring the site generally as indicated by Figure 22, Conceptual Cut and Fill Diagram, and to allow the drainage patterns illustrated by Figure 21, Conceptual Drainage Plan. All excavated soils would be re-used on site. No soil export is proposed. Soil erosion could occur during the construction phases of the proposed project. Specifically, increased soil erosion may occur with the use of heavy earth-moving equipment to grade the site, remove vegetation, and compact the soil in connection with the construction of the project's buildings, roads, drainage and other permanent improvements. The amount of erosion is dependent on soil type, vegetation cover, slope length and gradient.

According to the Soil Survey of San Benito County (1965) soils on the project site consist primarily of Rincon silty clay loam, nine to 15 percent slopes (RsC), but also include Antioch loam, two to five percent slopes (AnB) and San Benito clay loam, 15 to 30 percent slopes, eroded (SbE2). All three of these soil series have moderate to high erosion potential based upon the topography where they are found. The topography of the project site consists of undulating hills with a relative overall elevation change of about 45 feet. Slopes on the site range from 0 to 10 percent. The site-specific investigations (Terratech 1989, Terrasearch 2008) determined that erosion hazards on the site are low due to the relatively flat topography of the site combined with subsurface soil conditions as described above. Nevertheless, both reports recommend erosion control measures and revegetation of graded areas to reduce the likelihood of erosion on the site.

The Specific Plan also includes the following policies intended to further reduce the impacts of erosion during and after construction.

> **Policy RM-3.1.** Minimize soil erosion.
>
> 1. Erosion Control Plans shall be submitted to the County Public Works Department for review and approval when submitting subdivision improvement plans. Specific erosion control measures shall be included to protect drainage courses and the on-site habitat conservation area (should it be preserved on-site) from eroded soils and debris during construction. Soil exposed during grading that is no longer under active construction shall be stabilized.

2. Slope stabilization and erosion control (during both the construction and post-construction phases) shall only utilize mesh products that are made of biodegradable natural fiber materials. Plastic materials (such as silt fencing) may only be used if they are relatively solid (cannot entrap wildlife) and are removed from the site following use.

Policy RM-1.2. Allow potential for localized grading in the on-site habitat conservation area.

1. If a habitat set-aside area is retained on-site, localized grading is allowed within the 100-meter radius around the existing dry pond for the purposes of expanding storm water storage within the Plan Area. The amount of grading will be based on the need to collect and store water. This effort is intended to expand the storm water collection and percolation area, but may also enhance habitat, and should be designed with the intent to achieve both purposes.

2. Use vegetated areas within the 100-meter radius area for natural filtration. Prepare a grading plan for the planned habitat set-aside area, if retained on-site, in accordance with the approved Habitat Conservation Plan and with appropriate agency approvals and/or permits prior to grading activities within this area.

3. If all CTS mitigation is conducted outside the Plan Area, grading may occur as needed within the area identified for habitat conservation.

In addition, the Specific Plan requires that all development within the project site be subject to review by the County, to ensure consistency with the development and design standards described in Article 2.0, Land Use, and Article 5.0, Resource Management of the Specific Plan as well as the Grading Master Plan required by Article 7.0 of the Specific Plan (Implementation Plan). The process for review and approval is outlined in Article 7.0 of the Specific Plan.

Furthermore, the developer would be required to comply with the National Pollutant Discharge Elimination System (NPDES) permit program, in accordance with MM HYD-1b. Specifically, the developer would need to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP), which specifies Best Management Practices (BMPs) that would prevent all construction pollutants from contacting stormwater and with the intent of keeping all products of erosion from moving off-site into receiving waters. In addition, the developer would be required to incorporate post-construction stormwater pollution management measures, including, among others, source control measures, to reduce stormwater pollution during operation of the project, in accordance with MM HYD-1b. (See Chapter 3.8, Hydrology and Water Quality for additional information)

Mitigation Measure GEO-1 requires that the project implement the recommendations of the 1989 fault investigation and 2008 geotechnical reports. These reports include recommendations

to reduce erosion on the site, as noted above. Windborne erosion is addressed in Section 3.3, Air Quality, which includes MM AQ-1 to control dust during construction. Implementation of the following mitigation measure, in addition to Mitigation Measures GEO-1, AQ-1, HYD-1a, and HYD-1b would reduce the impacts of grading and erosion to a less than significant level.

MM GEO-6: The project developer shall comply with the policies found in Article 2.0 (Land Use) and Article 5.0 (Resource Management) of the Fairview Corners Residential Specific Plan. Grading and ground disturbance on the site shall be implemented as shown on the Specific Plan Figure 22, Conceptual Cut and Fill Diagram, and the required treatment of urban pollutants and application of pesticides on the project site shall be implemented in accordance with all applicable policies within Article 5, Resource Management as well as the project's Grading Master Plan (as may be amended). Further, the timing of implementation shall occur in accordance with Article 7 of the Specific Plan (Implementation Plan).

Implementation of the above mitigation measures will ensure that the erosion impacts of the project are reduced. Therefore, impacts related to increased erosion and sedimentation would be **less than significant with mitigation incorporated.**

Impact GEO-7: Expansive soils present on the project site may cause movement or heaving, potentially resulting in damage to foundations, concrete pads and pavements. This is considered a **potentially significant impact**.

According to the technical reports for the project site, moderate to highly expansive soils are present. Expansive soils can experience significant volume changes with variations in moisture content usually during seasonal wet and dry cycles. Expansive soils swell when wet, and shrink when dried. Such changes can cause distress to building foundations, slabs on grade, pavements, and other surface structures if not designed properly. However, the County routinely requires compliance with the then-current California Building Code (CBC), which includes provisions for the foundation design and construction in areas with expansive soils. Depending on site conditions and the nature of a project, a variety of approaches may be used, including over excavation and replacement of native soils with non-expansive fills, amendment and on-site use of native soils, and implementation of specialized foundation designs.

The fault and geotechnical investigation reports prepared for the proposed project include design specifications and performance standards for construction on expansive soils; additionally, the County would require building code compliance prior to the issuance of a building permit. MM GEO-1 requires implementation of identified recommendations as to project design to ensure all geotechnical and soils conditions are adequately mitigated. Among other things, these recommendations shall adequately mitigate potential impacts related to structures from construction on expansive soils.

Implementation of MM GEO-1 would reduce the impact of construction on expansive soils. Therefore, impacts related to expansive soils would be **less than significant with mitigation incorporated.**

Impact GEO-8: The soils on the project site may not be capable of adequately supporting the use of septic tanks. This is a **potentially significant impact**.

The Specific Plan anticipates that wastewater collection and treatment would be provided for by connecting to the City of Hollister's DWTP. In the event this does not occur, the Specific Plan contemplates the potential use of septic systems for residential development on the site under certain conditions. The proposed project includes provisions for the limited use of septic systems on lots of one acre or more, consistent with County design and performance standards (Article 7.0, Implementation Plan), until such time that connection to the DWTP is feasible. In either circumstance, the proposed project would be subject to the applicable requirements of the County's Hollister Water/Wastewater Master Plan and the Regional Water Quality Control Board.

In addition, the Specific Plan contains policies that are designed to reduce impacts related to the potential use of septic systems.

> **Policy PF-2.2.** The demand for wastewater collection and treatment may be provided for by septic systems on lots not less than one acre in size. Lots less than one acre in size, and where the number of lots within the Plan Area exceeds 45, shall not be served by the use of septic systems, but shall be served by the City of Hollister DWTP.
>
> **5.** Septic systems provided to serve the Plan Area shall meet County design, construction and maintenance standards. Designs shall be submitted prior to approval of tentative maps.

According to information provided by County staff, nearby areas in this general vicinity could not demonstrate suitable soil conditions following percolation testing and thus these adjacent sites did not obtain approval to subdivide. The general area has a fair amount of clay in the upper strata and has caused a 40 % +/- rate of septic system failure in the older houses around the project site (Ray Stevenson, pers. comm. 2011).

Groundwater below the project site is located at a depth of approximately 120 feet below ground surface, and on-site soils have a low infiltration rate. Soils with a low infiltration rate may not be suitable for the provision of septic systems. However, the geotechnical investigations on the site also noted that clay soils with low infiltration rates were not uniformly present on the site. Therefore, a soil profile analysis and percolation testing would need to be performed to determine soil suitability in the event the developer proposes to use septic systems rather than

connect to the City of Hollister's DWTP. Implementation of the following mitigation measure is recommended to reduce the impact of utilizing septic systems on soils incapable of supporting them, to a **less than significant level**.

MM GEO-8: In the event the developer seeks approval to use septic systems to serve a portion of the project, all of the following requirements shall apply:

1. Use of septic systems shall be permitted only if soil suitability can be demonstrated to the County's satisfaction and the developer has obtained any and all required permits, entitlements and approvals from relevant agencies to use septic systems on the project site. The developer shall comply with any space constraints imposed on the proposed lot by County and Regional Water Quality Control Board regulations for the location and placement of septic systems on the site.

2. Use of septic systems shall be consistent with the adopted Hollister Water/Wastewater Master Plan and the County's requirements for the use, design, and construction of septic systems, and applicable requirements of the Regional Water Quality Control Board.

3. The developer shall retain a qualified environmental health specialist or registered engineer to perform testing on each proposed lot, which shall include at least one soil profile analysis around a minimum of three percolation test holes spread out in the proposed location for the leachfield. Percolation testing shall adhere to the then-current federal Environmental Protection Agency (EPA) methodology. Said analysis shall be submitted to the County Environmental Health Department and Public Works Department for their approval as part of the subdivision map process for the lots being proposed to be served by septic systems. Prior to commencing the analysis, the developer shall give the County Environmental Health Department and the Public Works Department a minimum of 48 hours' notice so that County staff may observe the testing.

4 Soils testing and the use of septic systems shall comply with all applicable standards and requirements, including, without limitation, those of the County, the Hollister Water/Wastewater Master Plan, and the Regional Water Quality Control Board.

Therefore, impacts related to septic systems would be **less than significant with mitigation incorporated.**

3.7.5 Cumulative Impacts and Mitigation Measures

Geological Impact Risk to Projects

Impact GEO-9: The project, in combination with past, present, and reasonably foreseeable potential future projects, could result in the cumulative increase in the risk of geological impacts to the future residents of these projects. This is considered a **less than significant** cumulative impact.

Similar to the project, other past, present and reasonably foreseeable future developments may pose geological and soils hazards if identified impacts are not adequately mitigated. However, these types of hazards are typically site-specific, and therefore tend not to combine with other developments for a cumulative impact. Further, each of these other developments, similar to the project, would be required to evaluate potential geology and soils impacts and to implement feasible mitigation measures to reduce or avoid such impacts.

For these reasons, cumulative geological hazard impacts as a result of the proposed project, combined with other past, present, and reasonably foreseeable projects, are considered to be **less than significant**.

No mitigation is required.