4.4 GEOLOGY AND SOILS

4.4.1 INTRODUCTION

This section provides information regarding existing geological resources including soils including geological and seismic hazards in and around the proposed site locations. Following an overview of the regional and existing setting in **Section 4.4.2** and the relevant federal, state, and local regulations in **Section 4.4.3**, project-related impacts and recommended mitigation measures are presented in **Section 4.4.4**.

As explained in **Section 1.0**, the discussion and analyses in this SEIR tier from the information and conclusions included within the 2006 City of Hollister Domestic Wastewater System Improvement (DWSI) and San Benito County Water District Recycled Water Project (RWP) EIR (2006 EIR). The 2006 EIR described, in general, what potential environmental effects may be expected from the development of reclaimed water sites and the extension of water distribution pipelines, and how these impacts are to be addressed and/or mitigated. The 2006 EIR anticipated no significant and unavoidable geology and soils impacts resulting from implementation of the DWSI and RWP. Potential impacts to and from geological resources and soils were reduced to less than significant levels through implementation of mitigation measures. This section expands on the geological resource impacts discussion of the 2006 EIR as it relates specifically to the development of reclaimed water irrigation sites and previously unaccessed pipeline alignments.

4.4.2 ENVIRONMENTAL SETTING

Regional Setting

The regional environmental setting for geology and soils is incorporated by reference from Chapter 4.2.2 of the 2006 EIR (refer to **Section 1.3** of this SEIR).

Topography/Landslides

Landslides are defined as rock falls, topples, slides, spreads, and debris flows, which are more commonly referred to as mudslides (Varnes, 1996). Landslides can occur as a result of seismic events, periods of heavy rainfall, dramatic changes in groundwater levels, or land disturbances during construction activities.

Soils

Soils Surveys

Soil surveys for the proposed irrigation sites are available online through the Natural Resource Conservation Service (NRCS), a sub-unit of the United States Department of Agriculture (USDA, 2007). Each survey maps soil units and provides a summary of major physical characteristics for each unit with management recommendations.

Expansive Soils

The potential for soils to demonstrate expansive properties is primarily dependent upon clay content. Clay particles can swell by absorbing large amounts of water relative to their volume. When these particles dry out, they shrink. Conversely, when rain falls on dried clays, the clays swell and the ground can rise several inches (JCP, 2001).

Soil Erosion

Soil erosion is the removal of the soil materials from the ground surface and the transportation of soil materials resulting in deposition in a remote location. Mechanisms of soil erosion include natural phenomena such as stormwater runoff and wind, as well as human activities, such as changes in drainage patterns and removal of vegetation. Factors that influence soil erosion include physical properties of the soil, topography (slope), annual rainfall, and peak rainfall intensity. Erosion and potential project-related impacts are discussed more thoroughly in hydrology and water quality.

Seismicity

Active Faults

According to the Alquist-Priolo Act, active faults are defined as faults that have shown seismic activity within the past 11,000, which are classified as Holocene faults by the United States Geological Survey (USGS). The USGS definition, adopted by the California Geological Survey (CGS), defines active faults as faults showing signs of activity up to the beginning of the Quaternary age (1.6 million years ago).

Surface Rupture

Surface ruptures occur when movement along both sides of faults, which are located deep underground, produces enough energy to cause a fracture on the surface. The Alquist-Priolo Act, limits development on lands within a potential fault rupture zone.

Seismic Shaking Intensity: the Modified Mercalli Intensity Scale

The Modified Mercalli Intensity (MMI) scale (**Table 4.4-1**) is a common measure of earthquake effects due to ground shaking intensity. The MMI values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to XI could cause moderate to significant structural damage.

Liquefaction

Soil liquefaction can occur during seismic events. When subjected to energy associated with the shaking intensity of a considerably sized earthquake (MMI VIII and above), certain soils when saturated with water may loose their solid structure and act as liquids. Soils comprised of sand and sandy loams, in areas with high groundwater tables or rainfall, are subject to liquefaction. Ground subject to liquefaction may sink or pull apart. Liquefaction may lead to lateral spreading, where slopes even out, changing the topography of the area.

Project Site Setting

Although the project sites are within the same geomorphic province, the Traverse Ranges, specific geological resources, such as soil classifications and geological hazards, differ from site to site.

Site 1 - Hollister Municipal Airport

Topography/Landslides

Site 1 consists of agricultural land adjacent to the runways of the airport. The areas have been previously graded and are currently used for farming. Site 1 contains minor slopes with grades less than 5 percent. The topography of Site 1 is not be subjected to landslides from either weather or seismic related events.

Soils

The dominant soil types on Site 1 are classified as Pacheco silty clay (Pe), covering approximately 60 percent of the site, and Clear Lake clay (Ch), covering approximately 35 percent of the site (**Figure 4.4-1**). The Pe and Ch soil map units are classified as hydrologic group D, which accounts for soils that have a very slow water infiltration rate when thoroughly wet and slow rate of water transmission. Accordingly, these soils have a high rate of surface water runoff. These soils consist of clays that have a high shrink-swell potential (classified as expansive soils). Because of the clay content, Pe and Ch soils have a very low susceptibility to sheet and rill erosion. The Pe and Ch soil units have virtually no potential for ponding and experience occasional flooding.

Other soils types present on Site 1 are saline Clear Lake clays (Ck), covering approximately 1 percent of the site, and Sorrento silt loam (SnA), covering approximately 4 percent of the site. The hydrological properties of Ck soils are the same as those identified above for Ch soils, except Ck soils are higher in salinity. SnA soils are classified as hydrologic group B, which exhibit moderate infiltration rates when thoroughly wet and are moderately well drained with a moderate rate of water transmission. SnA soils do not experience ponding or flooding. These soils have a moderate rating for susceptibility to sheet and rill erosion.

Seismicity

Site 1 is located adjacent (within 300 hundred feet) to the northern tip of the Holocene-era, Class A Calaveras fault zone, southern Calaveras section (**Figure 4.2-2**). Class A faults have a slip rate of greater than 5 millimeters per year (mm/yr). The next closest fault is the Historic section of the Class A Calaveras fault zone, southern Calaveras section, located 800 feet west of the northwestern corner of Site 1. Historic faults have shown seismic activity within the past 150 years.

Surface Rupture

The Calaveras fault zone, southern Calaveras section located adjacent to the proposed reclaimed water irrigation site is a designated Alquist-Priolo Earthquake Fault Zone (Fault Zone). The Fault Zone is a designated area of potential surface rupture associated with a surface trace of an active fault. The zones include a buffer, typically 50 feet, where development is limited to structures that will not be used for human occupancy or structures that provide vital infrastructure for emergency services. The proposed Airport site is not located within the zone itself (**Figure 4.4-2**).

INSERT FIGURE 4.4-1

INSERT FIGURE 4.4-2

TABLE 4.4-1: MODIFIED MERCALLI INTENSITY SCALE

Intensity Value	Intensity Description	Average Peak Acceleration
I.	Not felt except by a very few persons under especially favorable circumstances.	< 0.0015*g*
II.	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	< 0.0015*g*
III.	Felt quite noticeably indoors, especially on upper floors of buildings, but many persons do not recognize it as an earthquake. Standing cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.	< 0.0015*g*
IV.	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.	0.015*g*-0.02*g*
V.	Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.	0.03*g*-0.04*g*
VI.	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.	0.06*g*-0.07*g*
VII.	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars.	0.10*g*-0.15*g*
VIII.	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving cars disturbed.	0.25*g*-0.30*g*
IX.	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	0.50*g*-0.55*g*
X.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	> 0.60*g*
XI.	Few, if any, masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 0.60*g*
XII.	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 0.60*g*
Note: [a] *g* is gravity = 9.8 meters per second squared. Source: Bolt, 1988.		

Shaking Intensity

According to the probabilistic seismic hazards map, Site 1 is located in an area with a potential ground motion of 0.789 percent of the force of gravity (CGS, 2007). This equates to a MMI intensity rating of severe (X and above). Seismic induced shaking at the estimated rate could result in total loss of most structures including loss of service of underground pipelines.

Liquefaction

Although located within an area with the potential for severe seismic shaking, the soils on the project site consist of clays and silty loams, which are not subject to liquefaction. These soils tend to remain in solid form when shaken due to their plasticity.

Site 2 - Brookhollow Ranch

Topography/Landslides

Site 2 consists of a relatively remote area of improved rangeland used for grazing. Slopes within the project site range from fairly steep (>30 percent) to level (<5 percent). Sub-area A identified for reclaimed water irrigation is located on the northern side of Flint Hills, where the valley floor meets the northern slope of the hills. Sub-area A has already been graded and is currently used for agriculture. Slopes on sub-area A range from 0 to 9 percent. Sub-area B identified for reclaimed water irrigation is located within the central area of Brookhollow Ranch within the Flint Hills. Sub-area B would border a hilltop lake to the east and is relatively flat compared to the surrounding hills. Soils associations within Sub-area B are the result of landslide activity. Based on the steep slopes, areas surrounding Sub-area B are subject to landslides during strong or sustained seismic and storm events.

Soils

Soils on Site 2~~of~~ Sub-area A consist of Cropley Clay (CwC), Diablo clay (DaD, DaE2), Soper Sandy Loam (SmE2), and Sorrento silty clay loam (SrA) (**Figure 4.4-1**). CwC, DaD, and DaE2 make up approximately 69 percent of the soils located on sub-area 1. These three soils are classified as hydrologic group D (high runoff potential, low rate of water transmission) with negligible ponding or flooding frequencies. The three main soils comprising Sub-area A are classified as expansive soils. Because of the clay content, CwC, DaD, and DaE2 soils have a very low susceptibility to sheet and rill erosion. The two other soil types located on Sub-area A are classified as hydrologic group C (SmE2) and hydrologic group B (SrA). Hydrologic group C soils have a slow infiltration rate when thoroughly wet with minimal frequencies for ponding and flooding. Hydrologic group B soils have a moderate infiltration rate when thoroughly wet and are well drained. SmE2 soils are not considered expansive, while SrA soils are considered moderately expansive. Both soils are considered to have a low to moderate potential for sheet and rill erosion.

Soils located on Sub-area B and the reclaimed water pipeline alignment include DaD, DaE2, and SmE2 along with Cotati loam (CvC) and landslides (LdF) (**Figure 4.4-2**). DaD, DaE2, and SmE2 were discussed above under Sub-Area A. CvC soils are similar to the main soils described under Sub-Area A and are classified as hydrologic group D. CvC soils are expansive with a low potential to experience sheet or rill erosion.

Seismicity

Site 2, including associated pipelines, is located within the Sargent Fault Zone, Southeastern Section (Sargent Fault) (**Figure 4.4-2**). The Sargent Fault associations are classified as Holocene, Class A faults (slip rate of 1 to 5 mm/yr). Traces of the Sargent Fault underlay Sub-area B and the pipeline from Sub-area A to Sub-area B. There are no fault traces underlying Sub-area A or the connecting pipeline alignments to Sub-area A.

Surface Rupture

Sub-area B of the proposed reclaimed water irrigation site and associated pipeline is located within the Fault Zone associated with the surface traces of the Sargent Fault (**Figure 4.4-2**). The surface traces of the fault within the project site may be susceptible to surface fault rupture during strong seismic events.

Shaking Intensity

According to the probabilistic seismic hazards map, the area encompassing both sub-areas of Site 2 has a potential ground motion of 0.756 percent of the force of gravity during strong seismic events, slightly lower than that calculated for the airport site (CGS, 2007). This equates to a MMI intensity rating of severe (X and above).

Liquefaction

The soils on the project site consist of clays and silty loams, which are not subject to liquefaction. These soils tend to remain in solid form when shaken, even during strong seismic shaking events, due to their plasticity.

Site 3 - Riverside Park

Topography/Landslides

Site 3 is divided into three topographical areas. The northwestern third of Site 3 slopes to the southeast towards the floodplain of the San Benito River. The southern half of Site 3 is relatively flat, with a mild slope to the north. The northeastern third of Site 3 is relatively flat and lower in elevation than the southern half of the site. The northern and southern halves of the site are divided by a non-bedrock escarpment (steep slope separating two comparatively level or more gently sloping surfaces). The relatively flat slopes of each section (0 to 2 percent slopes) are not conducive to landslides, although earthen debris may slide from the top of the escarpment at the border of the southern section to the lower northern section.

Soils

Site 3 is comprised of approximately 70 percent Reiff sandy loam (ReA) and 20 percent Metz gravelly sandy loam (MgA) (**Figure 4.4-1**). ReA soils are classified as hydrologic group B and MgA soils are classified as hydrologic group A. Soils classified as hydrologic group B are described above under Site 2 (moderate infiltration rate when thoroughly wet and well drained). Soils classified as hydrologic group A have a high infiltration rate and corresponding low runoff potential when thoroughly wet. MgA soils are

located within the floodplain of San Benito River and are occasionally subjected to long-duration flooding events. These soils are not classified as expansive soils as neither contains clay. ReA and MgA soils are mildly susceptible to sheet and rill erosion.

The remaining 10 percent of the soils types comprising Site 3 are Sorrento silt loam (SnC), Nacimiento loam (NcG3), Mets sandy loam (MeA), and riverwash (Rw) (**Figure 4.4-1**). These soils have classifications ranging from hydrologic group B to hydrologic group D. These soils are not considered expansive soils and range from mildly to moderately susceptible to sheet and rill erosion.

Seismicity

Site 3 is approximately 1 mile west of the Historic section of the Class A Calaveras fault zone, southern Calaveras section, discussed above under Site 1 (**Figure 4.4-2**).

Surface Rupture

Site 3 is not located within an within a Alquist-Priolo Act Earthquake Fault Zone, as the nearest fault is 1 mile east of the site. There are no known potential fault rupture hazards on the Site 3 (**Figure 4.4-2**).

Shaking Intensity

According to the probabilistic seismic hazards map, Site 3 has a potential ground motion during a strong seismic event of 0.790 percent of the force of gravity, similar to that calculated for the airport site (CGS, 2007). This equates to a MMI intensity rating of severe (X and above).

Liquefaction

Site 3 is mainly comprised of sandy soils. Due to the sites proximity to the San Benito River and potential for high water table, Site 3 has the potential to experience topsoil liquefaction during periods of strong seismic shaking and water saturation.

Site 4 - Pacific Sod Farm

Topography/Landslides

Site 4 consists of agricultural land adjacent to the San Benito River. The areas have been previously graded and are currently used as a sod farm. Site 4 contains minimal sloping, with slopes ranging from 0 to 2 percent. The topography of Site 4 is not be subjected to landslides from either weather or seismic related events.

Soils

Site 4 is comprised of approximately 70 percent MeA and 23 percent ReA (**Figure 4.4-1**). These soils types are also located on Site 3 and are discussed above. MeA and ReA are classified as hydrologic group A and hydrologic group B, respectively. The soils are well drained with high infiltration rates. Comprised of sand, these soils do not experience shrink-swell and are therefore not categorized as expansive soils. Because of the sand constituents, these soils have a moderate potential for erosion. Located adjacent to the riverwash, MeA soils have limitations for use as irrigation lands due to their flooding frequency.

Along the northern border of Site 4, adjacent to the San Benito River, are two soil types associated with flooding, river wash (Rw) and sandy alluvial land (Sc) (**Figure 4.4-1**). These soil types are classified as hydrologic group D and hydrologic group A, respectively.

Seismicity

Site 4 is not located within a fault zone. The closest fault zone is the Holocene, Class A Sargent fault zone, southeastern section (**Figure 4.4-1).** Traces of the fault zone are located approximately 0.8 miles north of Site 4.

Surface Rupture

Site 4 is not located within an Alquist-Priolo Act Earthquake Fault Zone, as the nearest fault is 0.8 miles north of the site (**Figure 4.4-2**). There are no known potential fault rupture hazards on the Site 4.

Shaking Intensity

According to the probabilistic seismic hazards map, Site 4 has a potential ground motion during a strong seismic event of 0.761 percent of the force of gravity during strong seismic events (CGS, 2007). This equates to a MMI intensity rating of severe (X and above).

Liquefaction

Site 4 is mainly comprised of sandy soils. Due to the sites proximity to the San Benito River and potential for high water table, Site 4 the potential to experience liquefaction during periods of strong seismic shaking and water saturation. However, the slopes are relatively level of Site 4. Strong seismic shaking, and the liquefaction of soils on the site would result in minimal lateral spreading.

Site 5 - San Juan Oaks Golf Club

Topography/ Landslides

Site 5 consists of a golf course. Reclaimed water would be used to irrigate the fairways and greens, which are relatively flat. According to the soils map, slopes within the project site range from 0 to 9 percent, with steeper slopes surrounding some areas of the fairways and greens (15 to 30 percent). Although some slopes exists adjacent to the golf course, the project site would not be subjected to weather or seismic induced landslides.

Soils

Site 5 is comprised of Salinas clay loams (SaA and SaC), Clear Lake clay (Ch), and Diablo clays (DaD and DaE2) (**Figure 4.4-1**). These soils are classified as hydrologic group D (Ch, DaD, and DaE2) and hydrologic group C (SaA and SaC). Containing clays, these soils are classified as expansive soils with a moderate to high shrink-swell potential. These soils have a low potential for sheet and rill erosion. Ch, DaD, and DaE2 soils are limited for use as irrigation lands due to slow water transmission rates. SaA and SaC soils are not limited in their use as irrigation lands.

Seismicity

Site 5 is not located within a fault zone. The closest fault zone is the San Andreas fault zone, Santa Cruz Mountains section, located approximately 0.5-miles southwest of the golf course (**Figure 4.4-2**). This section of the San Andreas Fault is a Class A fault zone with slip-rate movement greater than 5 millimeters per year.

Surface Rupture

Site 5 is not located within an Alquist-Priolo Act Earthquake Fault Zone, as the nearest fault is 0.5 miles north of the site (**Figure 4.4-2**). There are no known potential fault rupture hazards on the Site 5.

Shaking Intensity

According to the probabilistic seismic hazards map, Site 5 has a potential ground motion during a strong seismic event of 0.772 percent of the force of gravity during strong seismic events (CGS, 2007). This equates to a MMI intensity rating of severe (X and above).

Liquefaction

The soils on the project site consist entirely of clays, which are not subject to liquefaction. These soils tend to remain in solid form when shaken, even during strong seismic shaking events, due to their plasticity.

4.4.3 REGULATORY SETTING

Incorporation by Reference

A description of the regulatory setting is incorporated by reference from Section 4.2.1 the 2006 EIR (refer to **Section 1.3**). Section 4.2.1 of the 2006 EIR provides a description of the following:

- State Water Resources Control Board, National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity – Water Quality Order 99-08-DWQ
- Alquist-Priolo Earthquake Fault Zoning Act
- San Benito County General Plan – Land Use Element
- City of Hollister General Plan – Health and Safety Element and Community Services and Facilities Element

~~Supplemental regulatory information applicable to the development of the proposed reclaimed water irrigation sites is provided below.~~

4.4.4 IMPACT ANALYSIS

Thresholds of Significance

Criteria for determining the significance of impacts to geological resources and soils have been developed based on Appendix G of the CEQA guidelines and relevant agency thresholds. For the

purposes of this EIR, impacts to and from geological resources including soils are considered significant if the proposed project would:

- Expose people or structures to potential substantial adverse effects; including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map;
  - Strong seismic ground shaking intensity;
  - Seismic-related ground failure, including liquefaction; or
  - Landslides.
- Result in substantial soil erosion of loss of topsoil;
- Be located on unstable soil, or soil that would become unstable as a result of the proposed project, that could potentially result in onsite or off-site landslides, lateral spreading, subsidence, liquefaction or collapse;
- Be located on expansive soil, as defined by the Uniform Building Code, creating substantial risk to life or property; and/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.

Methods and Assumptions

This section identifies any impacts to and from geological resources that could occur during construction and/or operation of the proposed project, as determined in the Initial Study (**Appendix B**). Impacts to and from geological resources were analyzed based on an examination of the project site, published information regarding geological hazards of the project area, field studies, and comparison of these factors to the significance criteria listed above. If significant impacts are likely to occur, mitigation measures are included to increase the compatibility and safety of the proposed project and to reduce impacts to less-than-significant levels. Impacts that were determined to be less than significant in the Initial Study do not warrant further analysis and are not discussed within this SEIR

Mitigation measures identified in the 2006 EIR are assumed to be implemented as a component of the proposed project. The 2006 EIR identified mitigation measures applicable to the development of reclaimed water projects that would reduce potential impacts to soils. These measures are described in detail in **Appendix C** and briefly summarized below:

- **2006 EIR MM 4.2.4**: Irrigation with reclaimed water would be subject to Waste Discharge Requirements issued by the RWQCB, which would restrict application of reclaimed water to prevent off-site runoff. The City of Hollister shall implement measures required by the CCRWQCB.

- **2006 EIR MM 4.2.5**: To reduce impacts associated with reduced soil productivity as a result of irrigation with high salinity treated effluent, a sprayfield management plan shall be developed by the City of Hollister in cooperation with the San Benito County Water District. The sprayfield management plan shall identify agricultural best management practices (BMPs) that ensure that

sprayfields do not adversely impact structure and crop capability of soils. The sprayfield management plan shall be reviewed and updated annually.

- **2006 EIR MM 4.2.7(a)**: The City will be required to comply with the State's National Pollution Discharge Elimination System (NPDES) General Permit for Discharges of Storm Water Runoff Associated with Construction Activity (General Permit). The Central Coast Water Quality Control Board (CCRWQCB) requires that all construction sites have adequate control measures to prevent the discharge of sediment and other pollutants to streams or rivers. To comply with the permit, the City will file a Notice of Intent with the CCRWQCB and prepare a Storm Water Pollution Prevention Plan (SWPPP) prior to construction. A copy of the SWPPP must be current and remain on the project site.

- **2006 EIR MM 4.2.7(b)**: A geologic hazard evaluation of pipeline routes shall be conducted by a certified engineering geologist to map areas of instable slopes that have weak clay beds, bedding-plane shears, and adversely-orientated joints and/or bedding, and slopes greater than 30%.

- **2006 EIR MM 4.2.7(c)**: Development of pipelines should be avoided in areas of instable slopes defined in the geologic hazard evaluation.

Effects Found Not to be Significant

The proposed project does not include additional methods of wastewater treatment, such as septic tanks. Therefore, the potential impact of incompatible soils with alternate wastewater treatment systems, as discussed in the Initial Study, is not considered within this SEIR.

Impact Statements and Mitigation Measures

Construction Impacts

IMPACT 4.4-1. Construction of the proposed project would occur in areas of known landslide hazards and liquefaction zones, which could be exacerbated by construction activities.

Sites 1, 5 Sites 1 and 5 are level in topography and contain clay soil associations. These sites are not subject to landslides or liquefaction. Construction activities on these sites would not impact or be impacted by landslides or liquefaction. **No Impact**.

Sites 2 Site 2 consists of clay soil associations, which are not susceptible to liquefaction during strong seismic shaking events. However, Site 2 would be located within the Flint Hills, which have steep slopes and areas of known landslide debris flows (**Figure 4.4-1**). Construction activities including trenching of pipeline routes and equipment staging could reduce soil stability near steep slopes, either at the base or peak of the gradient. Reduced stability could result in onsite or off-site landslides, a potentially significant impact. Implementation of 2006

EIR MM 4.2.7(b) and 4-2.7(c), summarized above, would reduce this impact to a less-than-significant level. **Less Than Significant with Mitigation.**

Sites 3, 4 Sites 3 and 4 are relatively level in topography. Site 3 contains an escarpment separating the southern and northern sections of the site. The escarpment would remain undisturbed during construction. Sites 3 and 4 would not be subject to on- or off-site landslides. However, the sandy soils located at Sites 3 and 4 are subject to liquefaction during strong seismic shaking events. Construction activities described in **Section 3.5.1** would not increase the potential for sandy soils to liquefy during strong seismic shaking events. As discussed in **Section 3.5.1**, unstable soils extracted during trenching and other construction activities, would be backfilled with stable soils. Therefore, construction activities would have a less than significant impact on unstable soils associated with liquefaction during construction. **Less Than Significant**.

IMPACT 4.4-2. Construction and excavation activities associated with pipeline installation would remove vegetative cover and would expose soils to the effects of wind, rain, and surface flow, increasing the potential for erosion.

Sites 1-5 Although the potential sites for reclaimed water irrigation (Site 1 through Site 5) have differing potentials for experiencing erosion, mechanical disturbance of soils from construction activities can increase the potential and rate of erosion from either wind or rain by reducing soil surface tension and compaction. Additionally, excavated soils along pipeline alignments and imported soil for the development of Site 3 would be stockpiled during pipeline installation and would be subjected to natural elements, increasing the potential for erosion and loss of topsoil. Construction activities could result in a significant impact to soils due to the potential for increased soil erosion.

Implementation of 2006 EIR MM 4.2.7(a), summarized above, would reduce this impact to a less-than-significant level. Erosion control measures would be employed in compliance with the Phase I NPDES General Permit for construction activities under 2006 EIR MM 4.2.7(a). The provisions of the NPDES permit require a site-specific plan to be developed that would address each component of the proposed project. This SWPPP would be developed prior to any ground disturbance at the project sites or importation of soil at Site 3 and would include practices to reduce potential surface water contamination during storm events. The SWPPP will identify BMPs and the location of erosion control features recommended to direct and filter stormwater runoff during construction of each project component. BMPs applicable to the proposed project have been recommended within 2006 EIR MM 4.2.7(a) and would reduce impacts to less than significant. **Less than Significant with Mitigation.**

Operational Impacts

IMPACT 4.4-3. Implementation of the proposed project would occur within an Alquist-Priolo Earthquake Fault Zone.

Sites 1-2 As discussed in the 2006 EIR, the Alquist-Priolo Earthquake Fault Zoning Act (Act) regulates development of projects on active faults, as delineated by the California State Geologist, due to the potential for surface rupture along fault traces. The Act defines projects as either the development of structures for human occupancy, with a few exceptions, or any subdivision of land that contemplates the eventual construction of structures for human occupancy (California Public Resources Code Section 2621.6). The proposed project does not include the development of structures for human occupancy, or the division of lands that may eventually include the construction of structures for human occupancy. Therefore, the operation of the proposed project would be consistent with the Act, and potential impacts are considered less than significant. **Less than Significant.**

Sites 3-5 Sites 3 through 5 are not located with Alquist-Priolo Fault Zones and would not be subjected to surface rupture. **No Impact**.

Impact 4.4-4. Components of the proposed project would be subjected to strong seismic shaking in the event of a major earthquake. Ensuing damage to project facilities could result in loss, injury, or death.

Sites 1-5 Each site has similar ground motion potentials (0.756 to 0.790 times the force of gravity) in response to strong seismic events, which all have the same potential MMI intensity rating. There are no habitable structures that would be developed in these areas as a result of the proposed project. Strong seismic ground shaking at these estimated levels would not result in injury or death, however the force could stress pipelines resulting in fracturing and potential loss. This could be a potentially significant impact if storage capacity is unavailable or storage areas become damaged during the seismic event, resulting in the inability to dispose of reclaimed water.

To prevent the above mentioned impacts, pipelines and associated underground structures would be developed in accordance with City of Hollister General Plan Policy HS1.7, incorporated from the 2006 EIR, which states that new utility lines are to be constructed to accommodate possible fault movement and withstand the expected ground motion induced during an earthquake. By implementing design measures in compliance with Policy HS1.7, strong seismic shaking events would not result in the loss of pipelines and associated appurtenances. **Less Than Significant**.

IMPACT 4.4-5. Implementation of the proposed project would place pipeline components in areas of landslide potential and high liquefaction potential. During strong seismic shaking events,

susceptible soils may liquefy potentially causing damage to the pipelines and interruption of service.

Site 1, 5 Sites 1 and 5 are level in topography and contain clay soil associations. These sites are not subject to landslides or liquefaction. Operation of project components would not be impacted by landslides or liquefaction on these sites. **No Impact**.

Site 2 Application of reclaimed water at Site 2 could result in landslides if over applied to saturated, unstable soils. Over application would change the weight balance of soils at the apex of steep slopes, possible resulting in down slope debris flows. Additionally, erosion could result in the removal of load bearing soils near the base of steep slopes, resulting in landslides. However, with irrigation management, as required by 2006 EIR MM 4.2.5 (see Appendix C) and in proposed Mitigation Measure 4.4-5, soil water saturation would be prevented, reducing the potential for landslides induced by the operation of the proposed project to a less than significant level. **Less Than Significant with Mitigation**.

Site 2 consists of clay soil associations, which are not susceptible to liquefaction during strong seismic shaking events. **No Impact**.

Site 3-4 Sites 3 and 4 are relatively level in topography. Site 3 contains an escarpment separating the southern and northern sections of the site. The escarpment does not represent adequate change in elevation for debris movement to result in landslides. Sites 3 and 4 would not be subject to on- or off-site landslides. **No Impact**.

Over application of reclaimed water on Site 3 could increase the potential for liquefaction of the sandy soils during strong seismic events. Water saturation from reclaimed water would reduce the cohesive forces during strong seismic events resulting in the liquefaction of areas on Sites 3 and 4. However, with irrigation management, as required by 2006 EIR MM 4.2.5 (see Appendix C) and in proposed Mitigation Measure 4.4-5, soil water saturation would be prevented, reducing the proposed projects potential to increase the likelihood of liquefaction during strong seismic events. Therefore this impact would be considered less than significant with mitigation. **Less Than Significant with Mitigation**.

> **Mitigation Measure 4.4-5**: Implement Mitigation Measure 4.3-3 to develop a Management Plan for reclaimed water irrigation specific to each site.

Pipelines As discussed above, pipelines constructed within unstable soils would be backfilled with stable soils that would not be subject to liquefaction. The pipelines themselves would not be impacted during liquefaction events. In conjunction with the design requirements discussed in **Impact 4.4-1**, operation of the proposed project would not be impacted from liquefaction during strong seismic shaking events. **Less Than Significant**.

IMPACT 4.4-6. Use of reclaimed water on the proposed sites could result in runoff, increasing the

potential for soil erosion.

Sites 1-5 The use of reclaimed water at the proposed sites could result in saturation. For example, clays covering Sites 1, 2, and 5 have poor water transmissions rates to the soils layers below. Therefore, if application rates are greater than transmission and loss (evapotranspiration) rates, runoff would occur. Although clays have low runoff potentials, constant runoff generated from over application of reclaimed water would result in topsoil erosion. Erosion from surface runoff could lead to increased sediment loading to stormwater systems and surface waters. The application of reclaimed water to slopes presents the greatest erosion hazard, because saturated soils on slopes flow downhill very easily, carrying sediment to stormwater systems or surface waters. This could impact the quality of surface waters resulting in a potentially significant impact. This issue is addressed discussed in **4.2 Hydrology and Water Quality**. With incorporation of irrigation BMPs, as required by 2006 EIR MM 4.2.5 (see Appendix C) and in proposed Mitigation Measure 4.3-6, impacts would be reduced to a less than significant level. **Less Than Significant with Mitigation**.

> **Mitigation Measure 4.4-6**: Implement Mitigation Measure 4.3-3 to develop a Management Plan for reclaimed water irrigation specific to each site.

IMPACT 4.4-7. Irrigation with reclaimed water on expansive soils could cause shrinking and swelling of soil layers on the project sites, which could damage structures or result in other adverse effects.

Site 1-2, 5 Inconsistent application rates of reclaimed water could cause shrink-swell of clay soils located on Sites 1, 2 and 5. Although expansive soils are present, no habitable structures are located on the project site that would remain during operation and the proposed project does not entail the construction of habitable structures. The planned use as agriculture lands is consistent with existing property uses. Shrink-swell of clay soils on these sites would not impact life or property. **Less Than Significant**.

Site 3-4 Sites 3 and 4 contain sandy loams, which do not shrink and swell when water saturation levels drastically change. These soils are not expansive soils and would not be impacted by the application of reclaimed water in relation to shrink and swell. **No Impact**.