4.2 Land Resources

4.2.1 Alternative A – Proposed Action

Impact 4.2.1-1: Changes to Existing Topography (Less than Significant)

Development of the project site would involve grading and other earthwork as discussed in the Preliminary Grading Plan (**Appendix A**). For Alternative A, it is recommended that cut and fill be balanced on site. Approximately 1,000 cubic yards of fill would be generated by excavations on the western portion of the site, which would be used on the eastern portion of the site to elevate water and wastewater facilities above the floodplain. Significant changes to existing topography are not proposed and thus impacts would be less than significant.

Impact 4.2.1-2: Potential for Soil Hazards (Potentially Significant)

The previous development of residences on project site soils, the known characteristics of project soils, and preliminary borings do not suggest that soil hazards are likely to occur. However, subsurface conditions can vary and even soils suitable for development require mitigation for common soil limitations. Construction limitations include the potential for erosion, subsidence, shrink-swell behavior, and corrosion as described below.

> **Erosion** is the process whereby soil materials become detached and are transported either by wind or water. Rates of erosion can vary depending on the soil texture, structure, and amount of organic matter. The corresponding slope, length, and degree of steepness are also prime factors in determining the potential for soil erosion.
>
> **Subsidence** is the lowering of the land surface due to loss or compaction of underlying materials. Subsidence can occur as the result of hydrocompaction[1]; groundwater, gas, and oil extraction; or the decomposition of highly organic soils. Outside of the Delta, subsidence is generally attributed to consistent and long-term overdraft of the groundwater basin but can also be caused by oxidation, anaerobic decomposition, shrinkage, and wind erosion.
>
> **Expansive Soils** are soils that exhibit a "shrink-swell" behavior. "Shrink-swell" is the cyclical expansion and contraction that occurs in fine-grained clay sediments from wetting and drying. Structures located on soils with this characteristic may be damaged over a long period of time, usually as the result of inadequate foundation engineering.
>
> **Corrosive Soils** can damage underground utilities including pipelines and cables, and can weaken roadway structures.

These limitations may exist and would be potentially significant. **Mitigation Measure 5.2-1** would reduce impacts to a less than significant level. Erosion would be reduced by best management practices, which are included as project design elements as well as **Mitigation Measure 5.5-3**.

[1] Hydrocompaction is the process of volume decrease and density increase upon saturation of moisture-deficient deposits.

Significance after Mitigation: Less than Significant

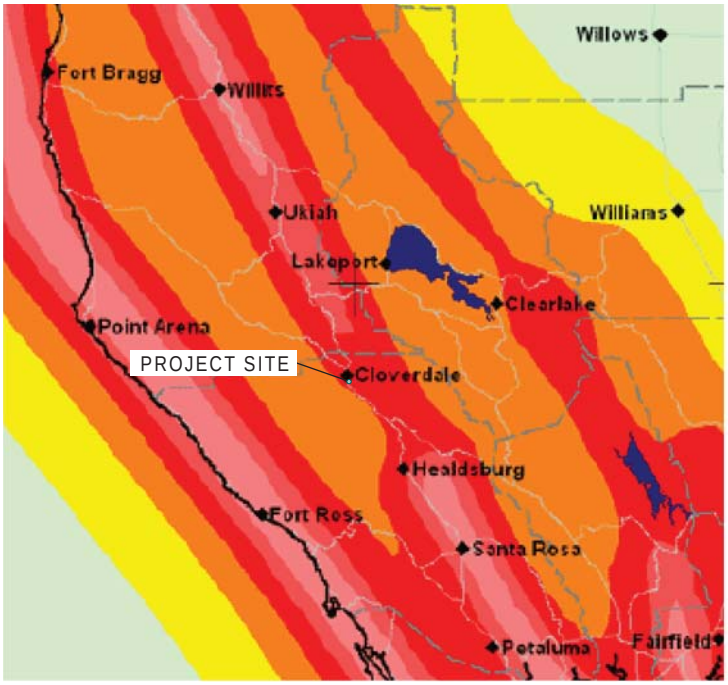
Impact 4.2.1-3: Potential for Seismic Hazards (Potentially Significant)

As the project site is within a seismically-active region there are several potential seismic hazards which could affect the proposed development. The major hazards associated with earthquakes are ground shaking, surface fault rupture, liquefaction, earthquake-induced settlement, and slope instability.

Ground Shaking: The California Geological Survey (CGS) has determined the probability of earthquake occurrences and their associated peak ground accelerations throughout the State of California. A probabilistic seismic hazard map shows the hazards from earthquakes that geologists and seismologists agree could occur in California. The map is probabilistic in the sense that the analysis takes into consideration the uncertainties in the size and location of earthquakes and the resulting ground motions that can affect a particular site. Maps are typically expressed in terms of probability of exceeding a certain ground motion. Current maps produced by the CGS are based on 10 percent exceedance in 50 years. This probability level allows engineers to design buildings for larger ground motions than those that geologists and seismologists think will occur during a 50-year interval. These levels of ground shaking are used primarily for formulating building codes and for designing buildings. The maps can also be used for estimating potential economic losses and preparing for emergency response. The peak ground acceleration (PGA) for the project site, based on a 10 percent exceedance in 50 years, could range from approximately 40 to 50%, which is considered moderate and can cause light structural damage (**Figure 4.2-1**).

Surface Fault Rupture: Fault rupture is displacement at the Earth's surface resulting from fault movement associated with an earthquake. Surface expression of fault rupture is typically observed and is expected on or within close proximity to the causative fault. The project site is not located within or near an Alquist-Priolo Earthquake Fault Zone and thus the risk of surface fault rupture is considered low.

Liquefaction: Liquefaction is the sudden temporary loss of shear strength in saturated, loose to medium dense, granular sediments subjected to ground motion. Liquefaction can cause foundation failure of buildings and other facilities due to the reduction of foundation bearing strength. The potential for liquefaction depends on the duration and intensity of earthquake shaking, particle size distribution of the soil, density of the soil, and elevation of the groundwater. Areas at risk of liquefaction are typified by a high groundwater table and underlying loose to medium-dense, granular sediments, particularly younger alluvium and artificial fill. Clayey type soils are generally not subject to liquefaction. Hazard maps produced by ABAG depict liquefaction hazards for the entire Bay Area. ABAG data indicates that the portion of the project site west of the railroad tracks has a low risk for liquefaction. While the portion of the project site east of the railroad tracks is very highly susceptible to liquefaction it is a moderate hazard due to the distance from the center of a major earthquake (**Figure 4.2-1**). Soils susceptible to strength loss during strong earthquake ground shaking are found in the project vicinity.



Probabilistic Ground Shaking -- 10% probability of Being Exceeded in 50 Years

Liquefaction Susceptibility

N

NOT TO SCALE

SOURCE: California Geological Survey, 2003; ABAG, 2011; and ESA, 2011

Figure 4.2-1
Probabilistic Ground Shaking and Liquefaction Susceptability

Earthquake-Induced Settlement: Settlement of the ground surface can be accelerated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid compaction and settling of subsurface materials (e.g., loose, non-compacted, and variable sandy sediments) due to the rearrangement of soil particles during prolonged ground shaking. Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different rates). Typically, areas underlain by artificial fills, unconsolidated alluvial sediments, slope wash, and areas with improperly engineered construction fills are susceptible to this type of settlement. Soils susceptible to strength loss during strong earthquake ground shaking are found in the project vicinity.

Slope Instability: Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. The susceptibility for native and engineered slopes to fail depends on the gradient and localized geology as well as the amount of rainfall, excavation, or seismic activities. Steep slopes and down-slope creep of surface materials characterize areas that are most susceptible to failure. Engineered slopes have a higher tendency to fail if not properly designed, constructed, or compacted. The slope of the project site is not considered a high risk for landslides.

The potential hazards as discussed above include ground shaking, liquefaction, and earthquake-induced settlement. Slope instability is less likely but could occur. Construction of the project facilities to California Building Code (CBC) standards as discussed in the project description (**Section 2.0**) would reduce impacts; however, this impact is still considered potentially significant. Implementation of **Mitigation Measure 5.2-1** would reduce impacts to a less than significant level.

Significance after Mitigation: Less than Significant

Impact 4.2.1-4: Loss of Mineral Resources (Less than Significant)

The eastern portion of the project site has the potential to contain high quality aggregate resources as identified by the California Geological Survey (2005); however, it is not guaranteed that these resources are present or that they can be economically extracted. Non-urban uses including agriculture and open space are considered consistent with the Mineral Resource Zone (MRZ)-2b. The eastern portion of the project site would be developed with water and wastewater facilities. The remainder of this portion of the site would support sprayfield crops and open space consistent with MRZ-2b. A significant amount of land in the vicinity, and outside of the project site, is zoned as MRZ-2b where mineral resources could be further defined and developed; therefore, the potential loss of resources on the project site does not represent a significant impact.

4.2.2 Alternative B – Reduced Hotel and Casino

Impact 4.2.2-1: Changes to Existing Topography (Less than Significant)

Alternative B would require the import of approximately 27,000 cubic yards of fill. The fill would be used to create building pad elevations similar to Alternative A. Significant changes to existing topography are not proposed and thus impacts would be less than significant.

Impact 4.2.2-2: Potential for Soil Hazards (Potentially Significant)

Potential soil limitations are the same as those discussed for Alternative A. These limitations would be potentially significant. **Mitigation Measure 5.2-1** would reduce impacts to a less than significant level. Erosion would be reduced by best management practices, which are included as project design elements as well as **Mitigation Measure 5.5-3**.

Significance after Mitigation: Less than Significant

Impact 4.2.3-3: Potential for Seismic Hazards (Potentially Significant)

The potential seismic hazards are the same as those discussed for Alternative A. Construction of the project facilities to CBC standards as discussed in the project description would reduce impacts; however, this impact is considered potentially significant. Implementation of **Mitigation Measure 5.2-1** would reduce impacts to a less than significant level.

Significance after Mitigation: Less than Significant

Impact 4.2.2-4: Loss of Mineral Resources (Less than Significant)

As with Alternative A, the eastern portion of the project site would contain uses compatible with mineral resources zones. Additionally, a significant amount of land in the vicinity, and outside of the project site, is zoned as MRZ-2b where mineral resources could be further defined and developed; therefore, the potential loss of resources on the project site does not represent a significant impact.

4.2.3 Alternative C – Reduced Casino

Impact 4.2.3-1: Changes to Existing Topography (Less than Significant)

Alternative C would require the import of approximately 27,000 cubic yards of fill. The fill would be used to create building pad elevations similar to Alternative A. Significant changes to existing topography are not proposed and thus impacts would be less than significant.

Impact 4.2.3-2: Potential for Soil Hazards (Potentially Significant)

Potential soil limitations are the same as those discussed for Alternative A. **Mitigation Measure 5.2-1** would reduce impacts to a less than significant level. Erosion would be reduced by best management practices, which are included as project design elements as well as **Mitigation Measure 5.5-3**.

Significance after Mitigation: Less than Significant

Impact 4.2.3-3: Potential for Seismic Hazards (Potentially Significant)

The potential seismic hazards are the same as those discussed for Alternative A. Construction of the project facilities to CBC standards as discussed in the project description would reduce impacts; however, this impact is considered potentially significant. **Mitigation Measure 5.2-1** would reduce impacts to a less than significant level.

Significance after Mitigation: Less than Significant

Impact 4.2.3-4: Loss of Mineral Resources (Less than Significant)

As with Alternative A, the eastern portion of the project site would contain uses compatible with mineral resources zones. Additionally, a significant amount of land in the vicinity, and outside of the project site, is zoned as MRZ-2b where mineral resources could be further defined and developed; therefore, the potential loss of resources on the project site does not represent a significant impact.

4.2.4 Alternative D – Casino Only

Impact 4.2.4-1: Changes to Existing Topography (Less than Significant)

Alternative D would require the import of approximately 34,000 cubic yards of fill. The fill would be used to create building pad elevations similar to Alternative A. Significant changes to existing topography are not proposed and thus impacts would be less than significant.

Impact 4.2.4-2: Potential for Soil Hazards (Potentially Significant)

Potential soil limitations are the same as those discussed for Alternative A. **Mitigation Measure 5.2-1** would reduce impacts to a less than significant level. Erosion would be reduced by best management practices, which are included as project design elements as well as **Mitigation Measure 5.5-3**.

Significance after Mitigation: Less than Significant

Impact 4.2.4-3: Potential for Seismic Hazards (Potentially Significant)

The potential seismic hazards are the same as those discussed for Alternative A. Construction of the project facilities to CBC standards as discussed in the project description would reduce impacts; however, this impact is considered potentially significant. Implementation of **Mitigation Measure 5.2-1** would reduce impacts to a less than significant level.

Significance after Mitigation: Less than Significant

Impact 4.2.4-4: Loss of Mineral Resources (Less than Significant)

As with Alternative A, the eastern portion of the project site would contain uses compatible with mineral resources zones. Additionally, a significant amount of land in the vicinity, and outside of the project site, is zoned as MRZ-2b where mineral resources could be further defined and developed; therefore, the potential loss of resources on the project site does not represent a significant impact.

4.2.5 Alternative E – Commercial Retail-Office Space

Impact 4.2.5-1: Changes to Existing Topography (Less than Significant)

Alternative E would require the import of approximately 4,000 cubic yards of fill. The fill would be used to create level areas for circulation and building pad. Significant changes to existing topography are not proposed and thus impacts would be less than significant.

Impact 4.2.5-2: Potential for Soil Hazards (Potentially Significant)

Potential soil limitations are the same as those discussed for Alternative A. **Mitigation Measure 5.2-1** would reduce impacts to a less than significant level. Erosion would be reduced by best management practices, which are included as project design elements as well as **Mitigation Measure 5.5-3**.

Significance after Mitigation: Less than Significant

Impact 4.2.5-3: Potential for Seismic Hazards (Potentially Significant)

The potential seismic hazards are the same as those discussed for Alternative A. Construction of the project facilities to CBC standards as discussed in the project description would reduce impacts; however, this impact is considered potentially significant. Implementation of **Mitigation Measure 5.2-1** would reduce impacts to a less than significant level.

Significance after Mitigation: Less than Significant

Impact 4.2.5-4: Loss of Mineral Resources (Less than Significant)

As with Alternative A, the eastern portion of the project site would contain uses compatible with mineral resources zones. Additionally, a significant amount of land in the vicinity, and outside of the project site, is zoned as MRZ-2b where mineral resources could be further defined and developed; therefore, the potential loss of resources on the project site does not represent a significant impact.

4.2.6 Alternative F – No Action

Impact 4.2.6-1: Changes to Existing Topography (Less than Significant)

Under Alternative F, no additional site development would occur in the near term. The project site may eventually be developed with business park, general industry, and/or public facilities. Future development would be required to prepare a grading plan which would address topographic changes to the project site.

Impact 4.2.5-2: Potential for Soil Hazards (Less than Significant)

Future development would be required to conform to building codes and to prepare a design-level geotechnical study prior to construction which would reduce impacts to a less than significant level.

Impact 4.2.5-3: Potential for Seismic Hazards (Less than Significant)

Future development would be required to conform to building codes and to prepare a design-level geotechnical study prior to construction which would reduce impacts to a less than significant level.

Impact 4.2.5-4: Loss of Mineral Resources (Less than Significant)

Future development of the project site would not likely result in a loss of mineral resources. While the eastern portion of the project site is designated as MRZ-2b, no resources have been identified on the site. There is a substantial amount of undeveloped land within the floodplain designated as MRZ-2b which could be investigated and developed and thus impacts would be less than significant.

4.2.7 References

California Geological Survey 2003.Seismic Shaking Hazards in California. Map based on USGS/CGS Probabilistic Seismic Hazards Assessment Model, 2002 (revised 2003), 10% probability of being exceeded in 50 years. http://redirect.conservation.ca.gov/cgs/rghm/pshamap/pshamain.html

ABAG, 2005. Liquefaction Susceptibility Map, http://quake.abag.ca.gov, USGS Open File Report 00-444.

CGS, 2005. Miller, Russell V. ,Kohler, Susan L., Busch, Lawrence L., Dupras, Don, Clinkenbeard, John, 2005, Mineral Land Classification of Sonoma County, California, Special Report 175, California Geological Survey.

This Page is Intentionally Left Blank