CHAPTER 4.0 – ENVIRONMENTAL IMPACTS/ AND MITIGATION

Chapter 4.0 of this EIR addresses the impacts/environmental consequences of the Proposed Project and three project alternatives described in Chapter 2.0, *Description of the Proposed Project and Alternatives*, of this EIR, including the Extraction to Natural Grade Alternative, Extraction to Varying Depth Alternative, No Project/Existing Plan Alternative, and the No Project Alternative. The cumulative analysis for each of the Proposed Project and alternatives is contained in Chapter 5.0 of this EIR. The Proposed Project and alternatives are addressed at an equal level of detail under each of the following 13 issue areas:

Subchapter

4.1 Geological Resources

4.2 Hydrology/Water Quality

4.3 Biological Resources

4.4 Cultural Resources

4.5 Noise

4.6 Air Quality

4.7 Transportation/Circulation

4.8 Hazardous Materials, Public Health, and Safety

4.9 Land Use and Planning

4.10 Aesthetics

4.11 Public Services and Utilities

4.12 Climate Change

4.13 Paleontological Resources

As discussed in Subchapter 1.1, *Introduction and Overview*, an Initial Study was completed by the County for the proposed project that confirmed that an EIR would be necessary. It was decided that an EIR, not a Supplemental EIR, was the appropriate CEQA document given that interim uses (such as the Proposed Project) were included but not analyzed as part of the EOMSP Final EIR. The resource areas potentially affected included geological resources, hydrology/water quality, biological resources, cultural/paleontological resources, noise, air quality, transportation/traffic, land use/planning, public services/utilities, and climate change. Therefore, each of these environmental issues is addressed within this chapter.

In order to assist the reader in tracking between impact significance conclusions and related mitigation measures, significance assessments and the associated mitigation measures have been given correlating numbers and letters. For example, for the topic of air quality, the first significant impact is identified in text in the analysis portion of the discussion as Impact AQ-1 (Air Quality Impact Number 1). The measure designed to attenuate that impact is identified as M-AQ-1 (i.e., Air Quality Mitigation Measure Number 1) in the subsequent mitigation discussion.

4.1 Geological Resources

4.1.1 Thresholds of Significance

The Project would have a significant adverse effect if implementation of a Project-related component would:

1. Expose people or structures to potential adverse effects, including the risk of loss, injury, or death, involving landslides.

2. Be located on a geologic unit or soil that is unstable or would become unstable as a result of the Project, and potentially result in an on- or off-site landslide.

3. Expose people or structures to potential adverse effects, including potentially liquefiable soils or in-situ soil densities that are not sufficiently high to preclude liquefaction.

The guidelines for significant geologic and soil impacts are based on applicable regulatory standards derived from the County Guidelines for Determining Significance for Geologic Hazards (County 2007b), which provide guidance for evaluating adverse environmental effects from geologic hazards. County Guidelines related to fault rupture, strong seismic ground shaking, and expansive soils are not applicable to the Proposed Project and are not addressed in this subchapter.

4.1.2 Proposed Project

4.1.2.1 *Analysis of Project Effects and Determination as to Significance*

As described in Subchapter 3.1, *Geological Resources*, a series of technical analyses have been conducted for the Proposed Project to identify/describe the geologic environment and assess potential Project-related geotechnical concerns. These investigations reflect the Proposed Project design at the time the reports were prepared, culminating in the 2014 Revised Report of Slope Stability Analyses and Reclamation Fill Settlement prepared for the current Proposed Project design (CWE 2014). All of the associated Project technical analyses are outlined below, along with evaluations of potential Project-related geotechnical issues.

Landslide Hazards and Unstable Geologic or Soil Units (Guideline Nos. 1 and 2)

Landslide/Instability Hazards for Proposed Cut Slopes

2005 Geotechnical Analysis

As previously noted, the Project impact footprint and vicinity are located within an area that includes slopes exceeding 25 percent**,** and therefore exhibit potential for landslide-related hazards (County 2007b). Accordingly, the 2005 Project Geotechnical Evaluation Report provided an analysis of post-reclamation cut slope stability, based on criteria including grading/excavation parameters proposed at that time, geologic structure, and local bedrock strength and deformation characteristics (TEUSL 2005). Specific methods used in the 2005 Project Geotechnical Evaluation involved review of aerial photographs, geologic mapping, field exploration/sampling, and laboratory analysis, with the resulting data used to assess slope stability via a three-stage process.

The first stage of this analysis used the Hoek-Brown criterion, an established industry methodology, to assess the gross stability of the largest cut slope proposed at that time, which was approximately 300 feet high. Specifically, applicable bedrock strength, deformation, and structural data were evaluated via computer modeling (the Slide Program) to identify the appropriate grade for a 300-foot high cut slope, while maintaining a 1.5 factor of safety (i.e., the industry standard minimum for static slope stability). This analysis included the assumption that associated bedrock structure encompasses two prominent intersecting joint sets, such that the rock behaves as a mass with no preferred joint orientations (based on field observations [TEUSL 2005]).

The second and third stages of the 2005 slope stability analysis involved the assumption that the stability of proposed rock slopes is controlled by the orientation and shear strength of the major discontinuities (i.e., joint sets) within the rock mass. Specific methodology included plotting discontinuity data on stereonets and conducting associated computer analyses (DIPS and Swedge programs) to evaluate the stability of potential wedge-type slope failures. Based on these assessments, recommendations for overall slope and bench-cut slope inclinations were developed for proposed slope faces.

Pursuant to the above slope analyses, a number of conclusions and recommendations are provided in the 2005 Project Geotechnical Evaluation Report, as summarized below in the bulleted list (with applicable recommendations included as Project Design Features [PDFs] and included in Chapter 10, *List of Mitigation Measures and Project Design Features for the Proposed Project*). These findings incorporated several assumptions regarding geotechnical conditions on-site, including: (1) mapped structure was assumed to be representative of areas not mapped or exposed; (2) shear zones, faults, and joint in-filling (i.e., clay and/or gouge, as described in Subchapter 3.1) were assumed to be localized and were not included in the Project site analysis; (3) the limit of proposed excavation depth (and related cut slope height) was assumed to be 305 feet; and (4) local groundwater conditions were assumed to remain the same as those observed during site analysis, and would therefore not affect overall slope stability.

- Geologic structures would play a prominent role in cut slope stability, with up to two planar features at each slope orientation used in the Project slope stability analysis.

- The described assessment of Project slope stability was determined to be the most appropriate methodology for the Project impact footprint, with the applicability of other types of slope analyses to be determined during future mapping.

- Slopes located within highly weathered materials in the upper approximately 20 feet of local bedrock should be constructed at more gentle inclinations than those recommended below for rock slopes (i.e., maximum 1:1 [horizontal to vertical] slopes), with a slope inclination of 1.5:1 suitable in such weathered areas for planning purposes.

- Observed joints were predominantly clean and rough, although some joint in-filling was observed. The presence of additional joint in-filling could significantly affect the calculated safety factors for proposed slopes.

- Normal, stress-dependent, instantaneous values of friction and cohesion used in the Project analysis were extrapolated from applicable non-linear shear strength criteria, the joint

roughness coefficient (JRC), a basic friction angle of approximately 30 degrees, and the joint compressive strength (JCS).

- A safety factor of at least 1.5 for gross stability of the proposed overall and inter-bench post-excavation cut slopes would be maintained with the following recommended static slope conditions: (1) an overall maximum slope inclination of 45 degrees (i.e., 1:1), (2) a maximum inter-bench slope inclination of 65 degrees, (3) a maximum inter-bench slope height of 60 feet, and (4) a minimum bench width of 6 feet.

The above conclusions and recommendations are based on data associated with relatively small and widely spaced outcrops. The 2005 Project Geotechnical Evaluation Report recommended that periodic mapping and engineering analysis be conducted during quarrying operations to verify the described on-site conditions and assumptions, and to evaluate new geologic conditions as they are encountered.

2009 Geotechnical Analysis

Based on a number of proposed Project design changes identified at that time, the 2005 Geotechnical Evaluation was reviewed in 2009 by Geotechnics to assess the adequacy of the 2005 slope stability analysis with respect to a maximum cut slope height of 500 feet (Geotechnics 2009). The Geotechnics analysis concluded that the 2005 slope stability analysis was adequate for the proposed 500-foot cut slope heights, with inclusion of the following assumptions and recommendations (with applicable recommendations included as PDFs and listed in Chapter 10): (1) with the exception of the noted 305-foot height limit and the slope inclination criteria outlined below, the slope stability assumptions identified in the 2005 Project Geotechnical Evaluation were deemed appropriate for the proposed 500-foot design; (2) mapping and engineering analyses were recommended to be conducted every 50 vertical feet during quarrying operations to confirm the geologic conditions analyzed in the 2005 Project Geotechnical Evaluation, and to evaluate variations in geologic conditions where applicable; and (3) depending on the results of the noted mapping and engineering analyses, weathering in near-surface volcanic rocks was determined to potentially necessitate slope inclinations shallower than the 1.5:1 grades for the upper 20 feet of quarry slopes recommended in the 2005 Geotechnical Evaluation (Geotechnics 2009).

2010/2011 Geotechnical Analyses

Similar to the above discussion, identified design changes in 2010/2011 resulted in additional review and analysis of slope stability and the IDEFO for the Proposed Project features at that time (Geotechnics 2010, CWE 2011). The 2010 Geotechnics analysis evaluated the overall feasibility of implementing the proposed IDEFO, with additional discussion provided below under evaluation of IDEFO fill slopes. The 2011 CWE analysis included: (1) review of previous design, geotechnical and reclamation reports; (2) field reconnaissance and geologic description; (3) evaluation of general subsurface conditions to the proposed excavation depth of approximately 500 feet; (4) completion of a computer-assisted slope stability analysis for the proposed slope configurations; and (5) provision of conclusions and recommendations regarding the 2005 and 2009 slope stability analyses, as well as the types of materials to be imported to the site for the IDEFO (CWE 2011). Based on this investigation, the CWE analysis provided the following conclusions and recommendations for geologic conditions and cut slope stability:

- Local geologic conditions are consistent with those identified in previous analyses, with site geology dominated by the Santiago Peak Volcanics, represented locally by dacite and agglomerate (and lesser amounts of tuff and tuff breccia), along with minor exposures of the Tertiary-age Otay Formation.

- Structural conditions (including rock types, rock strengths and the degree and pattern of fracturing) are similar to those described in the 2005 slope stability analysis.

- The most likely geologic hazard to affect the site is seismic ground shaking, with associated levels "[e]xpected to be low."

- The risk of significant deep-seated slope instability in the on-site native materials "[c]an be considered low…" with the potential for some less stable areas if localized intersecting fractures or other planes of weakness are present.

- Based on previous and current analyses, Project cut slopes would be stable for the proposed excavation depths at grades as steep as 1:1, and potentially as steep as 0.5:1, with the overall conclusion that the 2005 slope stability analysis conducted by TEUSL "[a]dequately addresses the stability of the proposed cut slopes."

2014 Slope Stability and Reclamation Fill Settlement Analyses

The 2014 update of slope stability and fill settlement analyses reflects the current Proposed Project design of cut and fill slopes extending to maximum heights of 525 and 550 feet, respectively (with fill slopes evaluated separately below). The cut slope stability analysis incorporates applicable data and results from the previous Project geotechnical studies, as well as modeling of potential planar and wedge failures for proposed slopes during all Proposed Project phases (using the Rockpack III© software). Based on this analysis, the 2014 study provides the following conclusions regarding temporary and final cut slope stability under the current Proposed Project design:

The steepest of the proposed extraction (temporary) cut slopes will demonstrate minimum factors-of-safety against static and pseudo-static failure in excess of the minimum County requirements for temporary slopes of 1.3 and 1.1, respectively, and the risk of significant deep-seated slope instability in the on-site native materials is considered low.

The final (permanent) cut slopes will demonstrate minimum factors-of-safety against static and pseudo-static failure in excess of the minimum County requirements for permanent slopes of 1.5 and 1.1, respectively, and are anticipated to be stable and not endanger public/private property or interfere with any existing drainage courses.

The 2005 geotechnical study (TEUSL 2005) "…adequately addresses the stability of the proposed cut slopes…"

The 2014 slope stability analysis also provides some qualifications of the above conclusions, however, noting that:

- Localized areas of potentially unstable slopes may be present (i.e., in association with intersecting fractures or other planes of weakness), and that such potential issues "…could

> be mitigated during site extraction with recommendations…by a qualified engineer…based on site observations by a qualified geologist."

- The need for rock fall or debris barriers/fences along final cut slopes should be addressed by a qualified engineer at the completion of site reclamation.

As a result, while temporary and permanent cut slopes would exceed the associated County factor-of-safety requirements as noted, some uncertainties exist with respect to geologic/structural conditions and the stability of temporary and permanent cut slopes related to rock/debris falls, and potential Project impacts related to landslide/instability hazards for cut slopes would be significant per Guideline Nos. 1 and 2 (Impact GE-1).

Landslide/Instability Hazards for Proposed IDEFO Fill Slopes

As described in the Project Reclamation Plan (EnviroMINE 2019b), the proposed quarry excavation would be backfilled on a phase-by-phase basis with inert fill material. Backfilled areas would be compacted into pads, resulting in the generation of fill slopes. The proposed IDEFO would be supervised by a geotechnical engineer to ensure conformance with related geotechnical recommendations and would be subject to applicable regulatory standards including pertinent elements of the County Excavation and Grading requirements, CBC/IBC, SMARA, and NPDES Storm Water Standards (as described in Subchapters 3.1, *Geology*, and 3.2, *Hydrology/Water Quality*). These standards address criteria related to fill slope design (e.g., maximum grades and bench heights) and construction efforts (e.g., proper fill composition, compaction, and moisture content), as well as use of appropriate vegetation types (e.g., native and/or drought-tolerant varieties), drainage facilities, and erosion/sediment control measures to enhance short- and long-term stability. The feasibility of implementing the IDEFO, as well as the stability of related fill slopes, has been evaluated in the previously referenced Geotechnics (2010) and CWE (2014 and 2011) investigations, as summarized below.

The 2010 Geotechnics analysis addresses the overall feasibility of implementing the IDEFO, and concluded that:

> From a geotechnical perspective, the proposed placement of engineered fill to bring the site back to commercially developable grades is feasible assuming the fill is placed and documented as engineered fill under the observation of a qualified geotechnical engineer…The specifications should address subgrade preparation, suitability of fill material, fill placement, and testing and documentation requirements appropriate to the potential uses of the property.

The 2011 CWE investigation included a stability analysis for the proposed IDEFO fill slopes. Specifically, this entailed generating a series of cross sections of the proposed fill slopes, identifying appropriate strength parameters and unit weights for assumed fill materials, and evaluating circular- and block-type failure modes under static and pseudo-static (seismic) conditions through computer modeling (with circular-type failures modeled to initiate at or near the toes of proposed fill slopes). The analysis recommended that fill slopes be constructed in conformance with the following slope height and ratio criteria to ensure an adequate factor of safety:

Slope Height (Feet)	Maximum Slope Ratio
100	1.5:1
200	1.8:1
300	2:1
400	2.2:1
500	2.5:1

For slopes greater than 100 feet in height with an overall slope ratio of 2:1 or less, the 2011 CWE report also recommended that no portion of these slopes be constructed at ratios steeper than 1.5:1.

Additional recommendations identified in the 2011 CWE investigation regarding proposed fill slopes included the following (with applicable recommendations included as PDFs and listed in Chapter 10): (1) fill would be placed and documented as engineered fill under the observation of a qualified geotechnical engineer; (2) fill slopes would be constructed in conformance with the slope height and ratio criteria identified in the referenced 2011 CWE investigation; (3) materials used as fill for the IDEFO should be limited to fully cured asphalt, uncontaminated concrete (including steel reinforcing rods embedded in the concrete), crushed glass, brick, ceramics, clay, and clay products, which can be mixed with rock and soil; (4) all fill materials used for the IDEFO should be properly compacted under controlled conditions to achieve a soil mass capable of supporting structural loading (or loading associated with other proposed uses); and (5) observation, testing and periodic monitoring by qualified personnel should be conducted to verify the assumptions, conditions and requirements identified in the evaluation of IDEFO fill slopes, including proper compaction, or to identify and implement appropriate modifications.

The 2014 CWE also addresses the IDEFO fill slopes as previously noted, based on the current Project design and the related slope parameters identified in the 2011 CWE Analysis. The current investigation concludes that the Proposed Project fill slopes would meet the County requirements for the minimum factors-of-safety against static and pseudo-static failure of 1.3 and 1.1, respectively, with the following recommended slope design criteria:

Project Fill Slope Phase	Slope Height (Feet)	Maximum Slope Ratio
4A	285	2.25:1
4B and 4C	550	2.6:1
4D	450	2.5:1
Final 4D and 4E	70	2.0:1

Based on implementation of the Proposed Project as part of, and in conformance with, applicable regulatory and technical standards (including all pertinent conclusions and recommendations provided in the Project geotechnical analyses and Reclamation Plan), potential Project impacts related to landslide/instability hazards for IDEFO fill slopes would be less than significant.

Instability (Settlement) Hazards for the Proposed IDEFO

The 2011 CWE investigation identified the potential for short- and long-term settlement of the IDEFO fill. Specifically, for general design purposes the analysis assumed that fill would likely settle between 2 and 5 percent. For the currently proposed fill depths approaching 550 feet, this would result in settlement of between approximately 11 and 27.5 feet. The assessment and

conclusions related to fill and potential settlement from the 2011 report were verified in the 2014 CWE analysis, which also concludes that primary settlement of the deeper fill areas may continue over a period of several years, while secondary settlement would likely continue over a few decades after completion of reclamation. Accordingly, the 2014 analysis recommends "…the placement and periodic monitoring of settlement monuments…to assist in future development of the site." Accordingly, with respect to potential future development at the site, potential Project impacts related to the noted degree of settlement for the IDEFO would be significant, pursuant to Guideline Nos. 1 and 2. (Impact GE-2)

Liquefaction (Guideline No. 3)

Liquefaction is a phenomenon in which loose, saturated granular soils lose shear strength, develop high pore water pressure, and exhibit fluid-like behavior after the occurrence of earthquakes or other sources of ground shaking. Liquefaction can also generate related effects, such as dynamic (or seismically-induced) settlement of liquefied soils, or lateral spreading (i.e., horizontal displacement on gently sloping surfaces as a result of underlying liquefaction). The 2011 Project geotechnical analysis concludes that "The native materials at the site are very competent and are not anticipated to be subject to liquefaction due to such factors as soil density, grain-size distribution, and deep ground water conditions…Properly compacted fill soils will also have a low potential for liquefaction" (CWE 2011). Based on this assessment and the fact that the noted conclusions are also applicable to the current Proposed Project design, potential Project impacts related to liquefaction hazards would be less than significant.

4.1.2.2 *Significance of Impacts Prior to Mitigation*

The following direct significant impacts related to geological resources would occur with implementation of the Proposed Project:

Impact GE-1 Construction of temporary and permanent cut slopes could potentially result in significant impacts related to landslide/instability hazards due to uncertainties regarding geologic/structural conditions and the stability of extraction and final cut slopes with respect to rock/debris falls.

Impact GE-2 Implementation of the Proposed Project IDEFO would potentially result in significant impacts related to short- and long-term settlement of fill materials.

4.1.2.3 *Mitigation Measures*

The Proposed Project would result in potentially significant impacts related to cut slope landslide/instability hazards (GE-1), and short- and long-term settlement of fill materials associated with the IDEFO (GE-2). The following mitigation measures shall be implemented to ensure that potential adverse landslide/instability and settlement impacts from Proposed Project implementation would be reduced below a level of significance:

M-GE-1 A qualified geologist shall be on-site during applicable temporary and permanent cut slope excavations to monitor for localized unstable geologic conditions associated with the exposure of intersecting fractures, planes of weakness, or other conditions that may result in unstable slopes. Applicable recommendations from the noted monitoring shall be provided to a qualified engineer and incorporated into the Project design and construction efforts, through measures approved by the County such as localized changes in cut slope grades, use of stabilizing structures (e.g., rock bolts or wire mesh) and installation of protective devices (e.g., rock/debris fall fences or barriers).

M-GE-2 A Settlement Monitoring Program (SMP) approved by the County shall be implemented by a qualified geotechnical engineer to monitor and document potential short- and long-term settlement related to the IDEFO. Specifically, this program shall include the following elements (or other applicable criteria as identified by the Project Geotechnical Engineer and/or the County): (1) identification of appropriate locations and design specifications for settlement monuments; (2) provision of a schedule to list the required frequency (e.g., weekly or monthly) of monitoring events and duration of the SMP; (3) installation of one or more settlement monuments at the location(s) specified in the SMP after completion of the IDEFO, but prior to construction of any subsequent proposed improvements (buildings, pavement, utilities, etc.); (4) documentation of all monitoring data; (5) review and analysis of monitoring data by the Project Geotechnical Engineer to determine if settlement is ongoing and additional monitoring or related standard remedial actions (e.g., surcharging to induce short-term settlement) are required; and (6) preparation/submittal of a report by the Project Geotechnical Engineer to the County documenting when significant settlement is no longer occurring, as well as any other conditions or standard remedial actions (e.g., surcharging) that may be required prior to development in the settlement monitoring area(s).

4.1.2.4 *Conclusion*

Based on the discussions provided above in Subchapter 4.1.2.1, potential direct impacts from the Proposed Project related to fill slope (IDEFO) landslide/instability and liquefaction hazards would be less than significant, effectively avoided, or reduced to less than significant levels through: (1) adherence to recommendations provided in the associated geotechnical analyses and reclamation plan (i.e., the PDFs identified above and in Chapter 10); and (2) conformance with established regulatory requirements. Accordingly, no associated mitigation is required.

Direct impacts related to cut slope landslide/instability are potentially significant under the Proposed Project, based on the possible occurrence of localized geologic conditions that could result in slope instability (refer to CWE 2014 in Appendix C). These potential impacts would be reduced to less than significant levels through the identified mitigation measure to monitor applicable cut slope excavations and incorporate associated recommendations into the Project design and construction efforts (M-GE-1).

Potential direct impacts related to settlement of the IDEFO fill deposits are potentially significant under the Proposed Project, based on the estimated range of potential settlement identified in the related Project geotechnical analysis (refer to CWE 2014 and CWE 2011 in Appendix C). These

potential impacts would be reduced to less than significant levels through the identified mitigation measure to implement a settlement monitoring program and (if applicable) related actions (M-GE-2).

4.1.3 Extraction to Natural Grade Alternative

As described in Chapter 2.0, this alternative would include only Phases 1 and 2 of the Proposed Project. Accordingly, while the overall impact footprint would be the same as the Proposed Project, excavation would only extend to natural grade elevations (i.e., to daylight with existing adjacent elevations to the west), and aggregate extraction would be limited to approximately 19 million tons (versus 89.2 million tons under the Proposed Project). The operational characteristics under the Extraction to Natural Grade Alternative would be the same as described for Proposed Project, although the IDEFO would not be implemented and no associated backfill would occur.

4.1.3.1 *Analysis of Project Effects and Determination as to Significance*

Landslide Hazards and Unstable Geologic or Soil Units (Guideline Nos. 1 and 2)

Landslide/Instability Hazards for Proposed Cut and Fill Slopes

As noted above, the Extraction to Natural Grade Alternative would entail a similar overall impact footprint as described for the Proposed Project, although excavation would extend only to natural grade and the IDEFO would not be implemented. This alternative would encompass similar geologic conditions as the Proposed Project, with the conclusions regarding landslide hazards and manufactured slope stability described above for the Proposed Project also applicable to this alternative (with associated hazards actually to be somewhat less due to the reduced scale of manufactured slopes). The recommendations provided in the Project geotechnical analyses and Reclamation Plan regarding landslide hazards and manufactured slope stability would also be generally applicable to this alternative, as similar geotechnical and excavation conditions would be involved. Some additional analysis would likely be required to address specific manufactured slope locations and dimensions for the Extraction to Natural Grade Alternative (i.e., similar to that recommended for the Proposed Project), although the basic geotechnical conclusions would not be expected to change significantly. Accordingly, while temporary and permanent cut slopes would be expected to exceed the associated County factor-of-safety requirements under this alternative (as noted for the Proposed Project), some uncertainties would exist with respect to geologic/structural conditions and the stability of extraction and final cut slopes related to rock/debris falls. As a result, potential impacts related to landslide/instability hazards for cut slopes under the Extraction to Natural Grade Alternative would be significant per Guideline Nos. 1 and 2 (Impact GE-1).

Based on the implementation of all conclusions and recommendations provided in the Project geotechnical and Reclamation Plan analyses (i.e., the PDFs identified above for the Proposed Project and listed in Chapter 10, with alternative-specific modifications as appropriate), as well as conformance with applicable regulatory requirements, potential impacts related to landslide/instability hazards for proposed fill slopes under the Extraction to Natural Grade Alternative would be less than significant.

Instability (Settlement) Hazards for the Extraction to Natural Grade Alternative

As noted above, excavation under this alternative would extend only to natural grade elevations, and there would be no IDEFO or associated backfill requirements. Accordingly, no potential impacts related to settlement of the IDEFO fill deposits would occur under the Extraction to Natural Grade Alternative.

Liquefaction (Guideline No. 3)

Potential Project impacts related to liquefaction hazards under this alternative would be less than significant, for similar reasons as outlined for the Proposed Project.

4.1.3.2 *Significance of Impacts Prior to Mitigation*

The following direct significant impact related to geological resources would potentially occur with implementation of the Extraction to Natural Grade Alternative:

Impact GE-1 Construction of temporary and permanent cut slopes could potentially result in significant impacts related to landslide hazards due to uncertainties regarding geologic/structural conditions and the stability of extraction and final cut slopes with respect to rock/debris falls.

4.1.3.3 *Mitigation Measures*

Implementation of Mitigation Measure M-GE-1, as identified for the Proposed Project, would also be required under this alternative. Implementation of this measure would ensure that potential impacts related to cut slope landslide/stability would be reduced below a level of significance.

4.1.3.4 *Conclusion*

Based on the discussions provided above in Subchapter 4.1.3.1, no potential direct impacts related to fill slope (IDEFO) landslide/instability hazards would result from the Extraction to Natural Grade Alternative. Associated potential impacts from this alternative related to liquefaction would be less than significant, effectively avoided, or reduced to less than significant levels through: (1) adherence to recommendations provided in the associated geotechnical analyses and reclamation plan (i.e., the PDFs identified above for the Proposed Project and included in Chapter 10); and (2) conformance with established regulatory requirements. Accordingly, no associated mitigation is required.

Direct impacts related to cut slope landslide/instability under the Extraction to Natural Grade Alternative are potentially significant, based on the possible occurrence of localized geologic conditions that could result in slope instability (refer to CWE 2014 in Appendix C). These potential impacts would be reduced to less than significant levels through the identified mitigation measure to monitor applicable cut slope excavations and incorporate associated recommendations into the Project design and construction efforts (M-GE-1), as identified for the Proposed Project in Subsection 4.1.3.3.

4.1.4 Extraction to Varying Depth Alternative

As described in Chapter 2.0, the Extraction to Varying Depth Alternative would include aggregate extraction to a depth between 50 feet and 200 feet below natural grade. The overall impact footprint would be the same as the Proposed Project, with aggregate extraction to include approximately 35 to 60 million tons (versus 89.2 million tons under the Proposed Project). The operational characteristics of this alternative would be the same as described for the Proposed Project, including implementation of the IDEFO with up to approximately 150 feet to 300 feet of backfill.

4.1.4.1 *Analysis of Project Effects and Determination as to Significance*

Landslide Hazards and Unstable Geologic or Soil Units (Guideline Nos. 1 and 2)

Landslide/Instability Hazards for Proposed Cut and Fill Slopes

As noted above, the Extraction to Varying Depth Alternative would entail a similar overall impact footprint as described for the Proposed Project, with excavation limited to an approximate maximum depth of 200 to 350 feet (compared to 550 feet for the Proposed Project), and the IDEFO to encompass approximately 150 to 300 feet of backfill, depending on the total depth of excavation. This alternative would include similar geologic conditions as the Proposed Project, with the conclusions regarding landslide hazards and manufactured slope stability described above for the Proposed Project also applicable to this alternative (and associated hazards actually to be somewhat less due to the reduced scale of manufactured slopes). The recommendations provided in the Project geotechnical analyses and Reclamation Plan regarding landslide hazards and manufactured slope stability would also be generally applicable to this alternative, as similar geotechnical and excavation conditions would be involved. Some additional analysis would likely be required to address specific manufactured slope locations and dimensions for the Extraction to Varying Depth Alternative (i.e., similar to that recommended for the Proposed Project), although the basic geotechnical conclusions would not be expected to change significantly. Accordingly, while temporary and permanent cut slopes would be expected to exceed the associated County factor-of-safety requirements (as noted for the Proposed Project), some uncertainties would exist with respect to geologic/structural conditions and the stability of extraction and final cut slopes related to rock/debris falls. As a result, potential impacts related to landslide/instability hazards for cut slopes under the Extraction to Varying Depth Alternative would be significant per Guideline Nos. 1 and 2 (Impact GE-1).

Based on the implementation of all conclusions and recommendations provided in the Project geotechnical and Reclamation Plan analyses (i.e., the PDFs identified above for the Proposed Project and included in Chapter 10, with alternative-specific modifications as appropriate), as well as conformance with applicable regulatory requirements, potential impacts related to landslide/instability hazards for proposed fill slopes under the Extraction to Varying Depth Alternative would be less than significant.

Instability (Settlement) Hazards for the Extraction to Varying Depth Alternative IDEFO

Potential settlement impacts related to the IDEFO under the Extraction to Varying Depth Alternative would be similar in nature to those described for the Proposed Project. That is, with the assumption that fill would settle between 2 and 5 percent, the resulting settlement would be

between approximately 3 and 7.5 feet for 150 feet of backfill and would be between approximately 6 and 15 feet for 300 feet of backfill. Accordingly, with respect to future development at the site, potential impacts related to the noted degree of settlement for the IDEFO under the Extraction to Varying Depth Alternative would be significant, pursuant to Guideline Nos. 1 and 2 (Impact GE-2).

Liquefaction (Guideline No. 3)

Potential Project impacts related to liquefaction hazards under this alternative would be less than significant, for similar reasons as outlined for the Proposed Project.

4.1.4.2 *Significance of Impacts Prior to Mitigation*

Similar to Impacts GE-1 and GE-2 under the Proposed Project, implementation of the Extraction to Varying Depth Alternative would potentially result in significant impacts related to cut slope landslide/instability hazards, and short- and long-term settlement of fill materials.

4.1.4.3 *Mitigation Measures*

The Extraction to Varying Depth Alternative would result in potentially significant impacts related to cut slope landslide/instability hazards, and short- and long-term settlement. Accordingly, implementation of Mitigation Measures M-GE-1 and M-GE-2, as identified for the Proposed Project, would also be required under this alternative. Implementation of these measures would ensure that associated potential adverse impacts related to landslide/instability hazards and settlement would be reduced below a level of significance.

4.1.4.4 *Conclusion*

Based on the discussions provided above in Subsection 4.1.3.1, potential direct impacts from this alternative related to IDEFO fill slope landslide/instability and liquefaction hazards would be less than significant, effectively avoided, or reduced to less than significant levels through: (1) adherence to recommendations provided in the associated geotechnical analyses and reclamation plan (i.e., the PDFs identified above for the Proposed Project and included in Chapter 10); and (2) conformance with established regulatory requirements. Accordingly, no associated mitigation is required.

Direct impacts related to cut slope landslide/instability are potentially significant under the Extraction to Varying Depth Alternative, based on the possible occurrence of localized geologic conditions that could result in slope instability (refer to CWE 2014 in Appendix C). These potential impacts would be reduced to less than significant levels through the identified mitigation measure to monitor applicable cut slope excavations and incorporate associated recommendations into the Project design and construction efforts (M-GE-1), as identified for the Proposed Project in Subsection 4.1.3.3.

Potential direct impacts related to settlement of the IDEFO fill deposits are potentially significant under this alternative, based on the estimated range of potential settlement identified in the related Project geotechnical analysis (refer to CWE 2014 and CWE 2011 in Appendix C). These potential impacts would be reduced to less than significant levels through implementation of a settlement

monitoring program under mitigation measure M-GE-2, as identified for the Proposed Project in Subsection 4.1.3.3.

4.1.5 No Project/Existing Plan Alternative

4.1.5.1 *Analysis of Project Effects and Determination as to Significance*

Landslide Hazards, Unstable Geologic or Soil Units, and Liquefaction (Guideline Nos.1 through 3)

The No Project/Existing Plan Alternative would involve similar geologic conditions and potential hazards as described for the Proposed Project. Specifically, the 410-acre Project site is located within an area that includes slopes exceeding 25 percent**,** and therefore exhibit potential for landslide-related hazards (County 2007b). While no data are available regarding potential grading, excavation, manufactured slope design or facility construction under this alternative, the conclusions, and recommendations provided in the Proposed Project geotechnical analyses and Reclamation Plan would be generally applicable, due to the similar site location and geotechnical conditions. Some additional analysis would likely be required to address specific development parameters under this alternative (including manufactured slope locations and dimensions) although the basic geotechnical conclusions would not be expected to change significantly. Accordingly, while cut slopes (if proposed) would be expected to exceed the associated County factor-of-safety requirements under this alternative (as noted for the Proposed Project), some uncertainties would exist with respect to geologic/structural conditions and the stability of cut slopes related to rock/debris falls. As a result, potential impacts related to landslide/instability hazards for cut slopes under the No Project/Existing Plan Alternative would be significant per Guideline Nos. 1 and 2 (Impact GE-1).

Based on the implementation of all conclusions and recommendations provided in an alternative-specific geotechnical analysis (i.e., the PDFs identified above for the Proposed Project and included in Chapter 10), as well as conformance with applicable regulatory requirements, associated potential impacts from the No Project/Existing Plan Alternative related to fill slope landslide/slope stability, settlement and liquefaction would be less than significant.

4.1.5.2 *Significance of Impacts Prior to Mitigation*

The following significant impact related to geological resources would potentially occur (if cut slopes are proposed) with implementation of the No Project/Existing Plan Alternative:

Impact GE-1 Construction of temporary and permanent cut slopes could potentially result in significant impacts related to landslide hazards due to uncertainties regarding geologic/structural conditions and the stability of extraction and final cut slopes with respect to rock/debris falls.

All other potential impacts related to geological resources under the No Project/Existing Plan Alternative would be less than significant.

4.1.5.3 *Mitigation Measures*

Implementation of Mitigation Measure M-GE-1, as identified for the Proposed Project, would also be required under this alternative (if cut slopes are proposed). Implementation of this measure would ensure that potential impacts related to cut slope landslide/stability would be reduced below a level of significance.

4.1.5.4 *Conclusion*

Based on the discussions provided above in Subchapter 4.1.5.1, potential direct impacts from the No Project/Existing Plan Alternative related to fill slope landslide/instability hazards, settlement and liquefaction would be less than significant, effectively avoided, or reduced to less than significant levels through: (1) adherence to recommendations provided in the associated geotechnical analyses and reclamation plan (i.e., the PDFs identified above for the Proposed Project and included in Chapter 10); and (2) conformance with established regulatory requirements. Accordingly, no associated mitigation is required.

Direct impacts related to cut slope landslide/instability under the No Project/Existing Plan Alternative would be potentially significant (if cut slopes are proposed), based on the possible occurrence of localized geologic conditions that could result in slope instability (refer to CWE 2014 in Appendix C). These potential impacts would be reduced to less than significant levels through the identified mitigation measure to monitor applicable cut slope excavations and incorporate associated recommendations into the Project design and construction efforts (M-GE-1), as identified for the Proposed Project in Subchapter 4.1.2.3.

4.1.6 No Project Alternative

4.1.6.1 *Analysis of Project Effects and Determination as to Significance*

Under the No Project Alternative, no development of the site would occur, with no potential impacts related to landslide/slope stability, settlement or liquefaction.

4.1.6.2 *Significance of Impacts Prior to Mitigation*

No significant impacts related to landslide/slope stability, settlement or liquefaction would result from implementation of the No Project Alternative.

4.1.6.3 *Mitigation Measures*

Because no significant impacts would occur, mitigation measures are not required.

4.1.6.4 *Conclusion*

Implementation of the No Project Alternative would not entail any proposed development or disturbance, with the project site remaining in its current (largely undeveloped) condition. Accordingly, no project-specific impacts related to landslide/slope stability, settlement or liquefaction would occur, and no mitigation measures are required.

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