3.5 Geology, Soils, Seismicity, and Paleontology

This section identifies and evaluates issues related to geology, soils, seismicity, and paleontology to determine whether the PCRP, including its revisions to the 2011 Creek Restoration Plan that are a component of the 2012 Reclamation Plan Amendment, would cause one or more new significant impacts or a substantial increase in the severity of significant impacts than were disclosed in the 2012 EIR. To do this, this analysis focuses on three things: (1) PCRP areas that are outside of the existing Reclamation Plan boundary (for which Grading Approval would be required); (2) PCRP areas within the Reclamation Plan boundary and within the 120-acre PCRA but outside of the PCRA's 49.2-acre disturbance area; and (3) more generally, whether the PCRP would propose work at greater intensity than previously considered in the 2012 EIR. As a result, Reaches 6–13 and Reaches 17 and 18 are key areas for evaluation.[1]

This section describes the physical and regulatory setting, the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment relative to the 2012 EIR. This analysis is based in part on information contained in the following documents:

- The Geologic and Geomorphic Assessment of Permanente Creek prepared by Golder Associates (Golder), dated October 31, 2019 (**Appendix G1**).
- The report prepared by Golder for its slope stability analysis completed in July 2021 (**Appendix G2**).
- An additional slope stability analysis conducted by Stantec Consulting Services Inc. (Stantec) in August 2022 (**Appendix G6**).
- The *Permanente Creek Restoration Plan Updated 90% Level Submittal Design Basis Technical Memorandum* prepared by Waterways Consulting, Inc., dated August 26, 2022 (**Appendix C**).

The preparers of this Draft SEIR independently reviewed these and other materials prepared by or on behalf of Lehigh and determined that those materials could be relied on (in combination with other materials included in the formal record) in the preparation of this Draft SEIR.

The County received no scoping comments regarding geology, soils, seismicity, or paleontology in response to the Notice of Preparation (**Appendix A**, *Scoping Report*).

[1] See Section 2.4, *Correlation between 2012 EIR PCRA and the PCRP*, for a crosswalk between the restoration activities described and analyzed in the 2012 EIR and the restoration activities described in the PCRP and analyzed in this SEIR. Section 2.5, *Permanente Creek Restoration Plan*, details the PCRP's proposed activities on a reach-by-reach basis.

3.5.1 Setting

3.5.1.1 Study Area

The "study area" for this analysis of potential impacts related to geology, soils, seismicity, and paleontology consists of the Project site described in Section 2.3.2 of the Project Description and shown in **Figure 2-3**.

3.5.1.2 Environmental Setting

Section 4.7.1 of the Draft 2012 EIR described the environmental setting for the 2012 EIR's consideration of geology, soils, and seismicity, including site geology and soils (Section 4.7.1.1, page 4.7-1 et seq.); naturally occurring asbestos, crystalline silica, and trace metal concentrations (Section 4.7.1.2, page 4.7-8 et seq.); regional faulting and seismicity (Section 4.7.1.3, page 4.7-11 et seq.); geologic hazards (Section 4.7.1.4, page 4.7-17 et seq.); and seismic hazards (Section 4.7.1.5, page 4.7-21 et seq.). These descriptions remain accurate for purposes of this analysis of the PCRP except as supplemented below.

Site Geology and Soils

The areas of the PCRP that are outside the Reclamation Plan boundary and thus were not covered in the 2012 EIR are the concrete channel area (Reach 6) and Reaches 7–11. Reaches 6 and 7–9 are underlain primarily by the Santa Clara Formation (described in detail in Section 4.7.1.1 of the Draft 2012 EIR, page 4.7-5), which was formed by prehistoric stream deposits composed of loose to slightly consolidated conglomerate, sandstone, siltstone, and claystone. Similar to the surficial materials within the Reclamation Plan boundary, the overlying surficial materials in Reaches 6–9 contain disturbed mixtures of alluvium, colluvium, and overburden material with minor (if present) native, intact soil horizons. The surficial materials and native soils have low shrink-swell behavior and thus are considered non-expansive. Reach 10 is underlain by graywacke sandstone (Ks) and Reach 11 is underlain by metabasalts (KV) (i.e., altered igneous rocks), which could include greenstone. (Bedrock underlying Reaches 10 and 11 is described in Section 4.7.1.1 of the Draft 2012 EIR, page 4.7-2.) Surficial materials in Reaches 10 and 11 are similar to those in Reaches 6–9, as described above. The Berrocal Fault (described in detail in Section 4.7.1.3 of the Draft 2012 EIR, page 4.7-17) crosses Reach 9 at about the halfway point of the reach. As discussed in the 2012 EIR, some of the slope failures observed on the Project site may be associated with zones of weakness and sheared rock located along strands of the Berrocal Fault.

Paleontological Resources

Paleontological resources setting information was included in Section 4.5, *Cultural and Paleontological Resources,* in the 2012 EIR. The descriptions presented in the environmental setting for paleontological resources in that section remain accurate for purposes of this analysis of the PCRP.

3.5.1.3 Regulatory Setting

Section 4.7.1.6 of the Draft 2012 EIR (page 4.7-23 et seq.) described the regulatory setting for the analysis of potential impacts related to geology, soils, and seismicity, including federal, state, and local laws, regulations, plans, and policies applicable to the analysis of the proposed creek restoration and other Project components considered in the 2012 EIR. The section summarized provisions of the Federal Mine Safety and Health Act of 1977 administered by the Mine Safety and Health Administration, the Surface Mining and Reclamation Act, the California Building Code, and County ordinances, local plans, and policies. The description of the regulatory setting remains accurate for purposes of this analysis of the PCRP except as supplemented below.

Santa Clara County General Plan

The Santa Clara County General Plan (1994) recognizes paleontological sites as having scientific value and the potential to increase knowledge of the natural world, and includes a goal (Goal 5.1) to protect and preserve paleontological resources. Policies C-RC 49 and R-RC 81 state that heritage resources, which include paleontological resources, in Santa Clara County and rural unincorporated areas should be preserved. Policies C-RC 50 and R-RC 82 provide a countywide general approach to heritage resource protection, which involves (1) inventory and evaluation of heritage resources, (2) prevention or minimization of adverse impacts on heritage, and (3) restoration, enhancement, and commemoration of resources as appropriate. Additional policies and recommendations set guidance for implementing the general approach. The following policies are relevant to the evaluation of the potential paleontological resources impacts of the Project:

> ***Policy R-RC 85****:* No heritage resource shall knowingly be allowed to be destroyed or lost through a discretionary action (zoning, subdivision site approval, Grading Approval, building permit, etc.) of the County of Santa Clara unless:
>
> a. The site or resource has been reviewed by experts and the County Historic Heritage Commission and has been found to be of insignificant value; or
>
> b. There is an overriding public benefit from the project and compensating mitigation to offset the loss is made part of the project.
>
> ***Policy R-RC 86****:* Projects in areas found to have heritage resources shall be conditioned and designed to avoid loss or degradation of the resources. Where conflict with the resource is unavoidable, mitigation measures that offset the impact may be imposed.
>
> ***Policy R-RC 88****:* For projects receiving environmental assessment, expert opinions and field reconnaissance may be required if needed at the applicant's expense to determine the presence, extent, and condition of suspected heritage resources and the likely impact of the project upon the resources.
>
> ***Policy R-RC 92****:* The participation of concerned citizens and professionals dealing with heritage resources in the identification of sites and the review and conditioning of projects by its boards and commissions shall be encouraged by the County.

3.5.2 Significance Criteria

Consistent with the County of Santa Clara Environmental Checklist and the version of the CEQA Guidelines Appendix G Environmental Checklist that was in effect at the time, Section 4.7 of the 2012 EIR determined that the proposed 2012 Reclamation Plan Amendment, including creek restoration work within the PCRA, would have a significant impact if it would:

a) Expose people or structures to potential substantial adverse effects, including risk of loss, injury, or death involving:

   i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;

   ii. Strong seismic ground shaking;

   iii. Seismic-related ground failure, including liquefaction; and/or

   iv. Landslides;

b) Result in substantial soil erosion or the loss of topsoil;

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property;

e) 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;

f) Cause substantial compaction or over-covering of soil either on-site or off-site;

g) Cause substantial change in topography or unstable soil conditions from excavation, grading, or fill; or

h) Directly or indirectly destroy a unique paleontological resource or site or unique geological feature.

Updates to the CEQA Guidelines Appendix G Environmental Checklist that were finalized in December 2018 made only non-substantive revisions to these significance criteria. Specifically, the resource topic areas addressing paleontological resources and unique geological features were removed as a cultural resources criterion and were added to the significance criteria considered in the geology, soils, and seismicity analysis. As a result, potential impacts of the PCRP on paleontological resources and unique geological features are analyzed in this section. Accordingly, these criteria remain relevant to this SEIR's consideration of whether the PCRP would cause any new significant impacts or a substantial increase in the severity of significant impacts than were disclosed in the 2012 EIR.

3.5.3 Direct and Indirect Effects

3.5.3.1 Methodology

The evaluation of environmental impacts associated with geology, soils, seismicity, and paleontology was supported by the technical reports completed by Golder and, more recently, by Stantec. Golder provided geotechnical support to Waterways Consulting, Inc., during the completion of the 70% Design Submittal (Golder 2017), and Stantec contributed to the refinements reflected in the Updated 90% Design Memo (Appendix G6, Appendix C) after significant recent additional geotechnical investigation (Golder 2012, 2017, 2018, see also Appendix G1 and Appendix G2). The Stantec memorandum (Appendix G6) characterizes the most recent understanding of Project site geology, seismic setting, and slope stability conditions, and provides the basis of the analysis for geologic conditions, slope stability, and other geotechnical aspects of the PCRP. This collective analysis provides an adequate technical understanding of the geologic and seismic conditions and the potential for slope instability during and after the PCRP's restoration activities. The impact analyses determine whether and to what degree the PCRP would affect slope stability, the existing regional and local seismic regimes, erosion potential, and paleontological resources. Based on this, the analysis determined whether the PCRP would cause a new significant impact or a substantial increase in the severity of a significant impact than identified in the 2012 EIR. The severity of an impact is determined based on the significance criteria identified in Section 3.5.2.

CEQA does not generally require lead agencies to consider how existing hazards or conditions might affect a project's users or residents, except where the project would significantly exacerbate an existing environmental hazard.[2] Accordingly, hazards resulting from a project that places development in an existing seismic hazard area or an area with unstable soils are not considered impacts under CEQA unless the project would significantly exacerbate the seismic hazard or unstable soil conditions. Thus, the following analysis evaluates whether the Project would exacerbate future slope instability, seismic hazards, or erosion potential, and result in a substantial risk of loss, injury, or death.

3.5.3.2 Baseline

Section 3.0.1, *Environmental Baseline*, explains that in the context of an SEIR, the CEQA baseline is adjusted such that the originally approved project is assumed. Therefore, the baseline used in this analysis to evaluate the impacts of the PCRP and alternatives consists of existing environmental conditions plus the 2012 Reclamation Plan Amendment and 2012 EIR, and the creek restoration plans evaluated therein. For purposes of this analysis of potential impacts related to geology, soils, seismicity, and paleontology, this means that the baseline includes the existing earthquake, fault rupture, and landslide potential at the Project site and the erosion potential as mitigated in accordance with the 2012 EIR and 2012 Reclamation Plan Amendment approvals. The baseline also includes the existing physical conditions of Permanente Creek and its adjacent riparian area (including the potential for previously unidentified paleontological resources to be present) in the PCRP implementation area outside the 2012 Reclamation Plan boundary, inside

[2] *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369.

the 2012 Reclamation Plan boundary but outside the approved disturbance envelope for the PCRA.

3.5.3.3 Discussion of Criteria with No Impact on Geology, Soils, Seismicity or Paleontology

Criteria d) and e) as set forth in Section 3.5.2 were eliminated from more detailed consideration in the 2012 EIR for the reasons explained on Draft 2012 EIR pages 4.7-28 and 4.7-29. For the reasons explained there, these criteria also are not considered in this SEIR.

In addition, criterion f) has been eliminated from further discussion because the PCRP would not cause substantial compaction or over-covering of soil either on-site or off-site. The Project involves creek restoration where, depending on the specific reach, a substantial amount of fill material (overburden, native landslide deposits, sediment) would be removed from areas adjacent to and within the existing stream channel. Following removal, these materials would be characterized, transported, and placed at an alternate, suitable location on Lehigh's property, within the 2012 Reclamation Plan boundary. Characterization and placement of these materials would be in accordance with Best Management Practice (BMP)-6 (see Section 2.5.9.1, *Best Management Practices*). These sediment materials would not cause substantial compaction or over-covering of soil horizons on or off the Project site because most of the Project site is overlain by rock or overburden and previous site disturbance has removed the native topsoil.

3.5.3.4 Direct and Indirect Effects of the Project

The analysis in this section evaluates the potential significance of the change in the physical environment that would be caused by implementation of the PCRP relative to baseline conditions, compares that impact conclusion with the impact conclusion reached in the 2012 EIR regarding the same consideration, and then makes a determination as to whether the implementation of the PCRP would cause one or more new significant impacts or a substantial increase in the severity of significant impacts than were disclosed in the 2012 EIR. For the reasons discussed below, implementation of the PCRP would not cause a new significant impact or a substantial increase in the severity of a significant impact than was disclosed in the 2012 EIR.

Impact 3.5-1: Restoration activities proposed under the PCRP could cause slope instability and failure if restoration components are not properly engineered and constructed.

This impact analysis corresponds to significance criteria a.iv), c), and g) as set forth in Section 3.5.2 and addresses slope instability under static and seismic conditions. In the context of Impact 4.7-1 (page 4.7-36 et seq.), the 2012 EIR concluded that, upon final reclamation, restoration with respect to slope stability would be similar or improved as a result of the restoration efforts; however, it further concluded that interim activities associated with PCRA improvements could result in further slumping or shallow sliding of overburden materials farther downslope. Mitigation Measure 4.7-1 was prescribed to increase the stability of slopes during slope grading activities to prevent overburden or native materials from moving downslope or into Permanente Creek. Mitigation Measure 4.7-1 reduced this impact to a less-than-significant level. The PCRP would involve the same or substantially similar restoration activities compared to

those originally proposed in the PCRA, and Mitigation Measure 4.7-1 would be implemented as part of the baseline condition for the interim activities (i.e., road grading, material removal) associated with PCRP improvements. For the reasons discussed below, the PCRP would cause **no new significant impact** and **no substantial increase in the severity of a significant impact** than was disclosed in the 2012 EIR for significance criteria a.iv), c), and g).

Slope instability could occur in channel reaches where PCRP restoration activities increase slope steepness, remove slope toe[3] support, or otherwise alter slope configuration. This is especially the case in the Rock Pile Area (Reach 11) and the Material Removal Area (Reaches 17 and 18), where the efforts to remove overburden and establish the channel on bedrock could require deep excavations with slopes that could become unstable if over-steepened. APM-GEO-1 (as set forth in Section 2.5.9.2 in Chapter 2, *Project Description*) would require the Project Geotechnical Engineer and/or Project Engineering Geologist to inspect all interim and final cut slopes as the Project progresses so that any potential areas of concern can be identified early in the process and remedial measures developed, if required. Geotechnical remedial measures could include the removal of additional material, slope laybacks and benching, engineered drainage controls, or slope buttresses consisting of compacted rockfill. Ongoing geotechnical inspection of interim alluvial/overburden slopes or final bedrock slopes by registered geotechnical engineers and/or certified engineering geologists would ensure that unstable slope conditions would be identified and corrected.

In addition to APM-GEO-1, the PCRP has incorporated as part of the Project Stantec's recommendations for rock and soil/fill slopes (Appendix G6):

> **Rock Slopes**: For planning purposes, slopes greater than 20 feet in height in greenstone[4] should not exceed slope angles of 2:1 (H:V).[5] Slopes less than 20 feet should perform adequately at 1.5:1.0; however, localized areas of instability may be encountered. Cut slopes in limestone and sandstone greater than 20 feet in height should not exceed 1:1 and slopes less than 20 feet should be limited to no steeper than 3/4:1.
>
> **Fill or Soil Slopes:** For planning purposes, permanent slopes comprised of mining overburden, alluvium, colluvium, or other site derived fill should not exceed 2:1 (H:V).

The section below discusses potential slope instability in each key channel reach of the PCRP.

[3] The "toe" refers to the lowest part of a slope or cliff. Removal or excavation into a slope toe can reduce the stable equilibrium of a slope and lead to failure.

[4] Greenstone is basalt that has undergone alteration.

[5] Slope steepness is expressed as H:V, which means Horizontal (H) to Vertical (V). For example, a slope of 2:1 (H:V) is a slope that extends horizontally 2 feet for every 1 foot of height gain and has an angle of 26.6 degrees, also referred to as a 50 percent slope.

Potential Slope Instability in Key Reaches

Reach 6

Reach 6 is identified as the "Concrete Channel Area" and is shown on Sheet L1 in Appendix C. There are no slope instability concerns in Reach 6 because the restoration activities do not require native or engineered slopes to be altered or reengineered.

Reaches 8–10

Reaches 8–10 are within the area referred to as the "Channel Widening Area" and are shown on Sheets C11, C12, C13, C14, C15, C16, C17, and C18 in Appendix C. Culvert 8 would be removed from Reach 9 (Sediment Removal Area) and the area would be restored with a floodplain bench incorporated along the northern bank. Restoration in Reach 9 involves minor grading to achieve the recommended 2:1 slopes, but the proposed grading would not require slope stabilization.

Biomechanical bank stabilization treatments, including vegetated rock slope protection, would be installed to provide channel stability in Reach 8 along the southern bank to support the toe of the hillslope where Culvert 7 would be removed and in Reach 10 where Culvert 9 would be removed. Vegetated rock slope protection would be constructed using boulders of specified sizes with live plant (typically willow) cuttings (stakes)[6] placed within the rock matrix during installation. Vegetated rock slope protection would be used where the south bank would be left in an over-steepened condition after culvert removal. Slope protection would not be necessary where Culvert 9 is removed if bedrock is exposed during excavation. The proposed biomechanical slope stabilization would be adequate to protect interim and final slopes in Reaches 8–10. The PCRP would cause **no new significant impact** and **no substantial increase in the severity of a previously identified significant impact** associated with unstable slopes.

Reach 11 (Rockpile Area)

Reach 11 is within the area referred to as the "Rock Pile Area" and is shown on Sheet C19 in Appendix C. Substantial excavation is required to remove the Rock Pile, which is an existing, large stockpile of aggregate material consisting primarily of mining overburden, artificial fills, and some natural landslide deposits overlying a native bedrock slope. Excavation and removal of the Rock Pile fills could cause instability and failure on the north slope of this reach if the material destabilizes during excavation, or if the native bedrock slope exposed after removal becomes unstable.

Stantec performed two-dimensional, limited equilibrium slope stability analysis to support the environmental review and subsequent permitting processes for the Project based on the Updated 90% Design Memo (Appendix G6). Stantec evaluated the stability of proposed slopes at the Rock Pile Area and the Material Removal Area (discussed below) under both static and pseudo-static (earthquake) conditions. The minimum acceptable Factors of Safety (FOS)[7] for the analyses were

6 Cuttings are capable of regenerating into mature plants.

7 The Factor of Safety (FOS) is found by dividing the forces that resist movement in the slope (such as cohesion in clays) by the forces that cause movement (i.e., gravity or water). A slope that is stable would have a FOS of 1.0 or greater, while slopes below 1.0 would have the potential to fail as a landslide or slump. For example, the less steep a slope is, the higher its FOS, as it is less prone to failure.

1.3 for static conditions and 1.0 for pseudo-static conditions based on mining industry standards (Appendix G6). Analysis of pseudo-static model conditions applied a horizontal seismic coefficient of 0.15 times the force of gravity (*g*) to the static condition models to be consistent with previous studies and to evaluate stability for earthquakes with magnitudes up to 8.25. Slope stability analyses conducted by Stantec focused on the areas with the greatest excavation depths including the Rock Pile removal area (Cross-section A; see Appendix C, Sheet C19) and the 1250 Pond area, discussed below (Cross-sections C and E; see Appendix C, Sheet C24). Stantec adjusted the limits of the analyses to evaluate both the global slope stability and the stability in the area immediately adjacent to the PCRP grading. The slope configurations analyzed by Stantec for the Rockpile Area exceed the minimum acceptable FOS.

APM-GEO-1 would require Lehigh's Project Geotechnical Engineer and/or Project Engineering Geologist to inspect and evaluate the nature and stability of the Rock Pile overburden material during excavation and the exposed native bedrock slope after excavation. If the inspection identifies existing or potential slope instability hazards, the engineer and/or geologist would recommend strategies to increase stability and avoid failure. In addition, Stantec's recommendations for final slope inclinations (listed above) have been incorporated as part of the Project, and the geotechnical inspection required under APM-GEO-1 would ensure that these slope angles are achieved.

The proposed design for the Rock Pile Area would improve the overall stability of the slope as compared to existing conditions. Therefore, the PCRP would cause **no new significant impact** and **no substantial increase in the severity of a previously identified significant impact** associated with unstable slopes in Reach 11.

Reach 13

Reach 13 is within the area referred to as the "Rock Pile Area" and is shown on Sheet C19 in Appendix C. Restoration activities in Reach 13 include removal of the dam infrastructure, construction of a restored channel through the abandoned Pond 13, removal of sediments, and installation of native vegetation. Restoration in this area would not rework existing slopes or create new slopes; thus, slope stabilization is not required.

Reaches 17 and 18

Reaches 17 and 18 are within the area referred to as the "Material Removal Area" as shown on Sheets C23 and C24 in Appendix C. Within Appendix C, see also Appendix L, *Material Removal Area Lower Limit of Potential Finished Grade Figures*. Reaches 17 and 18 include the Material Removal Area and the old concrete crusher foundation. Proposed restoration activities in Reaches 17 and 18 are the same as or substantially similar to those analyzed in the 2012 EIR and would include removing fill and overburden materials to form a more uniform profile gradient. Excavations at depths of 15–40 feet could be encountered in certain areas, but bedrock is expected to be close to the surface throughout Reaches 17 and 18. Areas requiring excavation could have interim instability, and although the reaches would be stable after restoration, implementation of Mitigation Measure 4.7-1 as identified in the 2012 EIR (which would be implemented under baseline conditions) would ensure that interim grading activities associated with the PCRP would not cause temporary, localized slope failure. Removing the relic concrete

structures and cutting back the old concrete crusher foundation could cause temporary instability within the channel if these structures contribute to the channel stability in these reaches.

Material removal in Reaches 17 and 18 could threaten foundation support for the Upper Water Treatment System, Pond 1250, and associated infrastructure (Appendix G1, page 13), which are located along the top of the creek bank and access road to Permanente Creek. These facilities are currently needed for ongoing quarry operations. If it is determined that these facilities are essential for post-PCRP activities associated with quarry dewatering and reclamation, they would be removed from their current location and relocated. Relocation would eliminate the need for embankment and foundation support structures in the channel to buttress the north toe of slope. The final slope following facility relocation would be graded at 2:1 (H:V), adhering to Stantec's recommendation for final slope inclinations.

Stantec (Appendix G6) analyzed the stability of slope cross sections in the Pond 1250 area (Cross-sections C and E; see Appendix C, Sheet C24) to evaluate the stability under different proposed slope configurations and excavation depths. The cross sections used in the analysis extend to the top of the surrounding slopes to evaluate the impacts of grading on global stability. The results of the analysis indicated that the proposed slope configurations exceed the minimum acceptable FOS (Appendix G6).

Restoration work in Reaches 17 and 18 would require the removal of sediment material and relic structures that could lead to localized slope instability. Lehigh would continue to be required to adhere to Mitigation Measure 4.7-1 (stabilization of interim slopes), which is an independently enforceable obligation of the 2012 Reclamation Plan Amendment approval; and APM-GEO-1 (Project Engineer inspections), which would minimize the potential for slope instability. Thus, the PCRP would cause **no new significant impact** and **no substantial increase in the severity of a previously identified significant impact** associated with unstable slopes in Reaches 17 and 18.

> **Baseline Mitigation from 2012 EIR:** Mitigation Measure 4.7-1, the text of which is provided in Draft SEIR Table H1, *Impacts and Mitigation Measures for the 2012 Permanente Quarry Reclamation Plan Amendment*.
>
> **Additional Mitigation:** None required.

Impact 3.5-2: Seismic ground shaking and associated ground failures could disrupt or damage restoration elements of the PCRP.

This impact analysis corresponds to significance criteria a.i), a.ii), a.iii), and c) as set forth in Section 3.5.2 and addresses hazards associated with seismic ground shaking and related ground failures such as surface fault rupture and liquefaction. In the context of Impact 4.7-2 (page 4.7-37 et seq.), the 2012 EIR concluded that the proposed reclamation activities, including creek restoration activities proposed within the PCRA, would result in a less-than-significant impact with respect to seismic ground shaking from a major earthquake. Seismic ground shaking could

result in injury to site workers or damage to equipment and structures, or could trigger slope failures. In addition, Impact 4.7-2 determined that a large earthquake on the San Andreas Fault could result in minor ground deformation along traces of the Berrocal or Monte Vista fault zones. For the reasons discussed below, the PCRP would cause **no new significant impact** and **no substantial increase in the severity of a significant impact** than was disclosed in the 2012 EIR for significance criteria a.i), a.ii), a.iii), and c).

The regional seismic setting has not changed since the publication of the 2012 EIR. No new active faults have been identified within the Project site and the probability of a regional earthquake has not increased since publication of the 2012 EIR. Restoration activities would occur only on the surface and would not require activities that could trigger minor or micro-earthquakes such as deep excavations, tunneling, deep borings, or blasting. The PCRP would improve slope stability by exposing native bedrock slopes and by removing overburden on steep slopes, thereby reducing the potential for seismically induced slope failure. Soils along Permanente Creek have the potential to liquefy under seismic loading (2012 EIR, page 4.7-22 et seq.); however, the PCRP improvements would not be adversely affected by liquefaction or its associated ground failures because liquefiable soils material (e.g., saturated coarse-grained overburden material or saturated fill) would be removed and replaced with engineered streambed material (ESM).

Baseline Mitigation from 2012 EIR: None required.

Additional Mitigation: None required.

Impact 3.5-3: Earthmoving, excavation, and other ground disturbance associated with the restoration could temporarily promote accelerated erosion and soil loss.

This impact analysis corresponds to significance criterion b) as set forth in Section 3.5.2 and addresses accelerated erosion and soil loss. In the context of Impact 4.7-3 (page 4.7-39 et seq.), the 2012 EIR concluded that earthmoving and other ground disturbance associated with the phased reclamation of the site, including within the PCRA, could temporarily promote accelerated erosion and soil loss, and that this would result in a less-than-significant impact. For the reasons discussed below, the PCRP would cause **no new significant impact** and **no substantial increase in the severity of a significant impact** than was disclosed in the 2012 EIR for significance criterion b).

There are areas of accumulated overburden materials within the PCRP restoration area that could be susceptible to accelerated erosion. However, the potential for soil loss within the PCRP restoration area is low because there are limited areas containing developed soil horizons. The PCRP proposes to remove the overburden from the Permanente Creek channel, which would in turn remove materials susceptible to accelerated erosion. Additionally, the stream channel would be reconstructed with ESM, which would further stabilize the channel and reduce the potential for excessive erosion.

As described in detail in the analysis of Impact 3.7-2 within Section 3.7, *Hydrology and Water Quality*, surface treatments and grade control elements have been incorporated into the PCRP design to minimize and/or avoid episodic or chronic releases of sediments to the creek. In addition to ESM, these elements include floodplain armor to protect newly developed floodplains, vegetated rock slope protection, border sills and weirs, rapidly growing vegetation, and BMPs. In particular, BMP-7 outlines the methods Lehigh must use to minimize erosion (see Section 2.5.9.1, *Best Management Practices*).

The PCRP would be an overall improvement to the hydrologic regime along Permanente Creek and would reduce erosion and sediment transport, improve water quality, create greater long-term slope stability, and minimize sediment sources. Consequently, the PCRP would cause **no new significant impact** and **no substantial increase in the severity of a significant impact** than was disclosed in the 2012 EIR regarding accelerated erosion and soil loss.

Baseline Mitigation from 2012 EIR: None required.

Additional Mitigation: None required.

Impact 3.5-4: Project activities could directly or indirectly destroy a unique paleontological resource or site.

This impact analysis corresponds to significance criterion h) as set forth in Section 3.5.2 and addresses hazards associated with destruction of a paleontological resource or unique geological feature. In the context of Impact 4.5-2 (page 4.5-28 et seq.), the 2012 EIR concluded that the PCRA would cause no adverse effect on a known unique geological feature, and that although there is no indication that the Reclamation Plan area—including the PCRA—contains unique or significant fossils or that paleontologically sensitive rock formations would be disturbed, the possibility of encountering fossils in the course of earthmoving operations cannot be discounted entirely, especially considering the scale of earthmoving operations proposed under the 2012 Reclamation Plan Amendment. Should a fossil be identified during the Reclamation Plan Amendment activities approved in 2012, Mitigation Measure 4.5-3 would require Lehigh to cease all activity within 100 feet of the fossil until it was evaluated by a qualified paleontologist. Mitigation Measure 4.5-3 reduced this impact to a less-than-significant level and would be implemented as part of the baseline condition during implementation of restoration activities for the PCRP. For the reasons discussed below, the PCRP would cause **no new significant impact** and **no substantial increase in the severity of a significant impact** than was disclosed in the 2012 EIR for significance criterion h).

Similar to the PCRA, the PCRP area does not contain known unique geological features that would be destroyed or lost by the Project. The probability of encountering a fossil during PCRP restoration activities is lower than it would be during the reclamation activities analyzed in the 2012 EIR because the PCRP restoration would occur within a smaller footprint and the underlying Franciscan mélange, containing greenstone, chert, and limestone, is generally consistent throughout the PCRP area. Fossil remains typically are not found in the Franciscan

mélange because these rocks were formed in a subduction zone, are altered or metamorphosed,[8] and are highly deformed. The possibility of identifying intact fossils is remote. The overburden material could contain fossils, given that it is reworked limestone; however, the probability is low that a fully intact fossil would be identified within the overburden material.

Baseline Mitigation from 2012 EIR: Mitigation Measure 4.5-3, the text of which is provided in Draft SEIR Table H1, *Impacts and Mitigation Measures for the 2012 Permanente Quarry Reclamation Plan Amendment*.

Additional Mitigation: None required.

3.5.4 Cumulative Analysis

The Draft 2012 EIR analyzed potential cumulative effects in Section 6.2.7, *Geology, Soils and Seismicity* (page 6-21), concluding that the 2012 Reclamation Plan Amendment, including creek restoration within the PCRA, would not result in a cumulatively considerable contribution to any significant cumulative effect. For the reasons discussed below, the PCRP would cause **no new significant impact** and **no substantial increase in the severity of a significant impact** in the cumulative context than was disclosed in the 2012 EIR.

The PCRP would improve slope stability within the study area by removing unstable overburden and requiring 2:1 (H:V) final slopes. Further, Lehigh would implement Mitigation Measure 4.7-1 from the 2012 EIR to address potential interim instability of construction slopes. The PCRP would not contribute to a cumulative impact on local or regional slope stability, because the Project's slope stability improvements would be localized conditions within the Reclamation Plan boundary within the PCRP project site and would not affect slope stability elsewhere in the reclamation area or off-site. Further, the Project would not exacerbate existing or future seismic hazards, including seismically induced slope failure and ground collapse, that would otherwise not occur or be present without the Project. The Project would not contribute to a cumulative loss of paleontological resources because the potential for recovering intact, scientifically significant fossil remains within the PCRP is extremely low. However, if a fossil is identified, then the implementation of Mitigation Measure 4.5-3 as part of the baseline condition (because it is an ongoing, independently enforceable obligation of the 2012 approval) would require that it be evaluated and recovered before work in the area could continue.

Baseline Mitigation from 2012 EIR: Mitigation Measure 4.7-1 and Mitigation Measure 4.5-3. The text of each is provided in Draft SEIR Table H1, *Impacts and Mitigation Measures for the 2012 Permanente Quarry Reclamation Plan Amendment.*

Additional Mitigation: None required.

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[8] Sedimentary rocks and igneous rocks that are changed through pressure and heat.

3.5.5 References

Golder Associates Inc. (Golder), 2017. *Geotechnical Plan Review—Permanente Creek Restoration Plan, 70% Design Submittal, Lehigh Permanente Quarry*. Technical memorandum from Ken Haskell and William Fowler (Golder) to Erika Guerra and Talia Flagan (Lehigh). October 27, 2017.

Golder, 2018. *Geotechnical Plan Review—Permanente Creek Restoration Plan, 90% Design Submittal, Lehigh Permanente Quarry.* Technical memorandum from William Fowler (Golder) to Erika Guerra and Talia Flagan (Lehigh). November 15, 2017.

Golder, 2021. Response to Permanente Creek Restoration Plan Supplemental EIR: Data Request 3, Prepared by ESA, Dated June 25, 2021. Letter. Prepared by George Wegmann and William Fowler (Golder) for Erika Guerra (Lehigh). July 23, 2021.