SANTA CLARA COUNTY, CALIFORNIA

PERMANENTE QUARRY

RECLAMATION PLAN AMENDMENT

CA MINE ID 91-43-0004

VOLUME I OF IV: RECLAMATION PLAN AMENDMENT TEXT AND GRAPHICS

JUNE 2023

This reclamation plan amendment is a comprehensive update that supersedes and replaces the prior approved 2012 reclamation plan.

Lead Agency:
Santa Clara County
Department of Planning and Development

Operator:
Lehigh Southwest Cement Company

Heidelberg Materials

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Lead Agency:
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Operator:
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1. SUMMARY

Table 1, "Reclamation Plan Requirements Summary," provides the key reclamation details in a format that corresponds to the State Mining and Geology Board's form (MRRC-1) for surface mining inspections. At the end of this document is Appendix A, "Index of Required Content," which provides the location in this document for specific requirements, practices, and standards for reclamation.

TABLE 1
RECLAMATION PLAN REQUIREMENTS SUMMARY

Requirements	Description	Reclamation Plan Section
GENERAL INFORMATION		
Mineral Products	Construction aggregate	3.1
Production Amount (Annual/Gross)	An average of 750,000 tons of construction aggregates annually; a minimum of 7 MT of stockpiled construction aggregates contained within the Quarry, WMSA, and surge pile. Average of 500,000 cubic yards of imported excess soil from regional construction used for Quarry backfill, cover of historic mine waste materials, and buttress for long-term stability of Quarry highwalls developed prior to current geotechnical requirements.	3.1
End Date of Operations	December 31, 2065 (for reclamation planning purposes)	2.9
Permit Number and End Date	No use permit; all operations on vested property.	2.5
End Use	Reclaimed to a stabilized condition as open space consistent with the County's Hillside (HS) zoning.	1.3
BOUNDARIES		
Property Acreage	3,510 acres	2.1
Permit Acreage	Operations under this plan occur on vested properties encompassing approximately 2,040 acres. The reclamation boundary encompasses 921 acres.	2.1
Reclamation Acreage (Surface Disturbance)	Reclamation surfaces encompass approximately 670 acres.	1.2
Setbacks	30-foot setback from property line for structures (per Section 2.20.030 of County zoning ordinance)	Sheet 2
SLOPES—GRADING		
Fill Slopes:		
Quarry	2% slope (backfilled surface); buttress: 2.6H:1V	4.1 and Appendix E
WMSA	Graded to 2.25H:1V or flatter	4.1 and Appendix E
EMSA	Graded to 2.25H:1V or flatter	4.1 and Appendix E
Shop and Office	2H:1V to 3H:1V	4.1 and Appendix E
Rock Plant	3H:1V or flatter	4.1 and Appendix E
Compaction	Compaction is not required for end use but is typically employed in practice by the loading imposed by the heavy hauling equipment and heavy tracked vehicles. In areas above historic groundwater levels and as needed, quarry backfill compaction to be achieved by truck or dozer during placement. Additional compaction to be achieved by static surcharge loading of the subsequent fill.	4.3.2 and Appendix E

Requirements	Description	Reclamation Plan Section
Cut Slopes:		
Quarry	Upper regrade: 2H:1V	4.1.3 and Appendix E
EROSION		
Best Management Practices	Temporary BMPs will be installed on-site post-reclamation until the vegetation is established. The BMPs include sedimentation basins, which have been sized based on the Sant Clara Valley URPPP and SWRCB guidelines. As a result, Permanente meets SMARA's current standards (CCR, Title 14, Section 3706) for erosion and sediment control.	4.6.4 and Appendix I
Grading	After reclamation is complete, most surface runoff from the Quarry, WMSA, EMSA, and Permanente Creek Reclamation Area will return to Permanente Creek.	4.6.1
Vegetation	Self-sustaining native vegetation species consistent with surrounding undeveloped areas of the property; interim erosion-control planting; hydroseeding of the finished slopes with native grasses, herbaceous plants, and shrubs; tree and shrub planting on contoured benches and riparian drainages.	4.8 and Appendix H
PONDS		
Design—Function	Settling ponds for stormwater detention and sediment control.	4.6.1, 4.6.2 and Appendix I
Capacity (area/depth/volume)	The majority of the post-reclamation flows will be conveyed to Permanente Creek. Temporary sedimentation basins will capture stormwater runoff from the combined Quarry, WMSA, EMSA, and Rock Plant Area. The basins and other interim erosion control measures will be used until the vegetation establishes. The sedimentation basins will be sized according to criteria from the SWRCB and SCVURPPP.	4.6.2 and Appendix I
Maintenance	Pond maintenance measures are reported to the RWQCB and specified in a SWPPP, which is updated annually.	4.6.2 and Appendix FI
STREAM AND WETLAND PROTECTION		
Buffers (distance to channel)	Historic operations placed materials in slopes along Permanente Creek; such pre-SMARA placement predated setback requirements. The PRCP restoration plan addresses the influence of sedimentation to the creek.	1.4.6 and Appendix B
Berms (distance/length/height)	NA	NA
Best Management Practices	SMARA water quality goals and performance standards will be achieved by compliance with applicable water quality standards via Permanente's existing WDRs issued by the RWQCB, including the approved final closure plan prepared pursuant thereto and site-specific acceptance criteria applicable to materials imported for backfill or cover purposes. Therefore, management practices and resulting water quality (to achieve compliance with applicable water quality standards) will meet or exceed SMARA requirements and will be in place beyond SMARA closure. Erosion and sedimentation will be controlled during operations, reclamation, and closure to minimize siltation to the creek. Temporary BMPs will be installed until the vegetation is established. The BMPs include sedimentation basins, which have been sized based on SCVURPPP and SWRCB guidelines. As a result, Permanente meets SMARA's current standards (CCR, Title 14, Section 3706) for erosion and sediment control. The BMPs will be updated as needed, based	4.6.3, 4.6.4 and Appendix I

Requirements	Description	Reclamation Plan Section
	on the results of monitoring and maintenance, to meet water quality standards reported to the RWQCB.	
Drainage	Basins are sized at a minimum to meet a 20-year/1-hour storm event per SMARA Section 3706(d) and sited to release flows into existing drainages feeding the creek. As reclamation progresses surfaces will be completed to meet final specifications for grading, cover, revegetation, and surface water conveyance. In the interim, runoff will continue to be captured and treated by on-site treatment facilities, as needed.	4.6.3, 4.6.4 and Appendix I
Grading and Slopes	Slopes along Permanente Creek are generally at the angle of repose (1.5H:1 or steeper) These slopes are either being reduced through restoration grading associated with the PCRP or will be reduced by grading under this reclamation plan. Slopes along the lower WMSA and Shop/Office reclamation areas will be reduced to between 2H:1V and 3H:1V.	4.1, Appendix B and E
Stockpiles	After materials suitable for construction aggregates are removed and the stockpiles are regraded, the remainder of the EMSA and WMSA used to store overburden material will be covered with materials specified in the WDRs' approved final closure plan and/or subject to site-specific acceptance criteria and revegetated.	4.6.4 and Appendix I
Stream Diversions	NA	NA
SENSITIVE WILDLIFE AND PLANT PROTECTION		
Species	The reclamation areas are generally devoid of vegetation and habitat, having been disturbed by over 100 years of operations. No new surface disturbance or habitat would be affected under this reclamation plan. Habitat occurs along Permanente Creek and other areas of the property within and surrounding the established reclamation boundary. **Special-Status Birds:** Potentially suitable foraging and/or nesting habitat for several special-status birds is present throughout oak woodland/forest, scrub and chaparral communities. Special-status birds consist of white-tailed kite, olive-sided flycatcher, and yellow warbler; white-tailed kite is the only species with potential to nest. Olive-sided flycatcher and yellow warbler are California species of special concern. White-tailed kite is a fully protected species. **Special-Status Bats:** Habitats on the property have the potential to support roosting special-status bat species, including western red bat and pallid bat. **Special-Status Mammal:** The San Francisco dusky-footed woodrat is known to nest in vegetated areas of the Permanente property and have potential to nest or otherwise occur in oak/woodland forest, scrub, and chaparral habitats. **Special-Status Amphibian:** CRLF consistently occupy limited areas of lower Permanente Creek and appear to be present in Monte Bello Creek. CRLF have been present in ponds and observed to successfully breed.	3.6 and Appendix G
Protection Measures	Reclamation activities described in this reclamation plan are limited to existing areas of surface disturbance. Restoration of Permanente Creek under the PCRP will have protection and mitigation for affected species as needed and addressed in the environmental review for that activity.	3.6

Requirements	Description	Reclamation Plan Section
SOIL/OVERBURDEN STOCKPILE MANAGEMENT		
Topsoil Availability and Storage:		
Location	Limited on-site soil and growth medium is available because the majority of surfaces were developed long before SMARA. Resoiling will occur as a result of cover materials imported for the WMSA, EMSA, and Quarry. Surplus soil imported will also be used to supplement growth media. Temporary storage would occur for imported cover and soil.	4.8.1
Slope Stability	Stockpiled cover and soils will have 2H:1V or flatter slopes.	4.6.4
Best Management Practices	Topsoil stockpiles are unavailable as a result of mine development prior to SMARA.	4.6.4
Overburden and Backfill:		
Location	WMSA, EMSA, Quarry	4.3
Slope Stability	Design minimum FOS: static—1.5; pseudo-static—1.0	4.3.1 and Appendix E
Best Management Practices	In areas above historic groundwater levels and when feasible, Quarry backfill will be dumped in a series of lifts and phases. Materials will then be compacted as a result of vehicle movement and rough-graded according to geotechnical recommendations. Otherwise, compaction will be achieved by static surcharge loading of the subsequent fill.	4.3.2 and Appendix E
Topsoil Application:		
Amendments	Growth media will be amended with limited materials from regrading on-site but largely from imported cover materials and soils.	4.7, 4.8, and Appendix H
Depth	After materials suitable for construction aggregates are removed and the stockpiles are regraded, the remainder of the WMSA, EMSA, and Quarry will be covered with imported surplus soil that meets site-specific acceptance criteria. To augment growth media, imported surplus soil with higher organic matter content than on-site materials may also be used in revegetation. The soil preparation depth for areas targeted for scrub planting over the majority of the surfaces is 6 inches, a depth tested in the test plots and considered suitable to support most shrub and grass species to be seeded, based on investigations of native soils and the planting palette and considering the available and potential materials to develop a planting substrate. Other surfaces, such as at the Shop/Office and Rock Plant Area, will be ripped before planting on native substrate.	4.7 and Appendix H
Moisture	No irrigation is proposed, but the need for short-term irrigation will be assessed based on the needs for container stock.	4.8.2 and Appendix H
Application Methods	Varies based on surface type (cover, soil backfill, or general compacted surfaces)	4.8.1 and Appendix H
REVEGETATION		
Test Plots	Previously completed; results documented	3.8 and Appendix H
Species Mix	A temporary erosion control mix is specified. Grasses, herbs, and shrubs are specified for long-term revegetation.	4.8.3 and Appendix H
Density	200 to 400 plants per acre, depending on reclamation surface	4.8.5 and Appendix H
Percent Cover	20 to 60%, depending on reclamation surface	4.8.5 and Appendix H
Species Richness	One to three species per 1-meter plot area, depending on reclamation surface.	4.8.5 and Appendix H

Requirements	Description	Reclamation Plan Section
Protection	Herbivory protection for specific species will be evaluated based on the results of initial plantings.	Appendix H
Success Monitoring	Revegetated areas would be monitored in late spring or early summer to ensure that most plants will be identifiable to the species level. A qualified biologist with experience in plant identification will conduct monitoring.	4.8.7
Invasive Species Control	Species listed by Cal-IPC (2006) as highly invasive will be considered problematic and will be targeted during maintenance if they exceed the target threshold of 10% cover, unless greater coverage is consistent with adjacent areas not subjected to mining.	4.8.5
OTHER		
Structures	To be removed.	4.9.2
Equipment	To be removed.	4.9.2
Closure of Adits	During final reclamation, the entrance and exit to the conveyor tunnel (from crusher to Cement Plant) will be sealed.	4.9.3
Other Reclamation Plan Requirements	NA	NA

Notes: BMP = best management practices; Cal-IPC = California Invasive Plant Council; CCR = California Code of Regulations; COA = condition of approval; County = Santa Clara County; CRLF = California red-legged frog; EMSA = East Materials Storage Area; FOS = factor of safety; RWQCB = San Francisco Bay Regional Water Quality Control Board; msl = mean sea level; MT = million tons; NA = not applicable; PCRP = *Permanente Creek Restoration Plan*; SCVURPPP = Santa Clara Valley Urban Runoff Pollution Prevention Program; SMARA = Surface Mining and Reclamation Act; SWPPP = stormwater pollution prevention plan; SWRCB = State Water Resources Control Board; WDR = waste discharge requirements; WQO = water quality objectives; WMSA = West Materials Storage Area.

1.1 Purpose

This reclamation plan amendment (2023 reclamation plan) for the Permanente Quarry (referenced herein as “Permanente” or the “quarry”) is a comprehensive update to the reclamation plan approved in 2012 (2012 reclamation plan). This 2023 reclamation plan incorporates the majority of the 2012 reclamation plan specifications but addresses the final reclamation and closure as a result of termination of limestone and cement production and updates final reclamation plans to align with technical analyses not available at the time the 2012 reclamation plan was approved. This amendment incorporates the following components:

- New California Surface Mining and Reclamation Act (SMARA) requirements adopted since approval of the prior plan in 2012 are addressed.
- The Permanente closure process begins by reducing the approved reclamation plan boundary from 1,274 acres to 921 acres (nearly 30 percent), which will consist of only the areas needed for processing stockpiled aggregates and reclamation and closure work.
- The geotechnical stability needs revealed by detailed investigations completed between 2018 and 2023 are addressed.
- The existing Permanente ridgeline will be retained.
- Pre-SMARA slopes along Permanente Creek (previously excluded in the 2012 reclamation plan) will be reclaimed. Flattening the slopes will enhance long-term geotechnical stability of the lower West Materials Storage Area (WMSA) surfaces (see Section 1.4 for a description of the key areas), enhance the success of the Permanente Creek Restoration Project (which addresses only certain slopes), and provides for improved cover options and long-term stormwater management.
- Interim and long-term water quality will be ensured by incorporating technical information not available in 2012 when the existing 2012 reclamation plan was approved, developed in concert with the San Francisco Bay Regional Water Quality Control Board (RWQCB) (Waste Discharge Requirements [WDRs] Order No. R2-2018-0028). The information informed a decision to backfill the Quarry with a combination of materials, including a portion (not all) of the WMSA, other on-site materials, imported materials, and amendments, as necessary, to ensure the effects of low-grade

limestone in the WMSA-related materials known to produce selenium and other constituents of concern (e.g., nickel) are controlled, minimized, and comply with applicable water quality standards. Therefore, a portion of the WMSA would remain in its current location and be closed and managed pursuant to the updated reclamation plan, the WDRs, and approved final closure plan pursuant to the WDRs, upon closure.

- The Quarry will be backfilled with a purposeful combination of both on-site and imported materials.
- Cover materials for the West Materials Storage Area (WMSA) and East Materials Storage Area (EMSA) and for Quarry cover and buttress fill, under a RWQCB final closure plan, are incorporated. Site-specific acceptance criteria will be developed in an imported soils management plan for materials imported for this purpose.
- The plan for acquiring the net gap of reclamation soils is included. Additional soil material is needed to reclaim the WMSA and ESMA, referred to as waste management units (WMUs) in the WDRs, and to cover the final Quarry surface. Imported fill is planned for use because it is superior for long-term water quality protection and various types (physical properties) are available for different uses (e.g., low permeability, soil for revegetation) that are not available on-site.
- A regional location is provided to beneficially reuse soil materials imported from off-site regional projects while reducing vehicle miles traveled for the regional project owners looking to find a new use for their soil, thus reducing regional air emissions.
- Processing and selling previously mined aggregate resources to meet final reclamation grades is included.
- A 40-year reclamation period is planned. The period corresponds to the regrading, quarry backfilling, and import of cover materials from regional sources at an expected annual rate of availability.
- Reclamation is completed in a sequence of phases scheduled as needed to regrade extensive areas, backfill the Quarry, and import cover and fill at an anticipated schedule of availability.

Acreages and volumes cited throughout this reclamation plan are approximate and for planning purposes but are consistent with engineering and other calculations provided in the appendices.

1.2 Reclamation and Closure Overview

Permanente is a historic cement-grade limestone and construction aggregate mining operation located in the Santa Clara County foothills west of the City of Cupertino (see Figure 1, “Regional Location,” and Figure 2, “Site Location”). Figure 3, “Existing Conditions,” identifies the location of key features on-site. Surface disturbances created over 100 years of mining encompass about 670 acres. Permanente produced minerals for two types of mineral products: (1) cement-grade limestone used for manufacturing cement at the adjacent Cement Plant and (2) greenstone, low-grade limestone, and other rock types used for construction aggregates. Permanente has reached the point where limestone reserves that can economically be used to produce cement are exhausted. Mining of limestone is therefore no longer planned. Production of construction aggregates is also scheduled for conclusion and only previously stockpiled materials will be processed.

Waste materials including overburden and waste rock (i.e., materials not suitable for use as cement-grade limestone or construction aggregate) and processing residuals are disposed of in two areas of Permanente: the WMSA and EMSA. Though this material is naturally occurring rock, the removal of the material from its native bedrock environment renders it mining waste. The threat to water quality from waste rock is greater than from native bedrock. The quarrying process (e.g., blasting, excavation, crushing) transforms bedrock into particles, sized from fine silt to cobbles. This process increases the surface area that is subjected to weathering, increasing its leaching potential. For example, exposure to oxygen and water can result in the solubilization (dissolution and potential mobilization) of some metals and metalloids that would otherwise be bound in the bedrock. Waste from cement manufacturing is not currently disposed in the WMSA and EMSA, but the WMSA was used historically for this purpose. The preparation of cement involves rock mining, crushing, and grinding of raw materials comprising limestone, clay, sand, and iron ore (materials bearing lime, alumina, silica, and ferrite, respectively); calcining the materials in a rotary kiln; cooling the

resulting intermediate product called clinker; mixing the clinker with gypsum; and then finally milling, storing, and shipping or bagging the finished cement product. Cement wastes, including cement kiln dust and bricks, may contain heavy metals and have a high pH (basic), potentially contributing to alkalinity in waters that come into contact with the wastes.

The WMSA and EMSA will have closure (and cover depth) specifications and post-closure monitoring under (1) the approved final closure plan prepared pursuant to the RWQCB's WDRs that will likely continue after reclamation and closure under SMARA; (2) per Title 14, California Code of Regulations (CCR), Sections 3706(a) and 3706(b); and (3) per Title 27 of the California Water Code under which the RWQCB regulates mining and specifies that "Mining Units" shall be closed so that they no longer pose a threat to water quality.

Ancillary components of the site for operation of aggregate processing and reclamation work include haul roads; property access and maintenance roads; the mine shop and offices area; maintenance, utility, and legacy structures and parking surfaces; a network of roads for property maintenance; stormwater ponds; and water conveyances. Maintenance roads and surface water management will continue to be revised through the reclamation process.

Groundwater monitoring wells allow Permanente staff to assess on-site water conditions. Water treatment facilities are designed to capture, treat, and convey stormwater to ensure that water entering Permanente Creek complies with RWQCB's water quality standards. The groundwater monitoring wells and water treatment facilities will continue to operate as dictated by the WDRs (and Permanente's separately issued surface water discharge permit, Order No. R2-2019-0024). Operation of water treatment facilities may continue until the overburden surfaces are covered and the Quarry is backfilled to a point that active treatment and discharge is no longer necessary, as determined by the RWQCB. (Manufacturing-related sources of pollutants from Cement Plant operations that are not addressed by reclamation planning will also influence the operation of these facilities.)

Primary activities under this reclamation plan involve:

- removing aggregate stockpiles;
- grading steep areas for stability;
- backfilling the Quarry;
- covering the WMSA, EMSA, and Quarry with suitable closure material (generated on-site and imported);
- buttressing Quarry walls with imported fill; and
- revegetating.

This plan amendment incorporates site-specific data for reclaiming Permanente's surface conditions while recognizing that no additional topsoil for revegetation will be generated via mining, and the limited stockpiles created since SMARA's enactment are insufficient. Moreover, the historic areas of overburden placement (the WMSA and EMSA) covering nearly 300 acres of Permanente are expected to require several feet of cover for long-term groundwater protection.

SMARA contemplates that cover materials may be needed for backfill and for revegetation purposes (*see* CCR Section 3501 and Section 3503[f]). A suitable substrate for revegetation is planned to cover the imported, lower permeability materials placed on-site. Thus, imported soil is needed for both cover and revegetation of the Quarry, WMSA, and EMSA.

The approved plant species palette is based on the results of 16 test plots and the assessment of native plants in undisturbed areas. Native and naturalized local plant species will be used to control erosion and for final revegetation. Plants will be acquired from native plant suppliers, locally collected seed, and plugs and container plants (where local slopes and solar orientation will support larger species).

1.3 Reclamation Land Use Objective

After a quarry operation ceases to extract mineral resources, SMARA requires mined lands to be reclaimed to a usable condition that is readily adaptable for alternative land uses. Permanente will return the site to an open space condition suitable for subsequent uses allowed under the applicable Santa Clara County Zoning Ordinance. Permanente is within a county planning area for Rural Base Districts and is largely zoned "HS Hillside." The stated purpose of the Hillside district is to preserve mountainous lands unplanned or unsuited for urban development primarily in open space and to promote uses that support and enhance rural character.

Reclamation at Permanente will generally be aimed at a condition where mine slopes are stable and safe, surfaces are properly graded to prevent erosion, and a vegetation cover is established that will be effective in controlling wind and water erosion as well as attenuation of the aesthetic contrasts where surfaces are visible from surrounding communities.

1.4 Site Components Summary

Reclaimed surfaces under this amendment will add no new mining surface disturbance; however, pre-SMARA lower slopes at the WMSA area are incorporated into the overall grading plan. For purposes of reclamation planning and phasing, Permanente is divided into six reclamation areas: the Quarry, WMSA, EMSA, Shop and Office, Rock Plant and Haul Road, and Permanente Creek Restoration Area/Lower WMSA. Figure 3 shows the location of these areas. The following sections describe these areas.

1.4.1 Quarry

This plan includes limited upper bench stabilization work based exclusively on geotechnical analysis and as needed to meet current seismic standards.

The Quarry is located on the hillside to the west of the Cement Plant and is where mineral extraction has historically taken place. The Quarry features elevations that range from approximately 550 feet (ft) above mean sea level (amsl) to 1,750 ft amsl. The topography surrounding the Quarry ranges in elevation from approximately 1,000 ft amsl near the east end of the south highwall to approximately 1,750 ft amsl at the top of the mining disturbance in the northwest corner of the highwall.

Reclamation of the Quarry will involve backfilling the Quarry to an elevation of approximately 990 ft amsl and then placing a buttress to stabilize the remaining highwalls. The final backfilled surface will slope to the southeast at 2 percent. The buttress needed to stabilize highwalls cut prior to current geotechnical requirements will be placed on top of the backfilled surface. Static and pseudo-static slope stability analyses were completed for this plan to evaluate the stability of the regraded (post-reclamation) buttressed slopes. Topsoil and other amendments will be placed on the backfilled slope and vegetation planted.

A total volume of approximately 42 million cubic yards (mcy) is required to fill the Quarry to its final design surface including the buttress. An additional 1.4 mcy is required to grade the remaining areas of Permanente. The Quarry will be backfilled with a mixture of greenstone overburden (generated on-site), concrete from demolition of the Cement Plant, and suitable surplus soil (imported from off-site) to a minimum elevation of approximately 990 ft amsl. This elevation corresponds to the lowest natural outlet in the surrounding topography so that the reclaimed surface of the Quarry does not impound water.

1972 Ridgeline Protection Easement

On August 18, 1972, Kaiser Cement & Gypsum Corporation granted Santa Clara County a *Ridgeline Protection Easement Deed* (hereinafter, the "1972 Easement"). The 1972 Easement required Kaiser and its successors to maintain a portion of the ridgeline at elevations not lower than elevations illustrated in an attached exhibit. On August 22, 1972, the County Board of Supervisors prepared a resolution formally accepting the 1972 Easement. The location of the easement is shown in Figure 3.

In August 1987, slope movement occurred on the northern ridgeline that lowered some areas below the minimum elevations shown in the 1972 Easement. Kaiser obtained emergency grading permits

from the County and performed corrective grading to stop further movement. No action was taken at the time to modify the 1972 Easement to reflect the changed conditions along the ridgeline.

In June 2012, the County approved the 2012 reclamation plan, which included a geotechnical analysis that determined that the ridgeline, in its current form, is stable according to SMARA standards.

Planned Quarry grading and buttress work under this plan will not lower the existing ridge crest along the highwall.

1.4.2 West Materials Storage Area

The WMSA is an approximately 210-acre area where approximately 48 million tons of low-grade limestone and greenstone were placed. The disposition of the WMSA has changed over the course of reclamation planning. The WMSA was initially intended to remain in place under the approved 1985 reclamation plan. Twenty-seven years later, the 2012 reclamation plan amendment revised that approach to backfill the lower portion of the Quarry to an elevation of 990 ft amsl and buttress the greenstone slide exclusively using materials from the WMSA. This 2023 reclamation plan similarly plans for filling the Quarry to the same elevation, but with a combination of on-site materials, including a portion of the WMSA, and imported fill.

The primary purpose of keeping some of the WMSA in place is to reduce potential near- and long-term surface and groundwater quality impacts from redisturbing the materials that are largely controlled currently and that could resuspend pollutants in a manner where they could become available in greater quantities to ground and surface water receptors. Since 2012, significant additional site-specific data has been developed regarding the hydrologic conditions at Permanente, including the underlying mechanisms affecting surface water and groundwater quality. Additional data has also been generated to evaluate the use of the WMSA materials as the sole source of material for the Quarry backfilling. Lehigh commissioned an expanded set of investigations to meet sampling and reporting obligations under the County's 2012 conditions of approval (COA) and, since 2013, has performed (and continues to perform) a variety of site investigation and monitoring work pursuant to Water Code Sections 13260 and 13267, Orders issued by the RWQCB, and the subsequently issued permits for the site. These activities include comprehensive surface water and groundwater monitoring investigations (including in the areas occupied by the WMSA), material characterization, seep monitoring, and a conceptual site model. The data developed through these investigations has allowed Lehigh to refine its approach to reclamation backfilling to further achieve compliance with applicable water quality standards.

WMSA cover will need lower permeability materials that are not available on-site in the required quality or quantity and will therefore be imported. Cover and fill from off-site sources such as regional construction is generated annually in sufficient quantities to use as cover and backfill. Use of these alternative materials will minimize or eliminate certain water quality risks from moving the entirety of WMSA materials to a location where conditions could exacerbate the leaching of metals into groundwater. This reclamation plan amendment provides for alternative sources of backfill materials in combination with WMSA (from areas regraded for slope layback and stability) and other on-site materials to backfill the Quarry portions of the WMSA. Reducing the contribution of on-site materials as backfill, so that sufficient capacity exists to incorporate other needed materials, will reduce certain risks to water quality that are disfavored by the current and anticipated site WDRs and other permits. A portion of the on-site suitable backfill materials will be generated via regrading the greenstone side of the west wall of the Quarry, and upper Quarry slope stabilization, grading at the shop and office area, and excavation of the lower WMSA along portions of pre-SMARA slopes previously excluded from the 2012 approved reclamation plan. Other material will be obtained from importing suitable surplus soils generated by regional development and construction projects or from other suitable sources.

Surfaces of the WMSA will be regraded for geotechnical stability, lowering slope angles to approximately 2.25H:1V or flatter and moving a substantial portion of the materials into the Quarry or spreading them over adjacent surfaces, based on the composition of the materials. This will include an area of historic fill (informally referred to as the "Yeager Yard," shown in Figure 3) as well as other lower WMSA slopes that were placed prior to SMARA. While many acres of lower WMSA slopes that were previously identified as

posing risks to Permanente creek have been incorporated into the PCRP, others were not. This reclamation plan incorporates those areas into the overall WMSA reclamation.

1.4.3 East Materials Storage Area

The EMSA is an approximately 65-acre area encompassing about 6.5 million tons of waste rock. Monitoring of the EMSA has been occurring pursuant to the site's WDRs because earlier characterization studies suggested that metals and metalloids could pose water quality risks, although constituents of concern are at low concentrations and are not observed in downgradient wells, suggesting these constituents may be relatively immobile.

Closure of the EMSA pursuant to the 2023 reclamation plan amendment and the sites' WDRs will ensure the materials are adequately protected and isolated. The WDRs require monitoring groundwater and hydrogeologically connected surface waters beneath, adjacent to, and downgradient of the EMSA. The continued monitoring and associated modeling evaluation will assess the effectiveness of the existing interim cover and planned final cover. EMSA cover materials will need lower permeability fill similar to the WMSA and Quarry cover that are not available on-site in the quality or quantity needed and will be imported. Areas covered by EMSA stockpiles will be reclaimed at an approximate 2.25:1 slope or flatter.

1.4.4 Shop and Office Area

This area contains primary and secondary crushing stations, offices, and maintenance areas. This active area encompasses approximately 64 acres and will continue to support aggregate processing operations, as well as offices and equipment for the reclamation and closure process. Limited grading is scheduled for this area for geotechnical stability with final slopes between 2:1 and 3:1.

1.4.5 Rock Plant and Haul Road

The Rock Plant is an active rock processing facility for construction aggregates. The Rock Plant is located on the south side of Permanente Creek, as shown in Figure 3. The facility occupies approximately 19 acres with gentle slopes. The facility is at a lower elevation ranging from approximately 580 to 770 ft msl. The plant is a collection of crushing, conveying, screening, and washing facilities that process rock into an assortment of types and grades of aggregate products. Aggregate products are stored in stockpiles until picked up by customers.

The main Haul Road adjacent to the Cement Plant (a separately permitted area not part of this reclamation plan) provides access for all vehicles and equipment from the site entrance to the reclamation areas. Santa Clara County requested the reclamation boundary be modified to include this feature (previously part of the Cement Plant). The road will remain following reclamation for site access.

1.4.6 Permanente Creek Reclamation Area

Over time, Permanente Creek has been modified by operations at the almost hundred-year-old Permanente operation; for example, culverts were installed to make way for roads, the natural creek floodplain was narrowed, and a dam was installed. Further, earlier operational practices resulted in mining-related material deposits to the creek. When the 2012 reclamation plan amendment was adopted, restoration plans overseen by the RWQCB pursuant to a RWQCB–imposed Cleanup and Abatement Order, Order No. 99-018, were incorporated into the 2012 reclamation plan, including restoration of the streambed, banks, and floodplain adjacent to Permanente Creek. The 2012 reclamation plan amendment included the planned creek restoration in the area referred to as the "Permanente Creek Restoration Area." The creek restoration project was subsequently further developed and refined, as reflected in the *Permanente Creek Restoration Plan* (PCRP) (see Appendix B, "Updated 90% Level Submittal Design Basis Technical Memorandum"). The refined plan is called the PCRP, incorporated in this 2023 reclamation plan amendment by reference for those areas within the reclamation plan boundary.

The objectives for the PCRP are to:

a) increase quantity and quality of resident rainbow trout habitat,
b) improve riparian habitat,
c) remove mining-related fill and sediments in the bed, banks, and adjacent slopes,
d) remove or alter human-made structures to improve riparian habitat, and
e) layback creek banks and adjacent hill slopes to provide stable slopes.

In 2021, Santa Clara County began processing a grading approval application for the PCRP to restore and modify specific segments of Permanente Creek located outside of the 2012 reclamation plan boundary. Santa Clara County is completing a supplemental environmental impact report to evaluate the impacts of the final PCRP. The Supplemental EIR will be incorporated by reference into the environmental review process.

2. PROPERTY DESCRIPTION AND USES

2.1 Location, Size, and Legal Description

The site location is shown in Figures 1 and 2. The operation is located in the County foothills west of the City of Cupertino. The overall property ownership includes approximately 3,510 acres, of which the area within the amended reclamation plan boundary is approximately 921 acres. Figure 4, “Parcels and Vested Rights,” provides a map showing assessor’s parcel numbers and acreages and shows which parcels have vested mining rights.

The legal description of the property under ownership is provided in Appendix C, “Legal Description, Parcel Data, and Vested Parcels.” Included therein is Appendix C-1, “Legal Description.”

Current conditions and topography at the time of this reclamation plan amendment are shown in Figure 3, and Sheet 1, “Existing Conditions.”

2.2 Conditions of Approval and Mitigation Measures

In accordance with California Public Resources Code (PRC), Section 2772.1(b)(7)(B), Appendix D, “Conditions of Approval,” provides the current conditions of approval for the approved 2012 reclamation plan amendment, and a location for a list of future conditions of approval or binding mitigation measures to be adopted by the County upon approval of this reclamation plan amendment pursuant to the California Environmental Quality Act; those conditions necessary to meet SMARA requirements are noted.

2.3 Existing and Allowed Land Uses

Mining activity at Permanente began in 1903. Surface mining activities have been continuous since at least 1939 and have been formally recognized by the County and the courts as a legal nonconforming (i.e., vested) use (See Figure 4 for a map of the vested areas). Historically, the Quarry has produced cement-grade limestone to supply the adjacent Cement Plant and construction aggregates to serve market demand. Cement mining operations ceased in 2021. Aggregate production has continued and approximately 7 million tons of quality material is stockpiled for continued aggregates operations. That production will continue for approximately 15 years as concurrent reclamation of other surfaces is accomplished.

The property is designated under the County’s general plan as Hillsides (HS) with a small portion designated as Other Public Open Lands (OPOL). The operation is subject to the County’s zoning ordinance and is classified as listed in Table 2, “Applicable Property Zoning Designations.” Uses allowed under the County Zoning Ordinance include mineral and other resource extraction and land in its natural state.

The eastern portion of the property has no designation in the County’s general plan because it is within the City of Cupertino’s urban service area. Two parcels on the west side are within the City of Palo Alto. None of the mining operations have occurred within the City of Palo Alto, and therefore these parcels are not

included in Table 2. See Appendix C-2, "Summary of Site Parcels, Acreages and Applicability," for a summary of parcels, acreages, vested parcels, and parcels that fall within the boundaries of this 2023 Reclamation Plan. County parcel boundaries are shown in Appendix C-3, "County Parcel Boundaries." The site survey with parcels and topography is provided in Appendix C-4, "Topographic Survey."

TABLE 2
APPLICABLE ZONING DESIGNATIONS WITHIN RECLAMATION BOUNDARY

Zoning Designation	Definition	Assessor's Parcel Numbers
County A-d1	Exclusive Agriculture, Santa Clara Valley Viewshed	351-10-008, -038
County A1-d1	General Use, Santa Clara Valley Viewshed	351-10-037
County A1-20s-d1	General Use, Minimum Lot Size 20,000 Square Feet, Santa Clara Valley Viewshed	351-10-037
County HS-d1	Hillside, Santa Clara Valley Viewshed	351-09-013, -022, -023, -025;
County HS-d1-sr	Hillside, Santa Clara Valley Viewshed, Scenic Roads	351-11-001, -081

Sources: Santa Clara County 2016, Santa Clara County 2019, ParcelQuest 2019, City of Palo Alto 2017, City of Cupertino 2018

No agricultural uses are on-site; no soils on-site are classified as Prime farmland according to the California Department of Conservation pursuant to the Farmland Mapping and Monitoring Program (California Department of Conservation 2009), the U.S. Department of Agriculture, and the Western Santa Clara County Soil Survey (U.S. Department of Agriculture 2011). The site is not subject to a Williamson Act contract.

2.4 Site Features and Utilities

The site is supported with all necessary infrastructure for mining and reclamation. Existing utility services to Permanente include water from San Jose Water, electrical from Pacific Gas and Electric Company (PG&E), sewer, and telecommunications. Major equipment, facilities, and structures receiving electricity include the:

- primary crusher,
- secondary crusher,
- conveyors,
- upper water treatment plant,
- shop and offices, and
- lights to illuminate certain access roads, conveyors, and processing facilities.

Figure 3 identifies the location of key features on-site.

Sewage generated from the Shop and Office Area is connected to a sewage treatment system. Portable toilets are stationed throughout the Quarry.

Power and water infrastructure not needed for groundwater monitoring or other post-reclamation SMARA needs will be dismantled and removed or abandoned in place (e.g., wells in accordance with state requirements) after service or use is completed.

2.5 Existing Land Use Entitlements

Permanente is a *vested operation,* which is recognized under SMARA as a surface mining operation with existing mining rights that does not require a use permit for mining to occur. All parcels where surface

mining operations and reclamation will occur under this plan are part of the vested operation. The County Board of Supervisors affirmed the Quarry's vested status at a February 8, 2011, public hearing. The vested parcels are shown in Figure 4. The accompanying resolution (see Appendix C-5, "Resolution No. 2011-85 Regarding Vested Rights") states:

> 4. That the Board has determined, on the basis of substantial evidence in the record and controlling legal authority, that vested rights exist over the entirety of parcels 1, 2, 3, 5, 6, 7, 8, 9, 11, 14, 15, 16, and 17, as shown on Exhibit 45 attached hereto ("Vested Parcels"), and that vested rights do not exist over parcels 4, 10, 12, 13, 18 and 19. quarry surface mining operations on the Vested Parcels are a legal non-conforming use, and do not require a County use permit for continued surface mining operations within the geographic area bounded by the Vested Parcels.

Just as a Quarry with a use permit requires an approved reclamation plan, a vested operation must also have a reclamation plan that ensures that planned mining areas will be reclaimed pursuant to SMARA and the County's implementing ordinance. The initial reclamation plan for Permanente was approved in 1985. The plan was comprehensively revised in 2012, reflecting the known and planned development of mineral reserves at that time. Changing conditions and new data caused the 2012 reclamation plan to become outdated in its descriptions of the mineral reserves, the timing of completion and topography of final surfaces, and the best methods to reclaim and meet long-term water quality objectives. This amended reclamation plan has been updated to the 2023 conditions in accordance with SMARA and incorporates all applicable new statutory and regulatory requirements.

2.6 Water Quality Protection

Current waste containment practices for the WMSA and EMSA consist of stormwater controls (e.g., best management practices such as berms, wattles, settling ponds, gabion basket check dams, floc logs, or active treatment for stormwater from the EMSA) to minimize the discharge of runoff that has come in contact with mining waste. Stormwater discharges are regulated under Permanente's National Pollution Discharge Elimination System (NPDES) permit. These management controls will continue until surfaces are reclaimed and closed.

SMARA requires protection of water uses and water quality per the Porter-Cologne Water Quality Control Act as well as erosion control. (14 CCR, Section 3706[a] and [c]; 14 CCR, Section 3710[a]). Title 27 of the SWRCB regulations under which the RWQCB regulates mining specifies that "The RWQCB shall issue WDRs which incorporate the relevant provisions of an approved mining and reclamation plan (see California Surface Mining and Reclamation Act, PRC Section 2770, et seq.), prescribe additional conditions as necessary to prevent water quality degradation, and ensure that there will be no significant increase in the concentration of indicator parameters or waste constituents in ground or surface water, unless requirements are waived." Title 27 also specifies that "Mining Units" shall be closed so that they no longer pose a threat to water quality. No post-closure land use shall be permitted that might impair the integrity of structures (such as cover materials). The mined materials are to be closed according to an approved closure and post-closure maintenance plan that provides for continued compliance with the applicable standards for mine waste containment, precipitation and drainage controls, and monitoring throughout closure and the post-closure maintenance period.

Water quality requirements and performance standards for Permanente (as it pertains to the storage and placement of mining materials as well as closure of various aspects of the site) are currently set forth by the State Water Resources Control Board (SWRCB) via WDRs issued to Lehigh pursuant to Title 27 of the CCR (Title 27) and Section 13263 of the California Water Code on June 13, 2018 (SWRCB Order No. R2-2018-0028. The WDRs govern activities that generate mining waste at Permanente that have the potential to impact groundwater and any hydraulically connected surface waters (in this case, Permanente Creek) for the protection of human health and the environment. This includes current and historical disposal activities, aspects of quarrying operations that generate waste, and reclamation (closure) of waste disposal units. Water quality requirements in the WDRs, derived from state law and water quality standards contained in the RWQCB's water quality control plan (Basin Plan), will meet or exceed SMARA requirements and are expected to be in place beyond closure under SMARA.

2.7 Permit and Planning Boundaries

Figure 4 shows the permit boundary for mining (vested parcels) and the reclamation plan boundary under this 2023 amendment. The SMARA *reclamation boundary* requirement was enacted to ensure that all surfaces for planned mining are included in plans for reclamation. All surfaces disturbed by mining operations must be reclaimed under SMARA, except for surface disturbances that occurred prior to January 1, 1976, the effective date of SMARA. Surface disturbances must remain within the reclamation boundary unless a reclamation plan amendment is obtained.

Permanente is now entering the reclamation phase. Therefore, areas no longer planned for potential expansion of operations are released. Under this amendment the 353 acres south of Permanente Creek are removed from the reclamation plan. (The majority, but not all areas south of the creek are thus excluded from this reclamation plan.) The revised reduced reclamation boundary is reflected in Figure 3.

2.8 Designated Mineral Resource

One objective of SMARA is to create a mineral lands inventory by designating certain areas of California as important for the production and conservation of existing and future supplies of mineral resources. Pursuant to SMARA Section 2790, the Surface Mining and Geology Board has designated certain mineral resource areas to be of regional significance. The purpose of this designation is to provide local agencies, such as the County, with information on the location, need, and importance of mineral resources and to ensure that this information is considered in local land use decisions. Construction aggregate was the first mineral commodity selected by the State of California for the regional significance designation because of its importance to the state throughout the construction industry. Construction aggregate is used in Portland cement concrete, asphalt, railroad ballast, stucco, road base, and fill. The availability of aggregate deposits and their proximity to markets are critical factors in the strength of the overall economy.

The Mineral Land Classification for the South San Francisco Bay Production-Consumption Region, published by the California Department of Conservation, Division of Mines and Geology (DMG) in 1996, classifies aggregate resource areas of the Permanente site as Mineral Resource Zone 2a (MRZ-2a). For a mineral deposit to be considered significant and therefore eligible for MRZ-2 classification, it must meet criteria established by the State Mining and Geology Board for material quality, marketability, and economic value. MRZ-2a is specifically defined as:

> Areas underlain by mineral deposits where geologic data indicate that significant measured or indicated resources are present. MRZ-2 is divided into MRZ-2a and MRZ-2b on the basis of degree of knowledge and economic factors. Areas classified MRZ-2a contain discovered mineral deposits that are either measured or indicated reserves as determined by such evidence as drilling records, sample analysis, surface exposure, and mine information. Land included in MRZ-2a is of prime importance because it contains known economic mineral deposits.

DMG updated its report on aggregate availability in its 2018 publication “Aggregate Sustainability in California.” This recent report indicated that the South San Francisco Bay has inadequate permitted aggregate reserves as compared to the region’s consumption.

2.9 Initiation and Termination Dates

Permanente was developed over more than 100 years, and reclamation of the nearly 670-acre area will require approximately 40 years for two reasons: (1) extensive grading is needed to provide long-term geotechnical stability and (2) closure requires locating the cover materials to address the surfaces with low-permeability material, which will limit groundwater infiltration through residual limestone materials in the waste rock and certain Quarry highwalls. Because the amount of cover material needed is not available from on-site areas, it must be imported from regional sources. The cover will also facilitate revegetation. Further, achieving long-term geotechnical stability for the Quarry highwalls at current standards (regardless of their pre-SMARA development) requires fill to buttress the slopes, because the Quarry’s north highwall cannot be laid back without lowering the elevation of the Permanente ridgeline, which is why the new approach to buttress that highwall has been developed.

For purposes of this reclamation plan, construction aggregates production will continue concurrent with the import operations, depending on market demand. Reclamation of the entirety of the mined lands with imported fill will extend through 2060, with final reclamation completed by 2065. The timeline may be shorter if suitable cover fill material is available in greater quantities than predicted.

Properly reclaiming the site without importing fill material is not possible. For the purposes of SMARA compliance under this plan, the ultimate reclamation configuration and condition is projected to be complete by ***December 31, 2065***.

2.10 Reclamation Phasing

Table 3, "Reclamation Phasing," provides the anticipated timing for completion of the various components of site reclamation. Final revegetation will occur as soon as each area receives final grading. The phasing is based on a conceptual material movement plan and a time frame dependent on the availability of imported materials needed for the reclamation. These time frames are conceptual; they are intended to show the sequencing of material placement and anticipated sourcing of cover and fill materials. The actual time frames will be affected by the annual quantities of imported cover and fill materials essential to close the WMSA, EMSA, and Quarry and buttress materials to cover and stabilize Quarry highwalls. The material movement plan assumes the average import of off-site material at 500,000 cubic yards every year until reclamation cover and fill needs are met. Final revegetation will occur as each area receives final grading and soil cover meeting RWQCB closure specifications.

The conceptual material movement plan assumes that the Quarry backfill will be sourced from excess on-site and imported off-site material during the establishment of the final reclaimed slopes.

TABLE 3
RECLAMATION PHASING

Phase	Reclamation Component	Reclamation Years	Description
1	***Permanente Creek Reclamation Area***[2]	0–10	• Permitting process completed • Creek excavations moved to Quarry • Grading completed and revegetation planted
	West Materials Storage Area		• Regrade for stability. Excess cut material sold or moved to Quarry • Complete drainage controls • Cover placed from Yeager Yard and imported materials
	East Materials Storage Area		• Final surface preparation, revegetation, and monitoring • Placement of final fill and regrading of surfaces to geotechnical specifications • Revegetation and monitoring
	Shop and Office Area		• Surge pile and lower slopes regraded • Grading for stability completed. Cut to Quarry
	Quarry		• Initiate Main Slide stabilization and complete Upper Regrade Area; • Installation of drainage controls • Placement of on-site and imported fill • Continued backfill with on-site and imported fill
2	***Rock Plant Area***	10-15	• Grading and revegetation completed.

Phase	Reclamation Component	Reclamation Years	Description
3	***Quarry***	10–30	• Completion of removal of construction aggregate stockpiles • Quarry backfilled to approximately 990 feet above mean sea level. • Final fill elevation reached (+/-990 mean sea level) • Installation of drainage controls • Revegetation and monitoring
4	***Quarry***	30–40	• Buttress using imported fill is constructed • Installation of drainage controls • Revegetation and monitoring

Notes:
(1) Phasing, tasks, and timing subject to actual production depending on market conditions and other engineering and economic factors. Specifications and future updates to waste discharge requirements or establishment of site-specific acceptance criteria for the beneficial reuse of import materials by the San Francisco Bay Regional Water Quality Control Board may dictate reclamation actions and timing.
(2) The project related to the *Permanente Creek Restoration Plan* must be completed in 5–10 years, once all related entitlements and approvals are granted to Lehigh per the February 2016 Amended Consent Decree between Lehigh and the Sierra Club.

The material movement plan assumes the average import of off-site material at 500,000 cubic yards (cy) every year until reclamation cover and fill needs are met. This import rate is conceptual and is intended to show the sequencing of material placement and possible sourcing of material and is subject to change. Final revegetation will occur as each area receives final grading and soil cover meeting RWQCB closure specifications is met.

3. CURRENT CONDITIONS

3.1 Mining

Permanente mineral production is now limited to processing of stockpiled aggregates placed on the west slope of the Quarry and a surge pile north of the Rock Plant. New excavation operations ceased in 2021 and operations at Permanente now consist of moving and processing the remaining approximately 7 million tons of stockpiled aggregates. No additional excavation of mineral resources is proposed for development under this plan.

3.2 Equipment Storage

Equipment, supplies, and other materials for maintenance are stored in designated areas. Current storage areas identified as “Equipment and Maintenance” are shown in Figure 3 and Sheet 1. Equipment will continue to be needed for the extensive grading, backfilling, cover placement and revegetation process.

3.3 Topography and Climate

Topography

Topography on-site and on surrounding lands consists of gentle to steep terrain. These areas contain a series of ridges and valleys trending in a general east-west direction. Steep slopes predominate, with flatter terrain occurring within some previously disturbed areas. Elevations within the larger site property ownership generally increase from east to west, ranging from about 500 ft amsl near the eastern entrance to about 2,640 ft msl at the western and southwestern property boundaries. See Figure 3 and Sheet 1 for existing on-site topography.

Climate

The site lies within a semi-arid Mediterranean climate zone characterized by warm summers and mild winter temperatures with a substantial slope effect contributing to vegetative community differences on north- and south-facing slopes. Rainfall occurs mainly from November–April. Average annual rainfall is about 22 inches; however, precipitation can range widely from year to year. On north-facing slopes, conditions are moister and cooler than on south-facing slopes as evidenced by the dramatic differences

in vegetative communities. Permanente contains both north-facing and south-facing slopes. Typically, winds tend to blow from the mountains toward the valley in a general southwest to northeast direction. Winds are light averaging between 6 and 10 miles per hour (mph).

During the summer, winds shift to blow from the north and northeast. Summer wind speeds range from 5 to 10 mph. Temperatures range from the low 40s to about 60 degrees Fahrenheit from November–April. During the remainder of the year, temperatures range from the high 40s to the high 80s.

3.4 Geology and Geotechnical Conditions

The following sections are summarized; see Appendix E, "Geotechnical Evaluation," for additional detail and sources. Geology of Permanente is depicted in Figure 5, "Geology."

Geology

Permanente is located on the northeastern flank of the Santa Cruz Mountains, within the Coast Ranges Geomorphic Province of central California. The Coast Ranges, typified by northwest trending ranges and valleys oriented subparallel to the San Andreas Fault, are predominantly composed of thick Mesozoic and Cenozoic sedimentary strata. The San Andreas fault zone, located approximately 2.25 miles to the southwest, separates Salinian Block units of the Pacific plate from the Franciscan Complex of the North American plate.

Permanente is underlain by rocks of the upper Jurassic to Cretaceous Franciscan Complex in fault-contact with lower Pleistocene and upper Pliocene Santa Clara Formation. The Berrocal Fault separates the two formations. The Franciscan greenstone is described as dark green to red, altered basaltic rocks, including flows, pillow lavas, breccias, tuff breccias, tuffs, and minor related intrusive rocks, and the Franciscan limestone as light gray, finely to coarsely crystalline limestone. The Santa Clara Formation is a gray to red brown, poorly indurated conglomerate, sandstone, and mudstone in irregular and lenticular beds. Conglomerate consists mainly of subangular to surrounded cobbles in a sandy matrix but locally includes pebbles and boulders. Cobbles and pebbles are mainly chert, greenstone, and graywacke with some schist, serpentinite, and limestone.

The site geology is complex due to the faulting and deformation associated with the Franciscan Complex. This geologic unit consists of faulted limestone and metabasalts (greenstone) and contains basalt, diorite, shale, sandstone, chert, greywacke, and schist. Structure in the area includes numerous low-angle and high-angle faults. Low-angle faults separate limestone units from greenstone units and tend to follow the limestone bedding planes and typically dip to the southeast at 10° to 40°. High angle faults, including the regional Berrocal Fault, are typically oriented in the northwest / southeast direction and dip at greater than 60°. The geology was mapped several times by different geologists, and numerous drilling programs were conducted.

The geology of the Quarry consists of the Franciscan Complex. The highwalls are mostly limestone mixed with a minority of greenstone. Several faults, including the Berrocal Fault, intersect the existing highwall. Golder identified the following key aspects that impact the Quarry slope stability.

Bedding is well developed in the limestone, and although it roughly parallels the thrust faults, bedding orientations can change abruptly due to small scale folding, or across the contacts between adjacent limestone blocks. Bedding is overturned near the Northwest Berrocal Fault strand. Bedding is involved in the control of bench face angles along the west and north walls; and in the development of slides two to three benches high in the north wall, west of the Main Slide (1987), below an elevation of approximately 1,500 ft.

Surface weathering affects rock mass strength of all lithologies to some extent, but particularly greenstones, which are pervasively oxidized and reduced to a clay-rich residual soil within 50 ft to 100 ft of the original ground surface.

Thrust contacts along the north wall dip to the south, toward the Quarry. A greenstone limestone contact is implicated in development of the Main Slide.

Fault and Structure Mapping

The current understanding of major fault structures in the area is based on surface mapping, drill hole intercepts, aerial photography, mapping, and published reports. As noted from the previous reports for Permanente and available regional geological information, the Quarry area is less than two miles from the San Andreas Fault and the Berrocal Fault. The Berrocal Fault has been mapped with multiple trace locations and has been mapped as running through the Permanente property. Permanente has numerous shear zones and faults running through it, which include both high and low angle faults. Given the potentially controlling nature of these faults on overall highwall stability, the development of a fault structure model was a critical step in evaluating the Quarry. In consideration of potential structural impacts on Quarry stability, conservative values for rock strength and wall slopes were used for the design.

Additional fault and discontinuity mapping were performed in October 2018, concentrating on mapping exposed larger scale discontinuities and shear zones and collecting data on dominant discontinuities and fracture and bedding sets in the Quarry and across the Permanente property. Structural orientations were acquired along many of the discontinuities and shear zones exposed within the Quarry, with an emphasis on the larger structures that could be traced across the Quarry as these features are more likely to have an impact on the stability. Fault mapping indicated numerous moderate to high angle, north/south and northwest/southeast trending structures present throughout Permanente.

Review of historical stereo photographs from as early as 1960 indicated a large northwest trending fault, or wide fault zone across the Permanente property. This fault is clearly visible in the stereo paired historical photos, but it is difficult to identify on the ground due to vegetation and modifications to the terrain that have occurred. The fault zone trends to the northwest and appears to dip steeply to the northeast. The fault may be made up of multiple strands, with the main strand trending northwest along the slope break of the ridge south of Permanente Creek, southeastward across the top of the ridge, and down a southeast trending drainage toward the Stevens Creek Quarry's northern and western highwall. While it is likely that this fault traverses the site, it is difficult to identify how the numerous faults that traverse the Quarry are connected, as the bottom of the Quarry is obscured by fill and water, and there appears to be two dominant trends as identified in the previous section. The interpretation is that the major fault visible on the historic aerial photos is possibly the western trace of the Berrocal Fault, with many other strands of faulting contained within the Quarry walls.

3.5 Hydrology and Water Quality

The predominant drainage is Permanente Creek, which drains the vast majority of the developed portions of Permanente. Permanente Creek is situated just south of the operation and is entrenched in limestone where it lies adjacent to the Quarry. To the west and east of the Quarry, Permanente Creek is mostly underlain by greenstone, greywacke, and undifferentiated Franciscan mélange.

Permanente Creek is generally dry adjacent to the Quarry during the dry season, due to head reversal caused by dewatering. However, in the foothill reaches, Permanente Creek is a perennial stream that typically flows year-round both upstream of and downstream from the Quarry. The creek is typically a gaining stream (i.e., baseflow from groundwater in the creek sustains the perennial stream). Recharge is in the uplands and side slopes and discharge to drainage channels in the form of seeps, springs, and baseflow.

Permanente is located in upland bedrock terrain that slopes eastward toward the Santa Clara Valley. Surface water and groundwater flow from the bedrock hills toward the alluvial valley. The primary groundwater basin near Permanente is the Santa Clara Valley Groundwater Basin. Permanente lies just west of the Santa Clara subbasin of the Santa Clara Valley Groundwater Basin, and the remaining portion of Permanente overlies fractured bedrock that drains to these basins.

The hydrostratigraphy of Permanente area consists of a heterogeneous groundwater system within low to moderately permeable greenstone, limestone, and graywacke. Groundwater flow generally mimics surface

topography, with recharge occurring at higher elevations and prominent ridges and discharge occurring in low-lying areas, streams, and in Permanente.

Groundwater flow is preferentially within the more fractured and rigid limestone blocks, but the limestone is limited in extent and compartmentalized, resulting in a groundwater flow system that is overall controlled by limited groundwater recharge, because of the climatic conditions and overall movement through the less permeable greenstone. Groundwater flow is under a downward component of hydraulic gradient below the hillsides and an upward component of hydraulic gradient in the valley bottoms.

Annual recharge to the groundwater system is estimated to range between 2 to 8 inches and is primarily from the infiltration of precipitation, but also locally from infiltration of surface runoff. Areas with flatter slopes or areas in topographic lows receive more recharge than steeper topographical areas because more runoff is in areas with steeper slopes and more run-on is on flatter areas. Runoff from the steeper slopes may also accumulate in local topographic depressions, resulting in localized increased infiltration.

Groundwater discharges to surface water bodies, such as Permanente Creek and its tributaries, where the groundwater table intersects the ground surface. Areas of discharge are southeast of the existing Quarry, where the groundwater intercepts Permanente Creek in the topographically low areas. Groundwater discharge to streams typically sustains base flow in the dry season.

Groundwater typically occurs at depths of 80 to 120 ft in the upland hillside terrain and at shallower depths (10 to 40 ft) at lower elevations. Structural complexity also creates locally perched and semi-confined conditions.

In general, first-encountered groundwater at Permanente occurs under unconfined conditions. Groundwater occurs within the Santa Clara Formation in the eastern portion of Permanente in both secondary openings (i.e., fractures, joints, shears zones, and faults) and potentially in primary pore spaces within the more permeable sandstones and conglomerates.

Groundwater also occurs in the fractured bedrock in the remainder of Permanente; however, the occurrence of groundwater at depth within the Franciscan bedrock is almost exclusively within secondary openings, such as joints, fractures, shear zones, and faults, in contrast to primary porosity or pore spaces within the rock. Because of the limited amount of storage capacity and the relatively low permeability, the Franciscan is considered by the State Department of Water Resources (DWR) to be “non-water-bearing” with respect to production of usable quantities of water.

Groundwater flow in the WMSA is controlled by the pre-stockpile surface topography and the two main ridges that formed the side canyon before the overburden material was placed in the WMSA. The predominant ridgeline that runs from west to east acts a groundwater divide just to the north of the WMSA. Groundwater south of this ridgeline flows to the south and southeast toward Permanente Creek and follows the former canyon drainage axis. The southwestern ridge, which forms the southern WMSA boundary, acts as another divide to flow.

Groundwater was not encountered in the overburden material within the WMSA when the monitoring wells were installed in 2015. Groundwater near the Quarry either flows toward and into the Quarry or into local drainages, depending on the geometry of the local surface topography relative to the Quarry. It is inferred that with greater depth, the influence (hydraulic gradient) of the local surface topography dissipates, and the influence of the hydraulic sink associated with the Quarry increases, resulting in a transition of groundwater flow controlled by local surface topography to groundwater flow controlled by the Quarry.

Appendix F, “Hydrologic Investigation,” provides an overall characterization of the current hydrologic conditions at the Quarry, including surface water and groundwater quality, and an evaluation of potential changes to these hydrologic conditions associated with mining and reclamation activities.

3.6 Biological Setting

The Permanente property is generally characterized by undeveloped hillsides to the south and an operating limestone quarry with associated facilities to the north. The operation is surrounded on all sides by steeply sloping rugged terrain dominated by a mosaic of various open and impenetrable chaparral and scrub communities, open woodlands, and dense forests. The majority of the area is drained by Permanente Creek, which runs west to east through the Permanente property. Two smaller watersheds are present in the southern portion of the Permanente property. The Permanente property is bordered by surrounding undeveloped lands to the north and west, Monte Bello Ridge and Stevens Creek Quarry to the south, Stevens Creek Reservoir to the southeast, and residential developments to the east.

The biological communities located on the Permanente property but located outside of the surface disturbances to be reclaimed are documented in Appendix G, "Biological Resources." Biological communities were classified based on specific vegetation alliances observed within each community. Twenty distinct biological communities are located on the Permanente property. Non-sensitive biological communities include (1) ruderal herbaceous grassland, (2) mixed scrub, (3) northern mixed chaparral, (4) chamise chaparral, (5) oak chaparral, (6) poison oak scrub, (7) nonnative annual grassland, (8) California bay forest, (9) California buckeye woodland, (10) rock outcrop, (11) revegetated areas, (12) active quarry, (13) disturbed areas, and (14) settling ponds and operational water features. Sensitive biological communities include (15) wetland, (16) willow riparian forest and scrub, (17) sycamore alluvial woodland, (18) white alder riparian forest, (19) oak woodland, and (20) streams and ponds. The locations and extent of these communities is shown in Appendix G. These communities lie outside the area of surface disturbance and will remain unaffected by activities under this amended reclamation plan.

Sensitive Species

Sensitive species that occur within the property include:

- Potentially suitable foraging and/or nesting habitat for several special-status birds is present throughout oak woodland/forest, scrub, and chaparral communities, including white-tailed kite, olive-sided flycatcher, and yellow warbler; white-tailed kite is the only species with potential to nest. All of these species, except white-tailed kite, are California species of special concern; white-tailed kite is a fully protected species.
- In addition to special-status species, nests of nearly all other native birds are protected by the Migratory Bird Treaty Act and California Fish and Game Code. Many common bird species are likely to occur and could nest in the study area, such as acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), California quail (*Callipepla californica*), and mourning dove (*Zenaida macroura*).
- Habitats within the study area have the potential to support roosting special-status bat species, including western red bat and pallid bat. These species are known to roost in tree cavities, under exfoliating bark (particularly the pallid bat), and in tree foliage (particularly the western red bat). Oak woodland/forest habitat nearby contains marginally suitable roost sites for these bats.
- San Francisco dusky-footed woodrats are known to nest in vegetated areas of the Permanente property and have potential to nest or otherwise occur in oak/woodland forest, scrub, and chaparral habitats. No vegetation removal is planned for reclamation activities that could directly affect dusky-footed woodrats.
- California red-legged frog (CRLF) is a medium-sized frog with reddish-colored legs. The species is generally restricted to riparian and lacustrine habitats in California and northern Baja California. In response to a significant decrease in the historic range of the CRLF, U.S. Fish and Wildlife Service (USFWS) listed the subspecies as threatened in 1996. CRLF prefer deep, quiet pools in creeks, rivers, or lakes below 1,500 meters in elevation. Habitat requirements include fresh emergent or dense riparian vegetation, especially willows adjacent to shorelines. CRLF can survive in seasonal bodies of water that are dry for short periods if a permanent water body or dense vegetation stands are nearby; rodent burrows and grasslands provide upland aestivation habitat.

- Numerous surveys have been conducted for CRLF on the Permanente property. CRLF were first discovered on the Permanente property in September 1997. The results of the surveys show that CRLF consistently occupy limited areas of lower Permanente Creek and appear to be present in Monte Bello Creek. Protocol surveys conducted in 2007 concluded that CRLF were present in ponds and have been observed to successfully breed. Upstream of the occupied ponds, aquatic breeding habitat is generally not present on the Permanente property because of lack of deep slack-water pools and lack of upland habitat within the active quarry. CRLF are unlikely to occur in the in heavily disturbed portions of the Permanente property because of a lack of cover, exposure to predation, and frequent vehicle traffic.
- The USFWS determined that the operation is not likely to result in the harassment, harm, capture, injury, or mortality of the Federal candidate monarch butterfly (*Danaus plexippus*) because (1) the majority of the permit area is highly-disturbed on an existing active quarry site with few monarch butterfly milkweed (*Asclepias* species) larval host plants or adult nectar plants, (2) pre-construction surveys for milkweed larval host plants and adult nectar plants will be conducted by a qualified biologist prior to Covered Activities that include vegetation maintenance (*i.e.*, removal, trimming, or mowing), (3) all milkweed larval host plants will be flagged and avoided, and (4) any nectar plants removed during Covered Activities will be replaced on-site by planting appropriate native, insecticide-free flowering plants that are available to monarch butterflies from January-April.

Protection Measures

Lehigh has and will continue to obtain permits for operations activities that could affect species protected under the federal Endangered Species Act (ESA) and the California Endangered Species Act. Lehigh currently addresses the federally listed CRLF under permission by the USFWS incidental take permit and low effect habitat conservation plan issued under Section 10(a)(1)(B) of the ESA. The permit was issued May 27, 2022, and the term is 20 years.

Although the ongoing activities would occur primarily in areas that provide poor-quality habitat for CRLF, these activities have potential to result in take. Implementing avoidance and minimization measures, including surveys for the CRLF and capture and relocation of individuals found in areas where operation and maintenance activities would occur, were determined to substantially reduce potential for direct injury or death. Activities covered under the permit include: (a) Stormwater Capture/Sedimentation Basin Operation and Maintenance, (b) Erosion Control, (c) Material Transport and Storage, (d) Vehicle Travel, Equipment Operation, Road and Berm Maintenance, (e) Vegetation Maintenance, (f) Water Quality Monitoring Activities, and (g) Pond 14 Monitoring and Habitat Management Activities (the known site for suitable breeding habitat).

3.7 Soils

As depicted in Figure 6, “Soils,” the *Soil Survey of Santa Clara Area, California* (USDA 1968) indicates that the entirety of the surface disturbance is classified as a “Pit” map unit. This map unit consists of areas large enough to map where excavations have been made and where the original soil has been removed. Excavations in this area have been principally for cement-grade limestone and construction aggregate production.

Along Permanente Creek, a broad area of the Mouser-Maymen complex occurs. This map unit consists of very steep and stony areas of Los Gatos and Maymen soils. Slopes are steep, and in most places rock outcrops are numerous. The vegetation is a dense growth of brush. The Los Gatos soil predominates, but in some places fairly large areas of Maymen soils occur. In most places some rock fragments occur in the subsoils. The subsoils grade irregularly at shallow depths into hard sandstone or conglomerate bedrock. These soils will be encountered during the Permanente Creek Restoration Project. Soil will be excavated along portions of the creek and immediately replaced along streambanks for revegetation.

No other new areas of the site are to be affected by mining, so no salvage and storage of soil for mine reclamation is planned.

3.8 Revegetation Test Plots

Sixteen test plots were constructed on top of bare, graded, overburden rock at two locations in fall 2008. To test the response of the seed mixes and plantings to various soil treatments, the test plots each differed by soil composition and soil depth. The soil treatments consisted of a combination of materials, including overburden rock, fine greenstone material, rock plant fines, and imported compost. Each test plot was divided into four equal quadrants, upon which four different native seed mixes were applied, followed by straw mulch, a hydro slurry of fertilizers, and a tackifier.

Results indicate that all soil materials added to overburden rock help to increase total plant cover, and grass cover in particular. While shrub cover was low after the first 2 years, shrub density was fairly high with many small individual plants observed. A higher cover of grasses appears to suppress shrub establishment, which is particularly true in plots with higher percentages of compost. Deeper and richer compost-laden plots mimic grassland soils more so than typical scrub soils, which promote grass growth. The test plot program is complete, and its results are incorporated in the revegetation approach. Appendix H, "Revegetation Plan," provides a detailed description of the completed test plot program.

4. RECLAMATION AND CLOSURE

The following sections describe final topography, plans for surface treatment (including resoiling with imported materials) and environmental objectives (primarily slopes and water quality). For descriptive purposes and reclamation phasing, Permanente is broken into six component areas, depicted in Figure 7 "Reclamation Boundary and Components," within the 921-acre reclamation boundary. Not all acreage within the components has been affected by mining; current surface disturbance is about 670 acres including the pre-SMARA surfaces within the Permanente Creek Restoration Area and lower WMSA slopes.

The site will undergo significant regrading to flatten surfaces to accomplish long-term slope stability. That topographic plan is shown in Figure 8, "Reclamation Grading Plan," and Figure 9, "Reclamation Grading Cross Sections," and corresponding Sheets 2 and 3. Final closure conditions, including placement of cover materials over the WMSA and EMSA and Quarry backfill and buttressing of the highwalls, are shown in Figure 10, "Fill and Closure Conditions," and Figure 11, "Fill and Closure Conditions Cross Sections," and corresponding Sheets 4 and 5.

4.1 Grading and Slope Specifications

The reclamation grading plan in Figure 7 includes the reclamation surface for the WMSA, Quarry, Shop and Office Area, EMSA, and the Rock Plant Area. Slope angles vary by area based on the materials used and stability. Final reclaimed slopes range from 2H:1V to 3H:1V. Table 4, "Cut and Fill Slope Specifications," shows the range of grading plan slopes and cut and fill quantities by area.

TABLE 4
CUT AND FILL SLOPE SPECIFICATIONS

Area		Grade Plan Slope
WMSA		2.25H:1V to 2.5H:1V
Quarry	***Upper Regrade***	2H:1V
	Buttress	2.6H:1V
	Backfill	990–1,020 ft amsl (2% gradient)
Shop and Office		2H:1V to 3.0H:1V
EMSA		no steeper than 2.25H:1V
Rock Plant		3.0H:1V or shallower

4.2 Fill and Cover Materials and Sources

4.2.1 Volumes and Sources

A total volume of approximately 42 mcy is needed to fill the Quarry to its final design surface, including the buttress. An additional 1.4 mcy is required to grade the remaining parts of the site. The Quarry will be backfilled with a mixture of greenstone overburden (generated on-site) limestone from the WMSA soils from the Permanente Creek restoration, suitable surplus soil (imported from off-site) and potentially concrete from Cement Plant demolition to a minimum elevation of approximately 990 ft amsl. This elevation corresponds to the lowest natural outlet in the surrounding topography so that the reclaimed surface of the Quarry does not impound water.

Table 5, "Cut and Fill Slope Volumes," shows the estimated volumes and placement areas.

TABLE 5
CUT AND FILL GRADING VOLUMES

Area		Cut Generated (mcy)	Fill Needed (mcy)
WMSA		7.30	0.70
Quarry	***Upper Regrade***	2.70	0.00
	Buttress	0.00	15.00
	Backfill	0.00	27.00
Shop and Office[1]		1.10	0.20
EMSA		1.10	0.52
Rock Plant[2]		0.02	0.02
	Total[3]	**12.2**	**43.4**
Balance Needed from Off-Site Import ***(for Quarry backfill only, not cover)***			31.2

Notes: mcy = million cubic yards.
(1) Volume includes surge pile.
(2) Volume assumes 80,000 cubic yards of stockpile is removed.
(3) Volume assumes 7.7 mcy aggregate sales shot rock stockpile is removed/sold from the site; 7.7 mcy is not included in the quantities shown by area.

Table 6, "Quarry Backfill Materials Specifications," summarizes the material specifications of the Quarry backfill.

TABLE 6
QUARRY BACKFILL MATERIALS SPECIFICATIONS

Backfill Location	Material Specification
Lower Quarry	• Undifferentiated greenstone overburden • Imported suitable surplus soil • Concrete from Cement Plant deconstruction.
Middle Quarry	• Undifferentiated greenstone overburden • Imported suitable surplus soil • Concrete from Cement Plant deconstruction.
Upper Quarry	• Imported suitable surplus soil
Highwall Buttresses	• Imported suitable surplus soil.

Since the 2012 reclamation plan amendment, a significant amount of data has been developed through investigations and other data-gathering exercises to understand the release of selenium and other constituents of concern (e.g., nickel) from residual mined materials and unmined limestone highwalls. These investigations targeted the stockpiled WMSA and EMSA materials, groundwater, and surface water. These data, in consideration of WDR mandates, show that using only on-site materials from WMSA as the

sole source of backfill (as scheduled in the prior 2012 reclamation plan) is not an environmentally preferable option for backfilling the Quarry, as described in detail in Appendix F. Instead, the use of other supplemental earth materials is expected to provide an environmentally superior solution that will lead to better certainty for compliance with water quality–related mandates and reduce the potential need for additional controls/mitigation measures for final closure. The supplemental earth materials include non-limestone overburden and imported fill generated from off-site sources. Materials from the WMSA containing limestone generated from slope layback and stability reasons will be placed in the Quarry, but it will be covered and managed with other non-limestone materials.

The characterization of non-limestone indicates that these materials are suitable for use as backfill material pending RWQCB approval. However, sources of non-limestone materials on-site are limited, and insufficient quantities of non-limestone material have been produced from mining operations to backfill the entire Quarry. Backfilling the Quarry using surplus soil from regional infrastructure projects would be beneficial to long-term water quality. The use of such imported fill will be superior because the type and chemical composition of the backfill material can be specified to ensure water quality impacts are minimized during placement and once dewatering activities cease and groundwater levels are restored. By doing so, compliance with water quality objectives and the WDR mandates can be achieved with greater certainty.

4.2.2 Cover and Resoiling Needs

Much of the mining on-site occurred before SMARA required topsoil to be set aside for reclamation. Thus, little topsoil is on-site. Graded slopes of overburden and other materials placed by historical mining will have suitable cover material placed depending on the material properties and specifications of the RWQCB. A minimum of 4 ft of suitable cover materials is assumed to overlay reclaimed slopes on the site where limestone fill is not present. Approximately 4 ft will overlay graded areas in the Quarry, WMSA, EMSA, and other areas that may contain selenium-bearing rocks. The specific material properties and characteristics of the cover materials will vary because the available materials are generated on-site using a blend of greenstone and Santa Clara Formation material and imported from various regional sources.

4.2.3 Imported Materials

An imported soils management plan will be developed and reviewed by the RWQCB to govern the procurement and placement of the imported fill and outline a systematic approach for acceptance of the material. The management plan will evaluate potential exposure pathways and will outline the required geotechnical and geochemical characterization of the material before selection, acceptance, and placement to ensure the quality of the material and to avoid adverse effects on water quality (referred to herein as “site-specific acceptance criteria”). The management plan may also reference confirmation testing in accordance with California Department of Toxic Substances Control protocols. Implementation of the imported soils management plan will be reported to the RWQCB as part of the final closure plan required by the WDRs.

An investigation of the types and quantities of surplus soil from regional infrastructure projects was completed for this reclamation plan amendment. Recent trends, industry input, and quantitative data from infrastructure activities within the region were assessed as a proxy for material availability. Actual and estimated quantities of recent and future surplus soils in Santa Clara, San Mateo, San Francisco, and Alameda counties were also assessed. The assessment concluded that approximately 4 mcy per year of surplus construction soils has been generated from within the four focus area counties in recent years, and that 2 mcy or more per year of that would be suitable for use in Permanente reclamation. Generation rates are projected to continue to increase as growth and development continues. Because there is limited and decreasing capacity to receive excess soils at reuse sites in the focus area, the use of these materials for Permanente reclamation would provide a much-needed reuse option within the region. Given these factors, it is estimated that 500,000 to 1 million cubic yards could be available and received at Permanente each year and would reduce vehicle miles traveled (VMT) for hauling that material outside the region.

4.3 Stability and Compaction

4.3.1 Geotechnical Evaluation

The Greenstone slide in the Quarry and other instabilities of cut and fill slopes have been evaluated several times both as part of reclamation plan amendments and for internal operational safety reasons. Drilling, laboratory testing, assessment of strength parameters for the various rock types encountered, and slope stability calculations were completed. Rock strength parameters were based on laboratory data, rock mass rating calculations, and back analysis of landslide areas. The strength parameters for soil, greenstone overburden, and limestone have been consistent through multiple geotechnical analyses performed. The strength parameters for greenstone vary significantly depending on the condition of the bedrock and amount of weathering and shearing. Lower-bound values have historically been used for design purposes to be conservative. These lower-bound values are based on back analysis of the Main Slide in the Quarry. Laboratory data suggest the in-place greenstone may have significantly higher strength. Site-specific geotechnical information is available for each rock type on the property, and strength parameters for the material have been established in previous geotechnical analyses and confirmed during recent drilling and laboratory testing programs. These strength parameters are based on laboratory testing, and back-calculation.

An update of prior geotechnical evaluations was completed for this reclamation plan update, particularly for the Quarry highwalls, Main Slide, and WMSA (See Appendix E, for details).

The slope stability analyses were modeled under static and pseudo-static conditions, with horizontal ground acceleration for reclamation and closure configurations of the highwalls. The minimum acceptable factor of safety for the analyses are 1.3 for static conditions and 1.0 for pseudo-static conditions based on regulatory standards. For the pseudo-static model conditions, a horizontal seismic coefficient of 0.19 times the force of gravity (g) was applied to the static condition models following guidelines in the Caltrans Geotechnical Manual for slopes where a mean displacement of 5 inches would be acceptable. This approach is conservative compared to the guidelines established by the California Geologic Survey (Special Publication 117A, 2008).

To evaluate the slope stabilities, cross sections were analyzed for the reclamation surface. Stability analyses focused on Quarry slopes where grading is planned, the highwall, and areas of instability. Geologic data including lithology, bedding planes, boreholes, and fault planes were considered when preparing the reclamation plan and were used in the slope stability analysis calculations. Where areas of instability are known to exist, the current topography was evaluated to demonstrate that a low factor of safety exists. These conditions were retained for the reclamation surface to demonstrate that adequate stability will be present for reclamation. The reclamation also assumes approximately 4 ft of cover material will be placed on the graded slopes of the WMSA and Quarry backfill.

The configurations modeled as part of this analysis meet or exceed the minimum acceptable factor of safety of 1.0 for both static and pseudo-static conditions (see Appendix E, pages 37–39). The modeled static slopes factor of safety (FOS) range from 1.5 to 5.6, with anything at 1.3 or higher considered stable. The pseudo-static analyses indicate FOS ranges from 1.0 to 2.0, with slopes at or above 1.0 considered stable. The final surface stability analysis does consider the presence of the backfilled material providing a buttress for the lower highwall slopes. Generally, geotechnical stability is governed by the gradient of the fill slope, and the reclamation slope gradients were established through geotechnical modelling so that the results met the project goals for stability. For rock slopes, stability is governed by the mining influenced zone and the presence of limestone remaining in the upper highwall.

The peak ground acceleration (PGA) value of 0.58g was used as the basis for the calculations, which is also consistent with previous analyses. This PGA corresponds to an earthquake with a magnitude of at least 7.9 and a mean return time of 475 years. According to the City of Cupertino General Plan, the maximum credible earthquake (MCE) along the San Andreas Fault system is a magnitude 7.9 earthquake with an estimated recurrence interval of 220 years. The MCE along the Sargent-Berrocal Fault system is a magnitude 6.8 earthquake with an estimated recurrence interval of 330 years. The PGA associated with

the seismic coefficient has a recurrence interval of 475 years; therefore, the design seismic coefficient of 0.19 would be a larger earthquake than the MCE.

The slope displacement analysis under seismic conditions indicates displacements during a maximum credible earthquake of between 1 and 4 inches (Appendix E, pages 39–40). Literature on seismic slope displacements suggest that median displacements of less than 6 inches (15 centimeters) are “minor” and displacements of greater than 3 ft (1 meter) are “major.” All displacements modeled for this site post-reclamation are “minor” and thus unlikely to impact the reclaimed slopes.

4.3.2 Material Placement and Compaction

Backfill of the Quarry will occur from the bottom of the Quarry upward. However, this does not mean each lift of material will be fully completed before the next level is started. While water in the Quarry may be pumped down, backfill will likely be placed below the water level for part of Phase 1. In areas above historic groundwater levels and when feasible, Quarry backfill compaction will be achieved by 2 to 5 passes with a truck or dozer during placement. Otherwise, compaction will be achieved by static surcharge loading of the subsequent fill.

During the Quarry backfill, lifts of backfill material will be advanced across the Quarry by end dumping material onto the advancing lift and dozing it into place. Lifts will be advanced, at an angle of repose, across the Quarry. Adequate compaction will be achieved as described above, and no formal compaction specifications are required.

4.4 Reclamation Components

4.4.1 Quarry

The Quarry backfill surface will have a 2 percent downward gradient from the northwest (1,020 ft amsl) to the southeast (990 ft amsl) to provide drainage. A buttress slope will be placed on top of the backfill to stabilize the north highwall. This buttressed slope prevents the need to impact the 1972 easement on the ridgeline. The buttress will be constructed using fill material imported from off-site locations.

Backfill of the Quarry will be completed in the following four stages:

Backfill Stage 1 of the Quarry backfill will occur from Quarry bottom (440 ft amsl) to approximately 880 ft amsl (the Lower Quarry). Undifferentiated greenstone overburden generated on-site from WMSA and EMSA and imported off-site fill will be used to backfill the Lower Quarry. Approximately 6.9 million cubic yards (mcy) of material will be moved from the WMSA and EMSA to the lower Quarry elevations. The final elevation of Stage 1 will depend on the amount of material imported while WMSA and EMSA are being graded and reclaimed.

Backfill Stage 2 of the Quarry backfill will occur from 880 ft amsl to 920 ft amsl (the middle Quarry elevations). Undifferentiated greenstone overburden generated on-site from the Shop and Rock Plant and imported off-site fill will be used to backfill the middle Quarry elevations. Approximately 1.2 mcy of material will be moved to the Quarry in Stage 2. The final elevation of Phase 2 will depend on the amount of material imported while the Shop and Rock Plant are being graded and reclaimed.

Backfill Stage 3 of the Quarry backfill will occur from 920 ft amsl to 990 ft amsl (the Upper Quarry). Suitable surplus soil, imported from off-site sources, will be used to backfill the Upper Quarry, covering the undifferentiated Stage 1 and Stage 2 materials. A total of 27 mcy of material is required to fill the Quarry.

Backfill Stage 4 of the Quarry backfill will occur above 990 ft amsl to construct a buttress to provide long-term stabilization for the surrounding highwalls. The buttress will be placed to a maximum elevation of 1,420 ft amsl. Suitable surplus soil, imported from off-site sources, will be used for buttress material. Approximately 15 mcy of material is required to construct the buttress.

Final cover over the Quarry will be from imported materials and graded to achieve the 2-percent slope for drainage. Revegetation will be completed over the final floor surface, and the buttresses as they are constructed.

The grading plan for the Quarry does not propose modification to the scenic easement; however, it will require 31 million yards of imported off-site material to backfill and then buttress the highwalls for long-term stability meeting current seismic standards.

The area above the maximum buttress elevation (1,020 ft amsl) in the northwest portion of Quarry, (referred to as the Upper Regrade Area), will need to be benched for stability to achieve an overall wall angle of 2H:1V. The Upper Regrade Area removes the Main Slide in its entirety and will leave a slope of competent bedrock. This regrading will not affect the County's scenic easement.

4.4.2 West Materials Storage Area

The native topography underlying the WMSA was steeply dipping slopes with valleys oriented generally from west to east. The WMSA is founded on native soils. The current topography surrounding the WMSA ranges in elevation from approximately 1,500 ft amsl near the east toe to approximately 1,960 ft amsl at the top of the area in the northwest. The WMSA measures approximately 157 acres in area. The maximum thickness of greenstone overburden at WMSA is approximately 350 ft. WMSA primarily consists of greenstone overburden materials and low-grade (not cement grade) limestone. Greenstone overburden was placed by end dumping the material in lifts, which resulted in the pile slopes being placed at the material's angle of repose with benches between lifts. The lower, south facing slopes were placed between 1960 and 1971, which was prior to the promulgation of SMARA. Following the passage of SMARA, overburden material continued to be placed on the upper portions of WMSA. Approximately 38 acres of the footprint, below 750 ft amsl, was placed before SMARA was enacted, effective January 1, 1976. This area is located along the southern boundary of the WMSA.

The WMSA will be subject to regrading; significant portions of the lower slopes will be relocated to establish stable slopes and materials suitable for construction aggregates will be removed and processed for water quality purposes, the majority of the materials are scheduled to remain in place and be covered with lower-permeability materials (see Section 3.5, "Hydrology and Water Quality," for water quality discussion)

A plan for regrading of the WMSA instability was developed to improve the static FOS and to achieve the necessary pseudo-static FOS for reclamation purposes related to slope stability. Creep movements were observed following the heavy periods of precipitation that occurred during the winter of 2022 and into Spring 2023. Prior grading plans were modified by adding a buttress at the toe of the instability area in the WMSA and removing material from the crest to achieve the reclamation goals. The grading plan includes a buttress at the toe of the instability placed at a 2.5H:1V gradient with material excavated from the crest of the instability to an elevation of 1,440 ft. The reclamation topography for the WMSA is reflected in Figures 9 and 10.

4.4.3 East Materials Storage Area

The EMSA will be regraded and covered to reduce the potential for selenium and other metals from being entrained in stormwater and groundwater. Topsoil and other amendments will be placed on the slopes, and vegetation planted in a manner consistent with the revegetation plan component of the 2023 reclamation plan amendment. Groundwater underlying the EMSA is anticipated to continue to meet water quality objectives after reclamation is complete, based on the planned reclamation activities, including the final closure plan and cover system. The water quality protection measures for this area will be developed and approved through the closure plan process mandated by the WDRs and the amended reclamation plan, which is expected to mirror the work that will be implemented under the WDRs to achieve final closure. The expected outcomes will be monitored, verified, and reviewed by the RWQCB and, informationally, by other regulatory agencies. Active water management and treatment, as necessary, will occur until verification monitoring demonstrates the closure effectiveness in meeting water quality objectives.

4.4.4 Shop and Office Area

Limited grading is scheduled for the Shop and Office Area for geotechnical stability with final slopes between 2:1 and 3:1. Best management practices (BMPs) will be employed to minimize potential surface water impacts related to reclamation activities. The Shop and Office Area is not anticipated to be a concern to water quality. Upon closure, verification monitoring will be implemented to assess the effectiveness of closure activities.

4.4.5 Rock Plant Area

Rock Plant Area equipment and excess materials will be removed. The area will be regraded and covered with non-limestone material. BMPs will be employed to minimize impacts related to reclamation activities. Upon closure, verification monitoring will be implemented to assess the effectiveness of closure activities.

4.4.6 Permanente Creek Restoration Area

The Permanente Creek Restoration Area includes approximately 49 acres of historic mining adjacent to the WMSA, the full extent of which was reached by 1975 (before SMARA's effective date on January 1, 1976), and thus does not require reclamation under SMARA. Nevertheless, this amendment includes regrading areas that are at their original angle of repose (approximately 1.5:1) to slopes consistent with the remainder of the WMSA. This work would be complimentary to the remaining areas being addressed under the PCRP streambed and adjacent bank restoration.

As described above, the PCRP is a detailed engineered restoration project with a completion date in advance of the longer term and larger acreages to be reclaimed throughout the remainder of Permanente operations (see Appendix B).

Consideration of boulders and the potential for leaching selenium were considered in the investigations for restoration of Permanente Creek. It was initially thought that a program to remove boulders along the creek would occur as part of the restoration work; however, this is no longer proposed based on a survey and detailed inventory of creek boulders (years of water quality monitoring supports the concept that these boulders are not a material source of selenium). Limestone outcrops are present in and on the canyon walls along sections of Permanente Creek; in the area where there are limestone outcrops, much of Permanente Creek has a rocky bottom of in-place limestone. Limestone boulders of a colluvial origin are present in Permanente Creek throughout the area of and downstream from where the limestone outcrops. Due to the blocky nature of the natural fracture pattern in the limestone, boulders attributable to mining activities versus freshly deposited colluvial boulders cannot generally be distinguished. Therefore, the limestone encountered was assumed to have had a natural origin unless a limestone boulder can be obviously attributable to mining activities. Only about half of the boulders in the inventory were small enough to move manually or can readily be broken into pieces small enough to move manually using hand tools. Those boulders which are too large to move manually or can be readily broken using hand tools are not accessible by machine without the construction of a road along the creek bed. Moreover, the risk of leaching selenium out of the boulders present in the balance of the survey area compared to the damage to Permanente Creek from the removal operation would not be beneficial. It is not possible to remove the boulders without impairing Permanente Creek; therefore, a decision was made not to remove limestone boulders from Permanente Creek.

4.5 Groundwater Quality Protection

4.5.1 Quarry Backfill Considerations

The Quarry will be backfilled to at least 990 ft msl to ensure a pit lake is not present at reclamation. Since 2012, a significant amount of additional data has been developed, derived from the numerous and intensive regulatory-driven investigations and other data-gathering exercises. These investigations were performed to further evaluate the stockpiled materials, groundwater, and surface water. Based on these data, and in consideration of WDR mandates, using the WMSA as the sole source of backfill (as approved in the 2012 reclamation plan) is not the preferred long-term solution to meet water quality objectives (see Appendix F).

The WMSA was planned for use as backfill for the Quarry under the 2012 reclamation plan amendment; however, based on the data collected since 2012, there is a greater potential that backfilling primarily with WMSA material could cause more significant water quality decline that will require additional time and resources to manage and cause greater uncertainty for long-term water quality conditions under reclamation and closure. While the characterization of on-site greenstone (and graywacke) indicates that these materials are suitable for use as backfill and cover material, sources of segregated greenstone are limited, and insufficient quantities of greenstone will be produced from regrading activities to backfill the entire Quarry or use as cover throughout the reclaim areas.

To account for the difference between available on-site segregated greenstone, limestone to be backfilled, and the amount of material needed to complete backfill of the Quarry as well as cover, off-site material will be imported. The use of imported material will be beneficial as it allows for the specification of the type and chemical composition of the backfill material to ensure that water quality impacts are minimized during placement and in a saturated state once groundwater levels are restored. By doing so, attainment with water quality objectives can be achieved with greater certainty while also limiting interim impacts by reducing the amount of limestone to be placed in the Quarry (Appendix F).

As noted above, an import soils management plan will be developed and reviewed by the RWQCB to govern the procurement and placement of the imported material and outline a systematic approach for acceptance of the material (otherwise referred to as site-specific acceptance criteria). Differing criteria are expected t to be included based on material placement location and elevation.

At the completion of Stage 3, a cover system will be placed over the backfilled Quarry. The performance standards of the cover will be designed to conform with applicable requirements of WDRs as necessary to be protective of groundwater and/or surface water.

Water quality after the Quarry is reclaimed will primarily depend on the interaction of stormwater runoff from remaining exposed highwalls and leaching from the placed material. In general, for most constituents, peak concentrations are expected to occur during the early period of groundwater level recovery in the Quarry during backfill Stages 1–3 because of ongoing sulfide oxidation of weathering products (source of sulfate and metals) from the Quarry walls and backfill as compared to the 2012 reclamation plan. The loading rate from the backfill will be limited based on the lesser amount of limestone planned to be used as backfill. During backfilling, water will be contained within the Quarry and not discharged to Permanente Creek without being processed through the existing water treatment system because groundwater flow will be inward to the Quarry.

The flooding of the backfill materials will minimize the oxidation of sulfide minerals present in the submerged Quarry walls and in the limestone in the backfill material, thereby minimizing these sources of sulfate and metal loading long term. At various levels within the Quarry (and at various time frames), anaerobic or minimal oxygen conditions will become established in the backfilled materials further reducing the selenium levels along with the active water treatment system that is planned to be in operation during some of the backfilling. Once minimal oxygen conditions are re-established, deep groundwater in the backfilled Quarry is anticipated to have the water quality of regional groundwater (See Appendix F). Sulfide minerals present mainly on the northern portion of the Quarry wall above the final groundwater elevation (*i.e.,* limestone in the exposed highwall is estimated to cover the Quarry surface water catchment area) will decrease over time as a source of metal loading to Quarry water due to the buttressing of the entire pit shell, including the currently exposed limestone highwalls. This source area will be further minimized once buttressing is complete. The buttress will consist of a minimum of a layer of non-limestone material placed around the entire pit shell, including the currently exposed limestone highwalls. Contact of precipitation or runoff with the Quarry walls will therefore be minimized with the reduced contact of precipitation with the Quarry walls from the buttressing. Once the highwall is buttressed, and deep groundwater returns to regional groundwater levels post backfilling, selenium concentrations in the shallow pit water are predicted to be less than 5 µg/L (Appendix F). Additional verification, modelling, and monitoring will be completed to validate these assumptions. Should additional data indicate that water quality standards will not be met in a timely matter, additional steps will be implemented. Options include using the current active treatment system or creating a passive system by adding organic amendments to the upper portion of the Quarry backfill to promote anaerobic conditions. Treatment is currently required for water discharged from the

Quarry to Permanente Creek to meet water quality standards for selenium. Once the Quarry backfilling is complete, or geochemical conditions allow, Lehigh can evaluate ceasing active water treatment for this area.

4.5.2 West Materials Storage Area Considerations

As provided in Appendix F, Section 2.4, WMSA materials in their present state do not appear to be significantly affecting groundwater quality under the WMSA, based on post-2012 investigations and monitoring. Data collected demonstrates that the WMSA was placed at grade (thus, not in direct contact with groundwater), and the overburden is largely dry. Much of the material has been buried at depth for many years and is exposed to limited oxygen, thus reducing the occurrence of sulfide oxidation and selenium mobilization via water contact. Much of the overburden material appears to be unexposed to the wet-dry cycle that tends to maximize the generation of selenium. While certain areas, mainly in more recently disturbed overburden, show elevated concentrations of selenium, these areas are localized and can be managed through regrading, removal, or capping of surface materials to protect water quality.

The WMSA will be regraded and covered to ensure non-limestone materials are present at the ground surface to reduce the potential for selenium and other metals to be entrained in stormwater runoff and to migrate to groundwater. The planned reclamation consists of regrading portions of the WMSA to achieve desired slope stability and placing a final cover over the WMSA. The final cover may be up to 4 ft thick in some areas; however, the exact specifications will be authorized by the SWRCB via the approved final closure plan and/or site-specific acceptance criteria, to ensure the water in contact with WMSA meets relevant water quality standards.

After Phase 1 of reclamation, stormwater from the WMSA will no longer be directed to the Quarry, but instead, to Permanente Creek. Stormwater runoff from the WMSA cover system is anticipated to meet water quality standards applicable to Permanente Creek based on the material to be used as cover, similar to the values observed at the EMSA. Low levels of selenium (i.e., less than 5 µg/L) have been measured in the samples collected from the EMSA in areas where water collected on the surface or in runoff samples that had contacted the non-limestone cover currently in place.

Limited areas are within the WMSA with impacts to groundwater associated with previous material placement, based on the groundwater monitoring program and material characterization. Portions of the WMSA remain the subject of ongoing testing and investigation under the WDRs and are expected to be addressed through approval of the final closure plan. Groundwater underlying the WMSA is estimated to meet water quality objectives after reclamation is complete, based on the planned reclamation activities, including the final approved closure plan and cover system. The water quality protection measures for this area will be developed and approved through the closure plan process mandated by the WDRs and the amended reclamation plan, which is expected to mirror the work that will be implemented under the WDRs to achieve final closure.

Pursuant to the closure plan required by the WDRs, the expected outcomes will be verified, and reviewed by the RWQCB and, informationally, by other regulatory agencies.

4.5.3 East Materials Storage Area Considerations

As provided in Appendix F, the EMSA contains similar types of overburden as the WMSA. Field observations and laboratory analysis of samples collected from the EMSA demonstrate that, consistent with the samples collected from within the Quarry and WMSA, the materials stored in the EMSA are classified as having no acid rock drainage potential. Some detections of extractable concentrations of selenium, arsenic, mercury, and vanadium in the soil/material exceeded groundwater or aquatic habitat ESLs. Moisture properties observed in the EMSA were generally dry to slightly damp. The quarterly groundwater data collected since 2015 supports the previous conclusion that little or no infiltration occurs through the EMSA to underlying native material and groundwater. EMSA materials in their present state, including the intermixed limestone material, do not appear to be significantly affecting groundwater quality.

The reclamation consists of regrading portions of the EMSA to achieve desired slope stability and placing a final cover over the EMSA. The final cover is anticipated to be up to 4 ft thick in some areas; however, the exact specifications will be determined by the SWRCB via the Site WDRs to ensure the water in contact with EMSA meets relevant water quality objectives. The primary objective of the final cover is to reduce infiltration within the EMSA to allow for a closure strategy that will not require active treatment.

To potentially address management of wastes related to former historical Cement Plant manufacturing activities along the southwestern portion of the EMSA, a repository may be included in the final design of the EMSA cover system. The repository would be designed in accordance with Permanente's WDRs to ensure containment of this material and environmentally isolate it to prevent potential degradation to groundwater. Groundwater and surface water monitoring will continue to ensure no significant impacts to surface water or groundwater are observed during reclamation. Should impacts be observed, Lehigh will employ an adaptive management system to minimize potential impacts during reclamation.

4.6 Surface Water Quality

4.6.1 Surface Water Management

Surface hydrology and grading designs can impact water quality through erosion of placed soils at closure. If erosion does occur, sediment laden flow can runoff into downstream receiving waters. Therefore, surface grading, hillslope lining, and hydraulic conveyance structures will be designed to reduce the likelihood of erosion and discharges into Permanente Creek.

Additionally, using stormwater best management practices during the construction phase of reclamation can eliminate erosion and sediment pollution during more typical day-to-day rain events. Therefore, the sequencing and planning around stormwater impacts are also important to overall project success in intermediate stages.

Integrated grading, drainage, and erosion control engineering features is planned to provide a system of drainage features that will route and discharge on-site rainfall into Permanente Creek during large storm events. The design is also planned in a way where the connected grading and stormwater management phasing can be implemented in three, semi-independent areas. Those stages are integrated with planned reclamation phasing and are reflected in Figure 12, "Surface Water Management," and include:

- **Reclamation Phase 1:** The major areas that will be closed include the WMSA, upper section of the Main Slide Area Regrade, and the EMSA. The Phase 1 reclamation areas extend both to the west and east of the Quarry. At closure, the water from these areas will be routed via drainage channels toward one of three outlet points.
- **Reclamation Phase 2**: The Office Area, with associated infrastructure, and the Rock Plant Area will be reclaimed. Also included are minor areas located east of the Quarry. The flow from these areas will be routed off-site discharge points shown on Figure 12. The discharge channel heads to the east, following the access road.
- **Reclamation Phases 3 and 4**: Reclaimed areas within the Quarry encompass the lower slide regrade area, the highwall layback area, in the Upper Regrade area (which will not impact the County's scenic easement), and the backfilled floor. Flow from Phase 3 will route towards one outlet point. Most flow from Phase 4 will drain to the Quarry outfall, with minor flows from upper slopes draining to the east and west via bench channels.

Reclamation Phases, major channels, and outfall locations will require minimal alteration to the completed channels due to isolation of drainage design between phases. This means only limited modifications to the major channels will be needed as reclamation of phases progresses.

Water Treatment System

Permanente is using a water treatment system, called the Final Treatment System (FTS), consists of two treatment trains, the Upper Treatment System (FTS-Upper), located near Pond 4A adjacent to the Quarry, and the Lower Treatment System (FTS-Lower), located upslope of Pond 11 and the Cement

Plant. Each treatment train was designed as ultrafiltration/reverse osmosis (UF/RO) units to remove dissolved solids and bioreactors to remove selenium and other metals. Bioreactors are a proprietary anaerobic attached growth system with a final filtration step. The FTS-Upper discharges at Discharge Point No. 001 (to Permanente Creek adjacent to the Quarry); the FTS-Lower has the ability to discharge at Discharge Point Nos. 001 or 007 (Discharge Point No. 007 discharges to the concrete-lined portion of Permanente Creek adjacent to the Cement Plant). Lehigh can pump water from the Quarry pit, comprised of infiltrating groundwater, direct precipitation into the Quarry, stormwater runoff from the WMSA, and seasonally recirculated water from the Cement Plant Reclaim Water System (during the rainy season, Lehigh is authorized to use the Quarry as equalization storage to store water for later treatment and discharge), to Pond 1250 within the Quarry and then to the FTS-Upper; or Lehigh can pump it to Tank 950, then to the FTS-Lower. Process and stormwater from the Cement Plant, stormwater generated from the EMSA (via Pond 30 or the EMSA French drain), stormwater from a drainage area within the Rock Plant, and bioreactor and UF/RO backwash water, are directed to Ponds 1 and 11. Lehigh either reclaims water collected in Ponds 1 and 11 for reuse, seasonally pumps it to the Quarry, and/or treats the water at the FTS-Lower for discharge via Discharge Point No. 007. The FTS-Upper and FTS-Lower are effective at reducing pollutants sufficiently to meet NPDES permit limitations and other Water Board regulatory requirements. Stormwater discharged from Discharge Point Nos. 002 (Pond 13B), and 005 (Ponds 17/20) does not presently receive treatment via the FTS-Upper or FTS-Lower.

As reclamation activities begin to beneficially improve the site conditions (e.g., placement of approved cover on WMSA and/or EMSA, backfilling the Quarry, PCRP creek restoration), and reduce the need to discharge water associated with industrial activity, use and need of the FTS-Upper and FTS-Lower to achieve water quality requirements will be continually evaluated. As part of the planned PCRP activities, the FTS-Upper infrastructure will be removed from its current location to accommodate slope layback requirements. Based upon the status of Quarry backfilling and/or WMSA cover activities, or other relevant considerations, the FTS-Upper system may not be relocated, and Lehigh will be able to rely upon the FTS-Lower for remaining water treatment needs until final reclamation is achieved. As noted elsewhere in the RPA, the goal of reclamation at this site is to ultimately eliminate the need for active treatment, in favor of a more passive circumstance."

4.6.2 Stormwater Analysis

A drainage analyses of the post-reclamation flow rates is provided in Appendix I, "Drainage Report." The majority of the post-reclamation flows will be conveyed to Permanente Creek. The current County drainage manual indicates that new storm drain systems and channels shall be designed to convey the 10-year storm without surcharge, and a safe release shall be provided for the 100-year flow. Furthermore, SMARA states that erosion control methods shall be designed for the 20-year/1-hour storm and shall control erosion and sedimentation during operations as well as after reclamation is complete (see CCR Title 14, Section 3706). The County's drainage manual (Santa Clara County 2007) provides parameters for the 25-year storm event, but not the 20-year event. The 25-year event was analyzed in this report to satisfy the requirements for the 10- and 20-year events. Since the 25-year event is greater than these two events, the 25-year results will provide a greater factor of safety in the drainage design. The 100-year event was also analyzed in accordance with the County's drainage manual criteria. The Federal Emergency Management Agency (FEMA) has established an existing condition 100-year flow rate in Permanente Creek, below the site, and delineated the associated floodplain. Hydrologic analyses performed demonstrates that the post-reclamation condition will not adversely increase the FEMA 100-year flow rate nor the floodplain. The project will not increase the risk of downstream flooding as defined by FEMA.

The analyses also included consideration of temporary sedimentation basins that will capture stormwater runoff prior to final reclamation. These temporary features will chance annually as surfaces are graded and are not shown in detail in this reclamation plan showing final conditions. Sedimentation basins are planned and sized according to criteria from the SWRCB and SCVURPPP.

The following specific methods will be used to control erosion:

Revegetation:

- Seed mixes include rapidly establishing annuals to provide interim erosion control until such time that the surfaces may be reclaimed with perennial plants.
- Revegetation will be sufficient to stabilize the surface against the effects of long-term erosion and is designed to meet the post-mining land use goals.

Settling Ponds:

- Temporary desiltation basins will capture storm runoff. The basins will be used until the vegetation establishes. The desiltation basins have been sized according to criteria from the SWRCB and SCVURPPP.

Erosion and sedimentation will be controlled during reclamation and closure to minimize off-site siltation.

Monitoring: The facility's surface water discharges, including stormwater, are subject to discharge requirements and NPDES permits. In accordance with the stormwater pollution prevention plan (SWPPP), an inspection for erosion of slopes, drainage channels, and unpaved areas at the facility is completed after each significant rainstorm. Conditions and maintenance will be recorded, and the appropriate remedial measure identified as part of an annual monitoring report. The SWPPP is required to be revised and implemented before specific changes in industrial activities, as specified by the NPDES General Permit.

Sedimentation basins will be maintained until areas of disturbance are revegetated sufficiently to provide for self-sustained erosion control, based on revegetation success monitoring. Following completion of revegetation and demonstration that surface erosion control is effective, siltation basins will be allowed to accumulate silt and revegetate naturally. Post-reclamation monitoring and reporting to the RWQCB will ensure that discharge is functioning properly and not causing off-site sedimentation.

Appendix I contains drainage analyses of post-reclamation flow rates. The drainage report also contains analyses for temporary sedimentation basins that will capture stormwater runoff.

The sedimentation control activities described in this reclamation plan are designed to control surface water runoff to protect surrounding land and water resources in accordance with the Porter-Cologne Water Quality Control Act, the federal Clean Water Act, and other applicable federal, state, and local requirements. These goals are achieved through a series of BMPs pursuant to the SWPPP. Drainage and erosion controls apply at all stages of operation and reclamation and are designed to exceed at least the 20-year storm event. The SWPPP covers existing operations on-site. Sediment basins (known as "ponds") provide stormwater detention and sediment control over the property. Basins are maintained according to Permanente's SWPPP and applicable NPDES permits. The WDRs and SWPPP are under separate permitting authorities and are not included in this reclamation plan.

4.6.3 Siltation and Pollutants

Permanente surface water discharges, including stormwater, are subject to discharge requirements and NPDES permits. The current NPDES permit prohibits any discharges related to process water, except through two, treated, discharge points such that all remaining discharge points comprise stormwater and/or authorized non-stormwater. A monitoring and reporting program (MRP) is part of the NPDES permit. The NPDES permit includes requirements for the SWPPP and an annual report.

The SWPPP specifies responsible persons and describes the facility, potential pollution sources, BMPs, source control, monitoring, and reporting. BMPs include measures such as scheduling activities to limit exposure of disturbed soil, preserving existing vegetation, hydroseeding, applying geotextiles and mats, slope protection, compost blankets, and soil binders.

Temporary BMPs will be installed until the vegetation is established in each phase of reclamation. The BMPs include sedimentation basins, which have been sized based on the SCVURPPP and SWRCB guidelines. As a result, Permanente has been designed for both the required design and water quality flow rates and meets SMARA's current standards (CCR, Title 14, Section 3706) for erosion and sediment control. The BMPs will be updated as needed to meet water quality standards reported to the RWQCB at reclamation and for final closure. Internal travel routes, access roads, or ramps specifically developed for reclamation purposes and unnecessary for post-mining land use will be inspected for road-base materials and petroleum or lubricant spill residue. If present, this material will be removed before soil decompaction and revegetation.

4.6.4 Stockpile Best Management Practices

The following BMPs are implemented as necessary to minimize water and wind erosion related to stockpiled materials at the WMSA and EMSA as regrading, cover placement and revegetation are completed:

- Run-on and stormwater generated from within the facility is diverted away from all stockpiled materials.
- Stockpiled cover and soils will have 2H:1V or less slopes.
- Fiber rolls or straw wattles may be used at active work areas. Fiber rolls should be placed along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope lengths and spread runoff as sheet flow. Fiber rolls should not include any synthetic component because of this material's potential adverse impact to wildlife.
- Temporary stockpiles are stabilized using an appropriate combination of BMPs to cover the exposed rock material, intercept runoff, reduce its flow velocity, and provide a sediment control mechanism (such as silt fencing, fiber rolls, or hydroseeded vegetation). Standard soil stabilization BMPs include sedimentation basins, geotextiles, mats, erosion control blankets, vegetation, silt fence surrounding the stockpile perimeter, and fiber rolls at the base and on side slopes.
- Up-gradient berms are installed where stockpiles are placed, to protect against stormwater run-on, and ditches and down-gradient berms are installed to promote infiltration rather than run-off.

The above descriptions of the ongoing methods to protect surface and groundwater quality are included in this reclamation plan for compliance with SMARA regulations at 14 CCR, Section 3710(a). The NPDES permit, SWPPP, and related implementing requirements are under the jurisdiction of the RWQCB and will change as they are periodically updated, and therefore are not specifically included in their entirety in this reclamation plan. SMARA regulations reference prevailing laws and regulations for compliance and are not intended to duplicate those efforts.

4.7 Resoiling

The conditions of Permanente limit the conventional SMARA regulation approach to soils salvage and redistribution. There are no existing native stockpiles of salvaged topsoil. For purposes of long-term water quality, imported cover will be necessary for cover of the WMSA, Quarry, and EMSA with several feet of imported materials placed over the top layer of WMSA overburden rock to improve soil conditions and enhance revegetation. The overburden rock substrate and potential soil materials are characterized as follows:

Overburden: The results of soil analysis indicate that the overburden rock alone is not an ideal substrate for certain plant communities. The U.S. Department of Agriculture classification for the overburden rock is a gravelly sandy loam with a diverse distribution of particle sizes. With this varied distribution of particle sizes, the susceptibility to consolidation is high. Given its rocky texture and low organic content, the overburden rock would benefit from the addition of topsoil and/or organic amendments. Blending stockpiled overburden rock with topsoil and other materials is a consideration for improving texture and nutrient content.

Imported Soils: The WMSA and EMSA and Quarry will be covered with imported surplus soil that meets site-specific acceptance criteria. Potential sources of this material will be evaluated for

contamination and testing for pesticides, and other impediments to plant growth. To augment growth media, imported surplus soil with higher organic matter content than on-site materials may also be used in revegetation.

Based on investigations of native soils and the planting palette and considering the available and potential materials to develop a planting substrate, the soil preparation depth for areas targeted for scrub planting over the majority of the surfaces is 6 inches, a depth tested in the test plots and considered suitable to support most shrub and grass species to be seeded. This target could include 50 percent ripped overburden rock mixed with 50 percent topsoil blend. Preliminarily, this could include 3 inches of loamy topsoil, which would be amended with other materials to achieve the 6-inch planting medium. In practice, the exact percentages of the blend may be altered based on topsoil and fill availability.

4.8 Revegetation

4.8.1 Resoiling and Revegetation Overview

The goal for revegetation efforts is to establish a self-sustaining vegetation cover that will control erosion, prevent off-site sedimentation, and attenuate visual contrasts where mined surfaces are visible from off-site locations. Fill slopes scheduled to undergo revegetation will first be graded to a final contour. The use of native shrubs will assist in blending mined surfaces into the surrounding landscape. Revegetation will be sufficient to stabilize the surface against the effects of long-term erosion and is designed to meet the post-mining land use goal.

Revegetation is intended to visually integrate with the surrounding undeveloped areas and provide soil protection. The surrounding areas include north-facing slopes with scrub communities and scattered high meadows and dry south-facing slopes vegetated with chaparral and scrub species. The objective for north-facing slopes is to establish shrub and herbaceous species present in adjacent undisturbed communities. For south-facing slopes, the objective of revegetation is to mimic the mixed scrub and chaparral communities present on south-facing slopes in adjacent open space areas by seeding with native shrubs and grasses that will eventually contribute to the establishment of scrub communities.

A site-specific revegetation plan has been prepared to update and replace the previously approved revegetation plan (2012). The plan provides specific guidance on soil composition and depth, species planting palette, and revegetation success criteria and is based on site-specific analysis and testing, augmented by the results of test plot monitoring, and current and future revegetation results, to optimize revegetation success. The revegetation plan is shown in Figure 13, “Revegetation.” The Permanente Creek Restoration Area has its own specifications along the creek channel (see Appendix B).

Operations at Permanente were initiated almost a century before SMARA regulations were developed. Consequently, creative options must be available to address surfaces that do not have any topsoil and thus improper water-holding capacity and nutrients for rapid establishment of vegetation; thus, this 2023 reclamation plan amendment compiles available data for site conditions and the results of on-site revegetation test plots and provides conceptual recommendations for resoiling and revegetation. Because no solution may be sufficient for the entirety of the approximately 631 acres to be revegetated, flexibility is provided for the soil amendment materials. While the vegetation goals are set in terms of SMARA reclamation standards for revegetation richness, density, and cover, the key determinant of success will be whether a self-sustaining vegetation is initiated that will, over time, control erosion, prevent off-site sedimentation, and attenuate visual contrasts where mined surfaces are visible from off-site locations. These revegetation goals are compatible with the land use goal of open space for the end use.

Because of the above circumstances, on-site materials available to supplement growth media are very limited. Revegetation will however capitalize on the imported soil needed for cover over extensive areas of the site. The revegetation strategies are based on a soil development plan and the test plot program. The test plot program generated useful data regarding the optimal species blends and planting methods. Additionally, the soil development plan and test plot program were designed to develop blends of materials available on-site and supplemented by imported cover that will enhance the amount of growth media available for revegetation purposes, as necessary to ultimately achieve revegetative success. Areas to be

revegetated will largely consist of overburden rock surfaces overlain by fine-grained cover, other fill slopes, areas used for general operations that have been compacted for vehicle travel, backfill, and limited stability benches along highwall cut slopes.

Though all revegetation areas will be revegetated to meet performance criteria, key areas on the WMSA ridgeline facing highly populated or frequently visited locations may require additional techniques to reach performance criteria more quickly to blend in with vegetated surroundings. These techniques may include tools such as short-term irrigation when practical, enhanced growth media application, emphasis on hydroseeding over broadcast seeding, and higher densities of container plantings.

4.8.2 Seeding

A preliminary erosion control stage may be incorporated prior to the revegetation tasks listed below, to allow for specific site revegetation plans to be developed based on reclamation field conditions. The seed mix shown in Table 7, "Erosion Control Seed Mix," includes species that have proven successful in other revegetation efforts and are planned to provide erosion control and initial establishment of grasses and herbaceous species as needed in temporarily disturbed areas.

TABLE 7
EROSION-CONTROL SEED MIX

Scientific Name	Common Name	Pure Live Seed (lb./acre) *
Bromus carinatus	California brome	16
Elymus glaucus	blue wildrye	10
Elymus X Triticum	Regreen sterile hybrid wheatgrass	10
Eschscholzia californica	California poppy	3
Lupinus nanus	sky lupine	5
Stipa pulchra	purple needlegrass	8
Plantago erecta	California plantain	3
Trifolium willdenovii	tomcat clover	3
Festuca microstachys	three weeks fescue	8
	TOTAL	**53**

Notes:
*The final seed mix will depend upon availability at the time of implementation.

Recontoured surfaces will be amended and covered with grass, herb, and shrub species over the areas to be revegetated. Drainage ditches and access roads will be left bare until the completion of the contouring and slope seeding, at which time roads will be ripped and revegetated. A limited area of highwall will be recontoured for stability; the benches will be seeded. Planned native seed mixes for reclamation are listed in Table 8, "Preliminary Species for General Seeding," and were tested in the test plots and include species known to thrive in undisturbed adjacent habitats or observed to perform well in previous revegetation areas and test plot results. These species should be used, pending availability, for the earliest stages of the reclamation work. The seed mix will be applied as necessary over the entire revegetation area.

TABLE 8
PRELIMINARY SPECIES FOR GENERAL SEEDING

Scientific Name	Common Name	Pure Live Seed (lb / acre)*	Bulk Seed (lb/acre)*
SHRUBS			
Adenostoma fasciculatum	chamise	1.0-2.0	7-15
Artemisia californica	California sagebrush	0.5-1.5	5-15
Baccharis pilularis	coyote brush	0.05-0.15	5-15
Diplacus aurantiacus	sticky monkeyflower	0.5-1	15-30
Eriogonum fasciculatum	California buckwheat	1-1.5	20-30
Heteromeles arbutifolia	toyon	2.5-4	5-8
Salvia leucophylla	purple sage	0.7-2	1.5-4
Salvia mellifera	black sage	1.1-3	2-6
GRASSES AND HERBS			
Achillea millefolium	yarrow	0.5-1.7	0.5-2
Acmispon americanus* var. *americanus	Spanish clover	0.7-2	1-3
Acmispon glaber	deerweed	1.5-3.5	2-4.5
Artemisia douglasiana	mugwort	0.1-0.5	1-5
Bromus carinatus	California brome	4.6-9	6-11
Elymus glaucus	blue wildrye	4.6-8	6-11
Eschscholzia californica	California poppy	1.2-2	2-3
Festuca microstachys	Three weeks fescue	2.5-5	3.5-7
Heterotheca grandiflora	telegraph weed	0.2-1.5	1-7.5
Lupinus nanus	sky lupine	0.8-2.5	1-3
Melica californica	California melic	1.3-3	2-4
Sisyrinchium bellum	blue-eyed grass	1.5-2	2-3
Stipa pulchra	purple needlegrass	2.9-7	4-9.5
Poa secunda	one-sided bluegrass	1.3-4	2-5.5
Trifolium willdenovii	tomcat clover	1.4-3	2-4.5

Notes:
*The final seed mix will depend upon availability at the time of implementation.

4.8.3 Shrub Plantings

Shrubs would be planted as seeds in the revegetation areas. Container plantings would occur on the benches where a deeper layer of topsoil and/or soil-building materials is applied to ensure adequate space for root development. To the extent practical, shrubs to be planted will be generated from seeds collected from the property or from local sources. Shrubs would be planted at approximately 4.5-foot spacing in the designated planting areas. The remaining slopes and benches would be covered with shallower topsoil and/or soil-building materials and seeded with a grass/herb/shrub seed mix, without containerized shrub plantings.

The need for herbivory protection for specific species can be evaluated based on the results of initial plantings. Weed mats or several inches of mulch may be placed around planted shrubs to reduce competition and retain moisture.

This plan is designed to provide appropriate conditions for planting, so it is not dependent upon irrigation. The need for irrigation during initial establishment should be assessed during the adaptive management

reclamation efforts. DriWater gel pack irrigation systems were tested in the test plots. DriWater is a biodegradable silica-based product that is buried next to the plants and slowly releases stored water into the soil. By planting shrubs without irrigation, a more drought-tolerant stand may be established, increasing the chances of their survival; however, if monitoring during the first 5 years of the early revegetation stages indicates significant losses of plant material that threatens achievement of performance standards, the need for temporary irrigation should be re-evaluated.

As with hydroseeding or seeding, adaptive management will be used over time to determine which shrub species will be planted, the most effective spacing and location, and species to use in replacement plantings if necessary. Species selection and numbers will depend on propagule collection and availability.

4.8.4 Performance Standards

In addition to vegetation monitoring to assess the success of revegetation efforts, the cover of weeds (non-native invasive plants) will be assessed as part of vegetation sampling.

Reference plots were surveyed in undisturbed natural grassland habitat in and adjacent to the property to assess native and non-native species richness and cover. The reference plots contained 28 species, 13 of which were nonnative, and an additional eight are listed as invasive species in the California Invasive Plant Council's (Cal-IPC) Inventory. Although two of the seven native species recorded had the highest cover, the next ten species with the highest cover were non-native or invasive species. Non-native and invasive species accounted for over 50 percent of the vegetative cover; therefore, performance standards were developed that took this information into account.

Revegetation Performance Standards

Performance standards are specified in Table 9, "Revegetation Performance Standards," describe the minimum targets for species richness and percent cover for hydroseed and planting areas. Performance standards represent anticipated conditions 5 years after installation, based on a study of reference sites nearby and test plot results. SMARA requirements state that performance standards must be met for 2 consecutive years without significant human intervention prior to release of financial assurances. Revegetation is intended to create approximately 40- to 60-percent coverage of native shrub habitat interspersed among grasses within 5 years of installation.

Reference data values for percent cover and density of shrubs describe mature communities that have not seen significant disturbance in decades. While the target plant communities of the revegetation areas should eventually blend with these mature communities, they cannot be expected to achieve similar characteristics over only 5 years of growth. Instead, shrub planting areas are designed to mimic pioneering plant communities that will continue to develop and dominate the benches and slopes over several decades through growth and natural regeneration.

TABLE 9
REVEGETATION PERFORMANCE STANDARDS

Surface Type	Canopy Cover	Richness	
		Shrubs/Meter	*Herbs/Meter*
Coarse Overburden	60%	1	1
Cover and Backfill	40%	3	3
Compacted Soils	20%	2	2
Highwall Bench	60%	3	3

Notes:
* Performance standards for seeded areas may need to be adjusted to reflect feasible 5-year results of the species mix ultimately selected based on test plot results and early revegetation efforts during the reclamation period. In particular, the balance between shrub and herbaceous species cover may vary.
** Richness standards are based on plot sizes used in reference data collection and described in this Plan: 5 meter-radius plots for shrubs, and 1 meter-radius plots for herbs/grasses.

Weed Control Performance Standards

For the purposes of reclamation plan amendment maintenance and monitoring, non-native plants, excluding annual grasses, listed in the Cal-IPC inventory (2023) as highly invasive will be considered invasive weeds subject to control and performance standards. If invasive weeds are found to exceed comparable levels of weeds on surrounding properties, weed abatement activities will begin. Invasiveness rankings in the Cal-IPC inventory may change over time based on new information; therefore, the rank of non-native plants found within the reclamation area could change.

4.8.5 Adaptive Management

The strategy described above may prove to be less efficient than other strategies developed based on the revegetation implementation and monitoring that will be implemented over an extended period of time. Therefore, if a different planting strategy is implemented in which the above performance standards and monitoring guidelines need adjustment, changes may be implemented that meet the same objectives for erosion control and revegetation.

4.8.6 Monitoring and Maintenance

Shrub Planting Areas

Randomly selected plots will be monitored in planting areas, with the number of plots sampled suitable to attain 80-percent confidence in data results. In addition, both north- and south-facing areas should be represented in sampling. Container planting areas will be sampled using a nested approach as utilized in reference site data collection; other sampling methods may be used but will require appropriate conversion of species richness standards. The nested approach means that once a plot center is randomly selected, shrubs are assessed within a 5-meter radius and herbs within a 1-meter radius from the plot center. Monitors will identify and count all shrubs surviving in their respective plots. All shrub and herb species cover within each layer will be estimated within each respective plot, and all species will be identified to the extent possible.

Seeded Areas

Sampling plots will be selected randomly throughout the areas seeded with grasses, herbs, and shrubs to determine native species richness and percent cover of each species. As with the planting areas, sampling will occur in nested plots, with shrubs assessed within a 5-meter radius and herbs within a 1-meter radius from the plot center. The number of plots for each installation stage will be selected to achieve an 80-percent confidence level in the performance results. Stratification of sampling areas may be necessary if the mix of shrubs and herbs varies greatly in different areas either due to variation in hydroseed applications or soil or other site conditions. For example, areas strongly dominated by herbs and grasses may instead be monitored using smaller sampling plots appropriate to grasslands.

Revegetated areas should be monitored in late spring or early summer to ensure that most plants will be identifiable to the species level. Monitoring will be conducted by a qualified biologist with experience in plant identification. After monitoring data has been collected, a report summarizing the success of revegetation efforts, comparison of data to Year 5 performance standards, any observed obstacles to achieving performance standards, and any remedial actions recommended will be prepared and submitted to Lehigh by October 15 of that year. This will allow for proper timing of remedial plantings and/or seeding if determined to be necessary.

Maintenance

Maintenance of revegetation areas shall consist of reseeding or replanting unsuccessful revegetation efforts, weed control to limit the extent of noxious weeds, and repair of erosion damage. If significant rills or gullies are identified that could contribute to off-site sedimentation, remedial actions will include reseeding of the area with an approved erosion control seed mix, and if necessary, slope stabilization measures will be undertaken.

If revegetation efforts are not successful within 5 years following initial seeding, the under-performing areas will be reevaluated to determine the measures necessary to improve performance. If necessary, these areas will be reseeded and/or replanted with methods modified as needed. This may include the use of container stock and irrigation or simply additional seeding during a wet winter season. Prior to reseeding, the operator shall evaluate previous revegetation practices to identify methods to benefit the overall revegetation effort. If, after a site is reseeded, revegetation efforts still do not yield satisfactory results, additional reseeding or other intervention methods may be required.

Weed control may be necessary to reduce the occurrence of undesirable invasive and noxious species of plants that may invade and where weeds could interfere with revegetation efforts or increase fire hazards, as specified in SMARA regulations. Weeds are undesired, generally introduced, and invasive plants that can compete with revegetation efforts; however, many introduced species occur widely in the region and are common in both the surrounding active areas and adjacent natural open space lands. Eradication of all weeds is therefore unachievable; so specific noxious plant species are targeted for control.

As described above, species listed by Cal-IPC (2023) as highly invasive will be considered problematic and will be targeted during maintenance of the revegetation effort if they exceed the designated threshold of 10-percent cover. Invasive plant species typically found on the site and in surrounding lands include yellow star thistle and pampas grass. Weed control methods may include chemical and mechanical removal techniques depending on the species and number of individuals encountered. Priorities in weed abatement should focus on those species listed as highly invasive, in addition to other weeds that directly threaten the successful establishment and survival of revegetation species. The percentage cover of weeds, abatement measures recommended and undertaken, and other observations on weed control will be included in vegetation monitoring reports. Weed abatement responsibilities may cease once performance standards have been met for each stage of revegetation efforts, unless invasive species in completed revegetation areas are deemed a threat to nearby efforts still in progress.

4.9 Final Closure Considerations

This section describes whether each project component will be removed or remain, and the related reclamation activities.

4.9.1 Background

Cement-grade limestone has been mined at Permanente since approximately 1903 for use in the production of cement and/or aggregate materials. Overburden, unmarketable rock, and processing residuals (sometimes called “waste” materials) have been placed in the WMSA and EMSA. Although these materials are naturally occurring, their removal from the native bedrock environment causes them to be regulated as mining waste. The mining process (including blasting, excavation, and crushing) transforms bedrock into particles, sized from fine silt to cobbles. This process increases the surface area that is subjected to weathering, increasing its leaching potential. For example, exposure to oxygen and water can result in the solubilization (dissolution and potential mobilization) of some metals and metalloids that would otherwise be bound in the bedrock (WDR Order No. R2-2018-0028).

The on-site mine wastes characterized for the WDRs are classified as Group B mining wastes (as defined in Title 27 Section 22480) because they “consist of or contain nonhazardous soluble pollutants of concentrations which exceed water quality objectives for, or could cause, degradation of waters of the State.” The RWQCB has formally designated the stockpiled overburden materials as a Group B waste (i.e., a nonhazardous waste with pollutant concentrations that could exceed water quality objectives or degrade waters of the state) and determined that these materials currently have the potential to adversely affect groundwater quality.

The RWQCB issues WDRs to regulate discharges to land pursuant to CCR Title 27 and Section 13263 of the California Water Code. To protect human health and the environment, the RWQCB issued an order that governs wastes and activities that generate waste at the site that have the potential to affect groundwater

and hydrogeologically connected surface waters. The activities include current and historical disposal activities, aspects of mining operations that generate waste, and reclamation of disposal units. Specifically, the WDRs for this site (WDR Order No. R2-2018-0028) state:

a) Require development of a Self-Monitoring Program (SMP) consistent with Title 27 to enable the detection of chemical releases from the site and to evaluate whether groundwater and hydrogeologically connected surface waters have been impacted by current or historical activities. In addition, it requires baseline monitoring to dictate reclamation plans, which includes expansion of the existing groundwater monitoring network and development of an updated conceptual site model;
b) Require an Operation, Maintenance, and Contingency Plan for waste management units (WMUs) to ensure containment procedures and monitoring infrastructure are properly operated and sufficiently monitored and maintained to be effective;
c) Require Closure and Post-Closure Maintenance Plans to ensure reclamation strategies are adequately protective and that implementation will not impact groundwater or hydrogeologically connected surface waters; and Preliminary Closure Plans (to be updated biennially) to enable Water Board staff oversight of interim preparations and evaluation of reclamation strategies; and
d) Require financial assurances to demonstrate that the Dischargers are capable of covering costs associated with closure and post-closure maintenance, as well as corrective actions should a release be identified.

Current waste containment practices for the WMSA and EMSA consist of stormwater controls (e.g., BMPs such as berms, wattles, settling ponds, gabion basket check dams, floc logs, or active treatment for stormwater from the EMSA) to minimize the discharge of runoff that has come in contact with mining waste. Stormwater discharges from the site are regulated under the NPDES permit for Permanente.

As addressed in Appendix F, pursuant to the Permanente WDRs, the operator must submit a preliminary closure plan that includes closure alternatives that will minimize water quality impacts. Additional site-specific data has been acquired since 2012 regarding the hydrologic conditions, including the underlying mechanisms affecting surface water and groundwater quality. Data has also been generated to evaluate the use of the WMSA materials as the sole source of backfill material for the Quarry.

The primary constituent of concern (COC) is selenium, though Lehigh evaluates both surface and groundwater quality for a variety of constituents. Selenium occurs primarily in association with the sulfides present in limestone and is released following sulfide oxidation. Following sulfide oxidation, water infiltration is the primary transport mechanism for selenium transport. Selenium water quality standards are derived from the RWQCB's basin plan (as well as applicable federal regulations) and are the basis of the RWQCB environmental screening levels. The water quality objective for selenium in federally recognized surface waters is 5 µg/L (chronic) and 20 µg/L (acute), which is based on the protection of aquatic habitat. The drinking water maximum contaminant level applicable to regional ground waters and surface waters used for municipal and drinking water supply is 50 µg/L. The aquatic habitat water quality objective is more stringent because it must protect aquatic species and the bioaccumulation potential of selenium.

The above descriptions of the ongoing methods to protect surface and groundwater quality are included in this reclamation plan for compliance with SMARA regulations at Section 3710(a). The WDRs and the various implementing requirements are under the jurisdiction of the RWQCB and will change as they are periodically updated, and therefore are not specifically included in their entirety in this reclamation plan. SMARA regulations reference other laws and regulations but that reference is not intended to duplicate compliance efforts.

4.9.2 Structures and Equipment Removal

With the exception of equipment required for reclamation purposes, equipment and structures supporting mining will be removed at final reclamation. This includes all mobile equipment such as loaders, dozers, excavators, haul trucks, storage vans, and water trucks. This also includes all buildings and facilities such as conveyors, crushers, trailers, maintenance buildings, storage sheds and other types of structures. All

surplus equipment and supplies will be transported off-site. Scrap equipment will be disposed off-site for salvage value. Any trash and miscellaneous debris will be collected and hauled to an appropriate waste disposal facility pursuant to the state and local health and safety ordinances.

4.9.3 Closure of Drill Holes, Water Wells, and Monitoring Wells

Permanente is now well studied, and many geologic drillings and water monitoring wells have been developed. Certain wells have been improved for long term monitoring groundwater levels and groundwater quality. The current well locations are shown in Figure 3. Additional wells may be developed as needed for monitoring as reclamation operations continue.

A well completion report must be filed within 30 days of a new well, in accordance with State of California requirements (DWR Form 188). Well abandonment is required to follow established procedures. Local requirements for a well permit must also be met. The local drilling permits require notifying the grout inspector so they can be on-site for the abandonment.

Geologic borings for mineral exploration and geotechnical evaluations have been completed at many locations on the property, including recent work at the WMSA and Quarry to improve understanding and planning for geologic stability following closures shown on Figure 5, and documented in Appendix E. Geologic exploration borings were grouted and abandoned within 24 hours as required. Thus, such temporary borings are not included in Figure 3.

At reclamation, monitoring wells no longer needed will be abandoned according to standards set forth in applicable regulations, ordinances, and SWRCB Bulletins 74-81 and 74-90. Many monitoring locations will continue to be used following closure under SMARA for purposes of long-term water quality monitoring pursuant to WDRs.

Material conveyed from the primary crusher to the secondary crusher area passes through a 550-foot tunnel. The entrance and exit of the tunnel will be closed following conveyor dismantling and removal. See Figure 3 for those locations.

4.9.4 Structures and Surfaces to Remain

Structures at the site are generally limited to mobile buildings in support of mining and would not remain following operations. Power extended to Permanente is expected to remain to support environmental monitoring and land uses following mining. Water conveyance systems and water treatment features will remain as necessary, and water monitoring installations will remain until such time that the WDRs are rescinded.

Many roads used for post-reclamation access throughout Permanente will remain following mining and reclamation. Roads expected to be retained for property access and maintenance are shown in Figure 8 and Figure 10).

Primary access to the operating site is through a single roadway, which has a gated entrance. Fencing and gating will remain during reclamation.

4.9.5 Impact of Reclamation on Future Mining

As a result of the plan to backfill the Quarry, the remaining cement-grade limestone existing in the Quarry below the 990 msl elevation will be buried beneath backfill and buttress fill and it will not be economically recoverable in the future.

Areas of known limestone remain south of Permanente Creek. This reclamation plan removes these resources from coverage under this reclamation plan by withdrawing a 353-acre area.

4.9.6 Public Safety Considerations

This site is private property, located in an area that is relatively inaccessible by road except through controlled points (i.e., locked gates or monitored access). Steep slopes and dense vegetation also discourage trespassing. The potential for public exposure is therefore limited.

Access to Permanente is currently restricted by a gated entrance manned by security guards 24 hours per day. Security will be continued during reclamation activities in the same manner as during operations. Existing perimeter fences, locked gates, and signs will be maintained to exclude public entry to Permanente.

Locks, gates, signs, and fences are regularly inspected. Any damage to the security system caused by vandalism, trespassing, or natural wear and tear will be repaired and/or replaced. Signs will be repaired or replaced on an as-needed basis to maintain their visibility.

Post-reclamation public health and safety will be protected in accordance with County standards for undeveloped land. Final slopes will be consistent with SMARA stability standards for post-reclamation use.

5. FINANCIAL ASSURANCE

This section addresses the primary reclamation tasks associated with the reclamation plan. These tasks are the basis of financial assurance calculations for the site, which are required to be revised annually and will therefore change over the course of operations.

Financial assurance cost estimates for the initiation of the operation are based on:

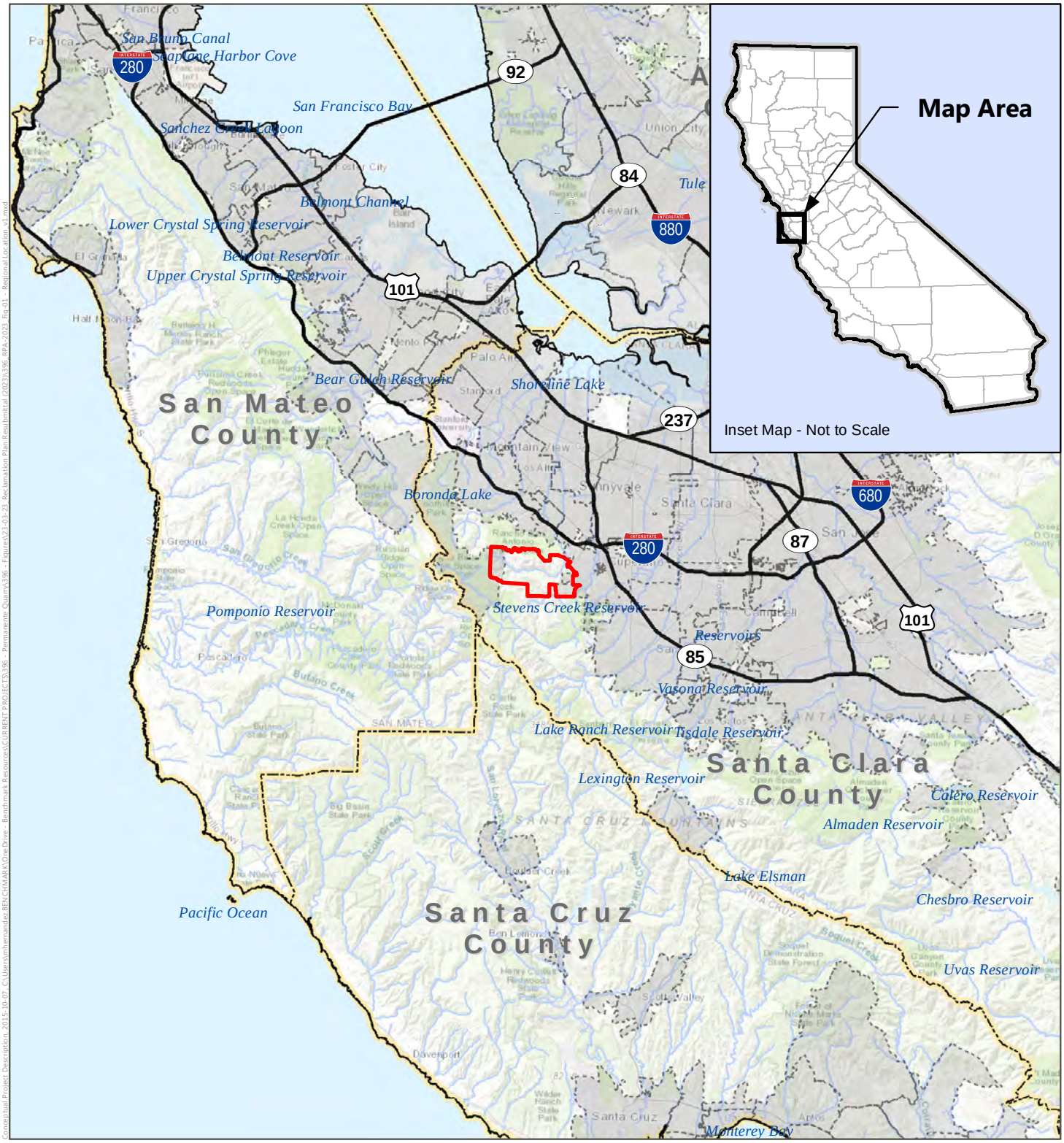
- an analysis of the physical activities necessary to implement the approved reclamation plan,
- the lead agency's (or third-party contract) unit costs for each of these activities,
- the number of units of each of these activities, and
- an amount to cover contingency costs (not to exceed 10 percent of the above-calculated reclamation cost) and actual lead agency administrative costs.

The following tasks will need to be completed to implement this reclamation plan:

- **Grading**
  - Contour slopes as necessary for geotechnical stability and establish proper drainage.
- **Quarry Backfill**
  - Placement of fill from both on-site and off-site sources to reach the 990-ft elevation.
- **Quarry Buttress**
  - Placement of fill from off-site sources to cover highwall limestone and provide geotechnical stability.
- **Cover Placement**
  - Cover placement over WMSA, EMSA, and Quarry backfill from select on-site and imported materials.
- **Revegetation**
  - Distribute cover material.
  - Seed and plant.
- **Equipment and Facilities Removal**
  - Remove mobile equipment, including structures at the Shop/Office
  - Remove structures and foundations at rock plant site, conveyor to surge pile and the old and modern crushers.

- **Monitoring/Maintenance**
  - Inspect planting and seeding success.
  - Inspect slopes for erosion.
  - Monitor for noxious weeds.
  - Maintain and weed the revegetation.
  - Collect data and report on reclamation progress.
  - Prepare contingency for replanting.

FIGURES



SOURCES: ESRI World Shaded Relief accessed 2023, ESRI World Topographic Map accessed Jan. 2023; ESRI World Streetmap, 2009; compiled by Benchmark Resources in 2023

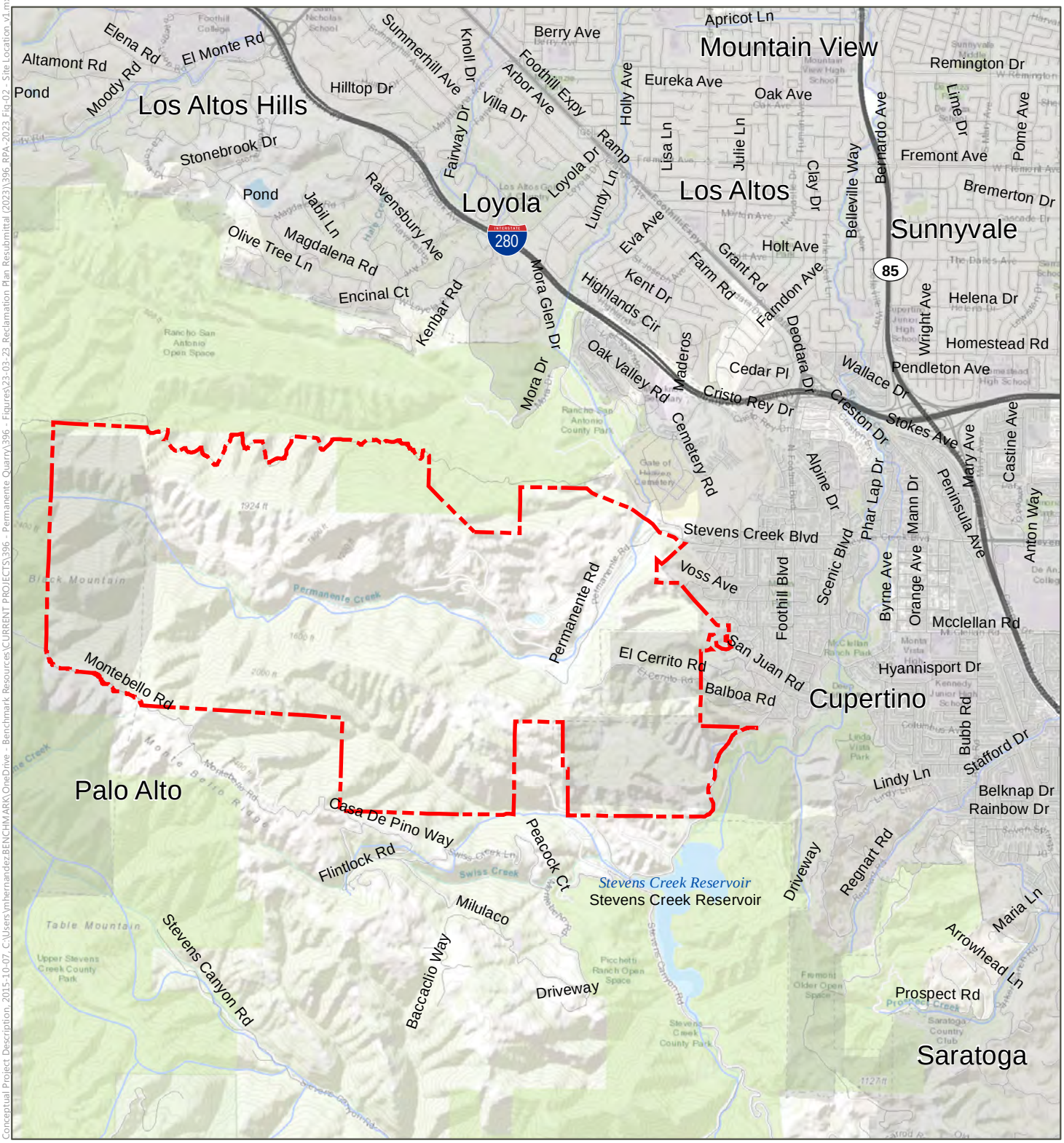
Property Boundary
City Boundary
County Boundary
Major Highway
River

BENCHMARK RESOURCES

N

0 3 6 12 Miles

Regional Location
PERMANENTE QUARRY
RECLAMATION PLAN AMENDMENT
Figure 1



SOURCES: ESRI World Shaded Relief accessed 2023, ESRI World Topographic Map accessed 2023; ESRI World Streetmap, 2009; adapted by Benchmark Resources in 2023

Property Boundary
City Boundary
Water Body
Interstate
Street
River

BENCHMARK RESOURCES

N

0 2,000 4,000 8,000 Feet

Site Location
PERMANENTE QUARRY
RECLAMATION PLAN AMENDMENT
Figure 2

Project Location
T07S, R02W Santa
Clara County, CA

Review
Prepared by CF on 2023-05-25
Final Review by HL on 2023-05-25

Notes

1. Coordinate System: NAD1983 StatePlane California III FIPS 0403 feet.
2. Basemap Image: Google earth and client supplied 2023 flyover images.

Legend

- PROPERTY BOUNDARY
- RPA BOUNDARY
- EXTENT OF AGGREGATES STOCKPILE
- PCRP BOUNDARY
- SCENIC EASEMENT
- SURGE PILE BOUNDARY
- GREENTONE SLIDE
- YEAGER YARD
- WELL LOCATION
- CONVEYOR TUNNEL
- CROSS SECTION

EXISTING TOPOGRAPHY

- 100 FT INDEX CONTOUR
- 20 FT CONTOUR
- IMPOUNDMENT OF JURISDICTIONAL
- WATERS
- OPERATIONAL POND
- QUARRY PIT
- ACCESS / HAUL ROAD

LICENSED PROFESSIONAL ENGINEER
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GE 2939
GEOTECHNICAL
STATE OF CALIFORNIA

Stantec

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EXISTING CONDITIONS
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
FIGURE 3

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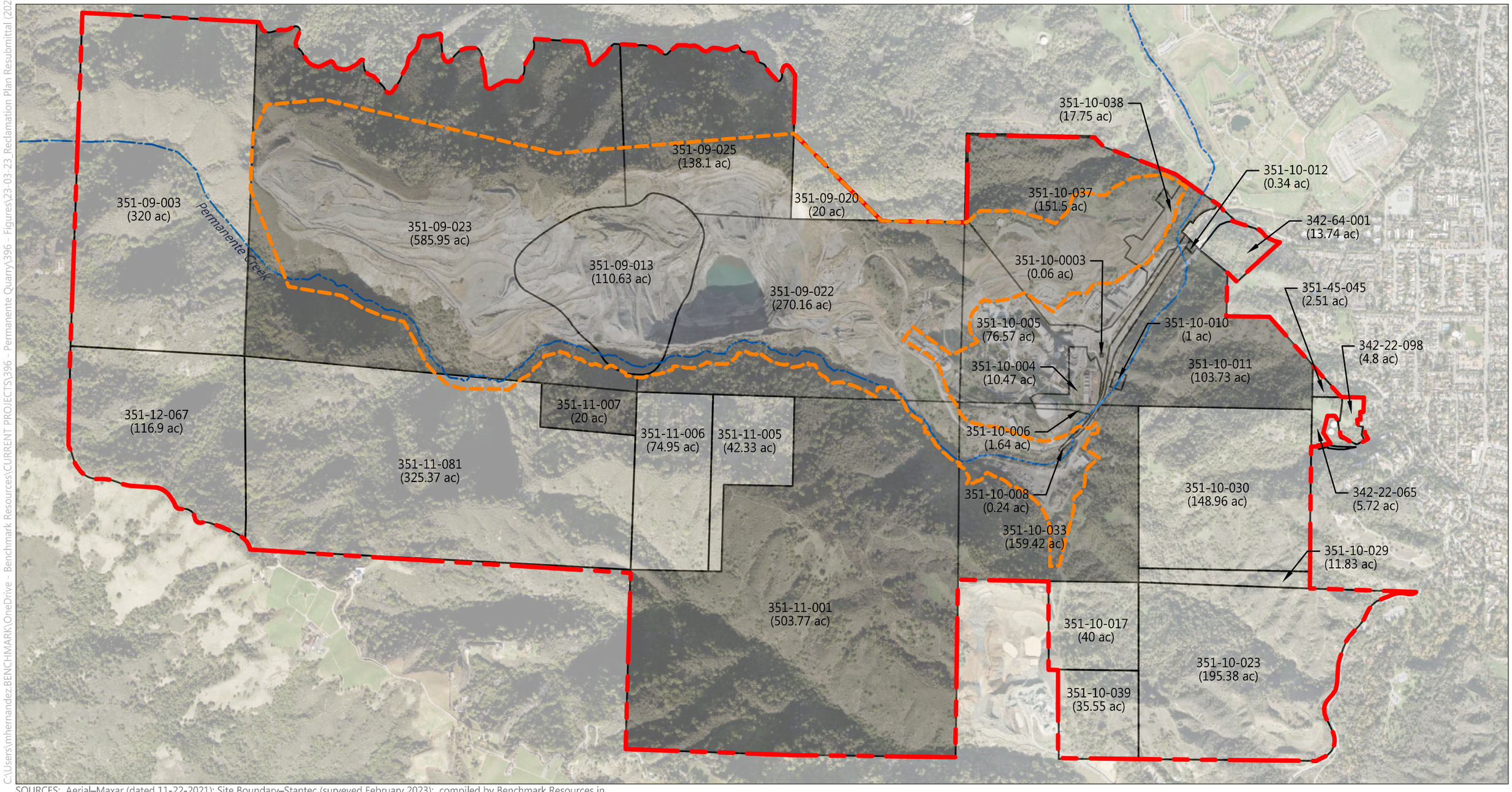

SOURCES: Aerial–Maxar (dated 11-22-2021); Site Boundary–Stantec (surveyed February 2023); compiled by Benchmark Resources in 2023; Parcels–Santa Clara County parcel data accessed in 2018; compiled by Benchmark Resources in 2023

NOTES:
1. ac = acres
2. Property boundary for illustrative purposes only. See Appendix C-3 "County Parcel Boundaries" for county parcels.
3. Current surface disturbance is ±670 acres (boundary not shown).

Property Boundary	3,510 acres
2023 Reclamation Plan Boundary	921 acres
Permanente Parcels	
Permanente Creek	
Vested Parcels	

BENCHMARK RESOURCES

N

0 700 1,400 2,800 Feet

Parcels and Vested Rights

PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Figure 4

6,092,000 6,094,000 6,096,000 6,098,000 6,100,000

1,944,000 1,942,000 1,940,000

S-1-2018-4 S-1-2018-3 S-1-2018-2 S-1-2018-1 GT-1-2018-1 GT-2018-2

fl fs fg fsr QTsc Qpaf af H2O fc

Geo 2-1A Geo 2-19 Geo 2-6B Geo 2-13 P2-7 Geo 2-17 GT2-7 Geo 2-10A Geo 2-12 P2-3 GT2-14 P2-11 P2-11A P2-11B

Legend

- Drill Hole (2007) - Core
- Drill Hole (2018) - Core
- Drill Hole (2018) - RC
- Drill Hole (2018) - Sonic
- Drill Hole (2018) - Sonic Vibrating Wire Piezometer
- 50 ft Contour
- 250 ft Index Contour
- Fault, moderate to large scale, dashed where certain,dotted where concealed
- Fault, moderate to small scale, dashed where uncertain, dotted where concealed
- Reclamation component boundaries
- Thrust Fault, certain
- RPA Boundary
- H2O - Water
- QTsc - Santa Clara Formation
- Qpaf - Alluvial fan and fluvial deposit (Pleistocene)
- af -Artificial fill
- fc - Franciscan complex, chert
- fg - Franciscan complex, greenstone
- fl - Franciscan complex, limestone
- fs - Franciscan complex, sandstone
- fsr - Franciscan complex, sheared rock (melange)

LICENSED PROFESSIONAL ENGINEER
CHENGLIANG HSIAO
GE 2939
GEOTECHNICAL
STATE OF CALIFORNIA

Notes

1. Coordinate system: NAD 1983 StatePlane California III FIPS 0403 feet.

Project Location
T07S, R02W Santa
Clara County, CA

Review
Prepared by CF on 2023-05-25
Final Review by HL on 2023-05-25

Stantec

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GEOLOGY
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
FIGURE 5

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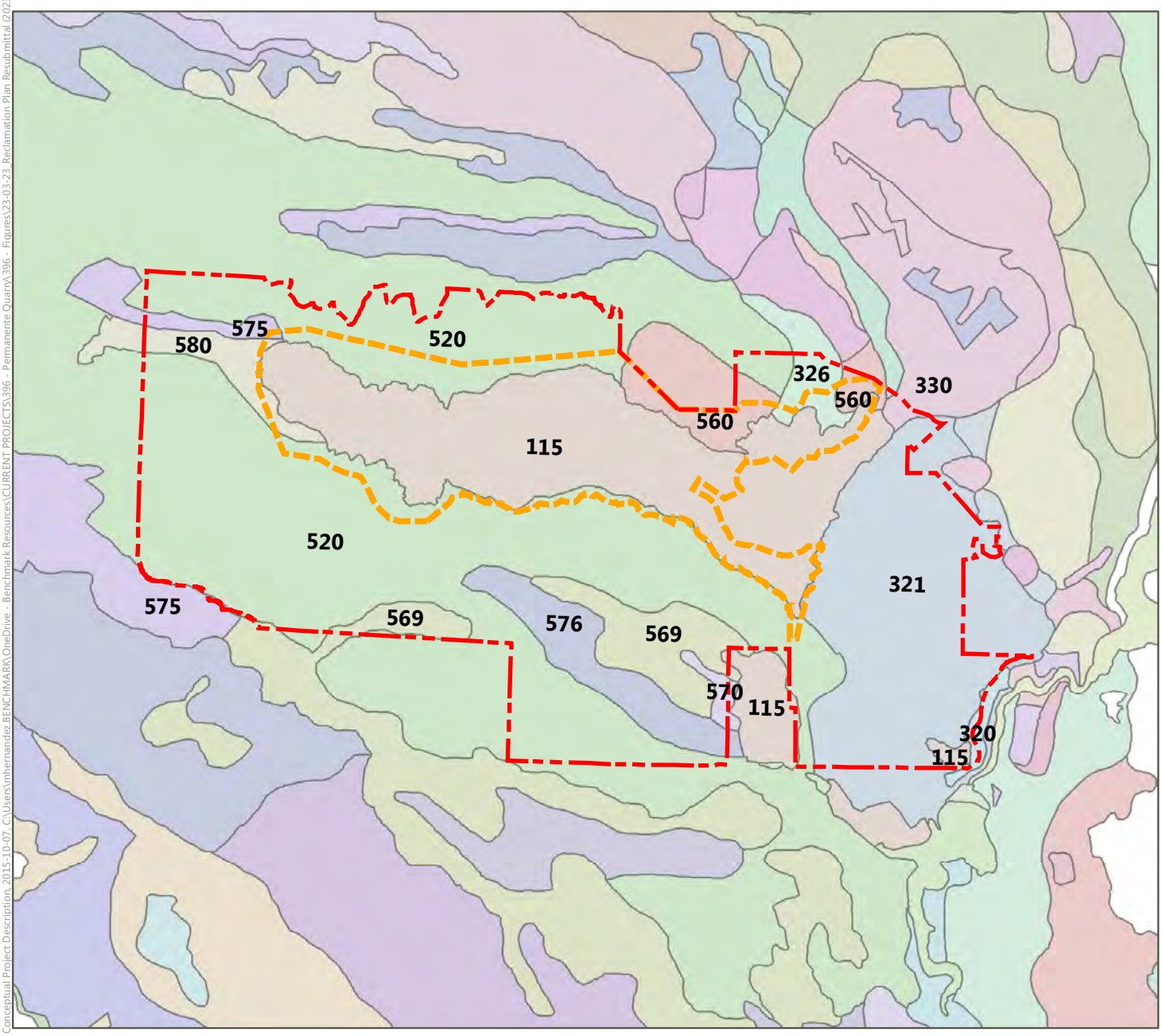


SOURCES: ESRI World Shaded Relief accessed 2023, U.S. Department of Agriculture Natural Resources Conservation Service Web Soils Survey, accessed 2023; adapted by Benchmark Resources in 2023

NOTES:

1. Property boundary for illustrative purposes only. See Appendix C-3 "County Parcel Boundaries" for county parcels.
2. This figure was prepared for land use planning and informational purposes only. The information shown and its accuracy are refelctive of the date the data was accessed or produced.

Property Boundary Reclamation Plan Boundary

Map Units

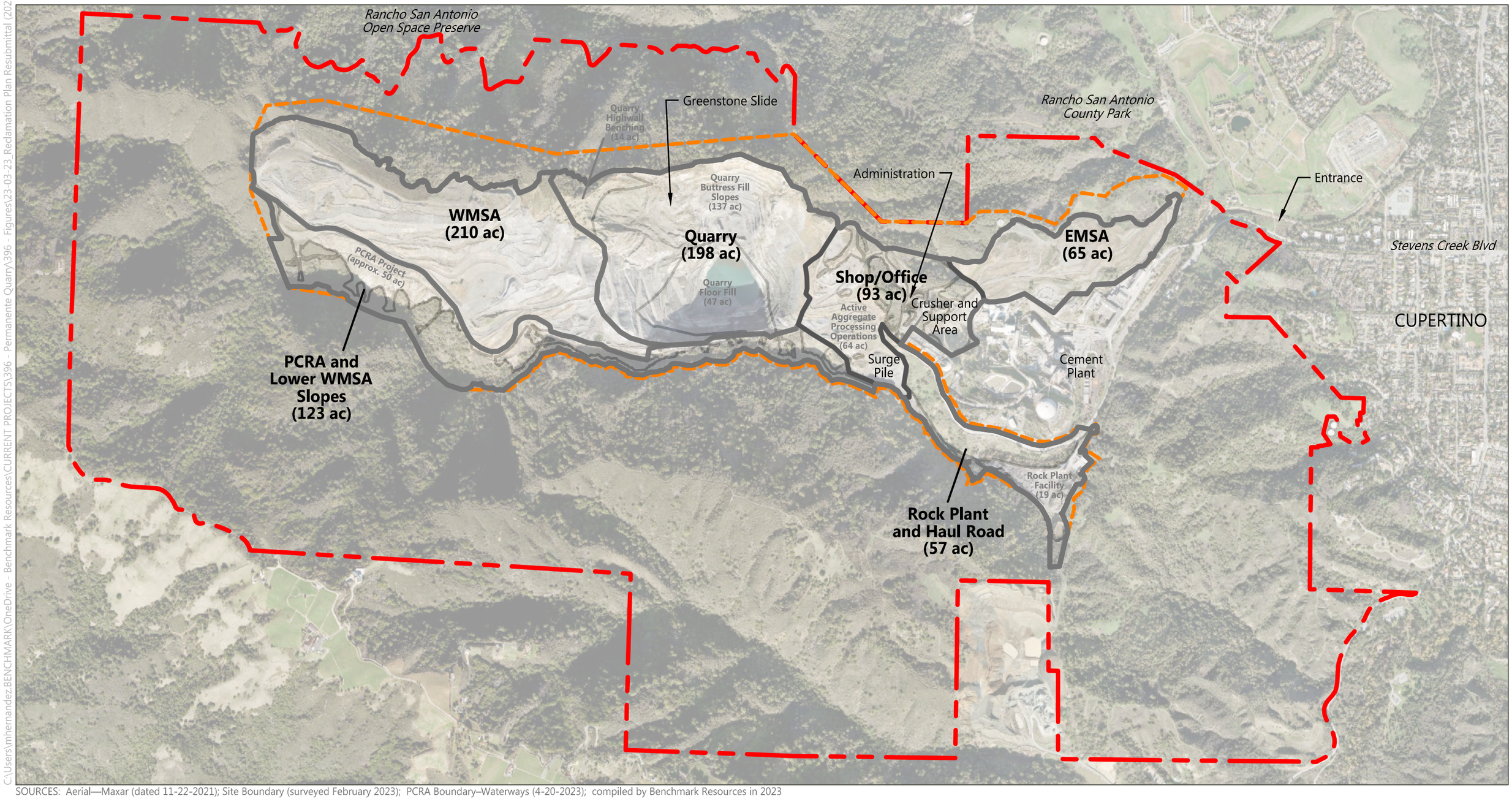
326	Airship-Minlum complex, 40 to 65 percent slopes	321	Merbeth-Literr complex, 30 to 65 percent slopes
570	Footpath-Mouser complex, 50 to 75 percent slopes	330	Montavista clay loam, 15 to 30 percent slopes
560	Katykat-Mouser-Sanikara complex, 30 to 50 percent slopes	575	Mouser-Footpath complex, 8 to 30 percent slopes
569	Katykat-Sanikara complex, 8 to 30 percent slopes	520	Mouser-Maymen complex, 30 to 75 percent slopes
320	Literr-Merbeth complex, 15 to 30 percent slopes	115	Pits, mine
580	Maymen gravelly sandy clay loam, 30 to 50 percent slopes	326	Sanikara-Footpath complex, 30 to 75 percent slopes

BENCHMARK RESOURCES

N

0 1,500 3,000 6,000 Feet

Soils
PERMANENTE QUARRY
RECLAMATION PLAN AMENDMENT
Figure 6



SOURCES: Aerial—Maxar (dated 11-22-2021); Site Boundary (surveyed February 2023); PCRA Boundary–Waterways (4-20-2023); compiled by Benchmark Resources in 2023

NOTES:
1. Property boundary for illustrative purposes only. See Appendix C-3 "County Parcel Boundaries" for county parcels.
2. Current surface disturbance is ±670 acres (boundary not shown).
3. PCRA Project acreage derived from Permanente Creek Restoration Plan Supplemental Environmental Impact Report (March 2023).

OWNER:
Hanson Permanente Cement, Inc.
300 E. John Carpenter Freeway #1645
Las Colinas, TX 7502

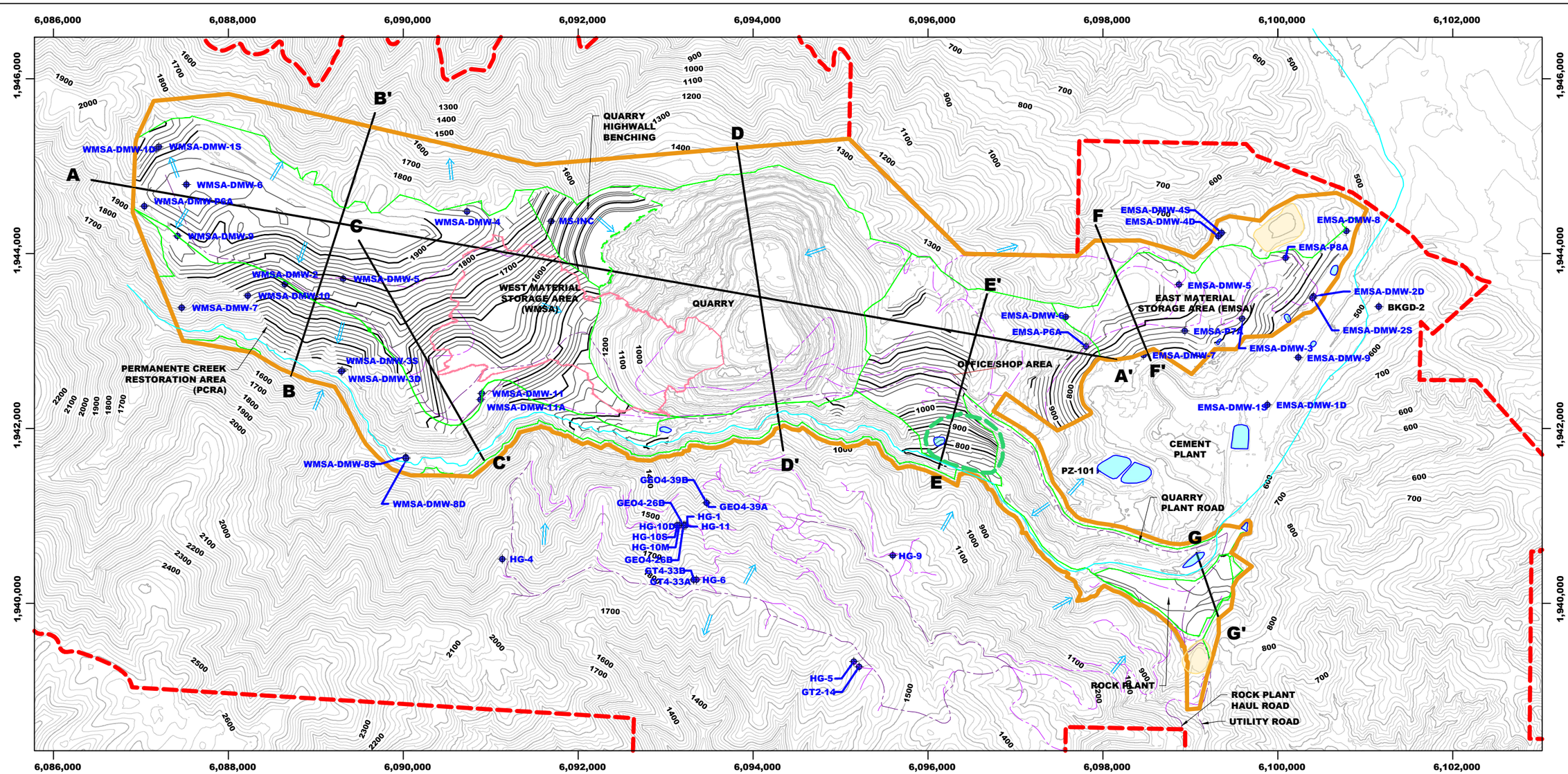
Property Boundary	3,510 acres
2023 Reclamation Plan Boundary	921 acres
2023 Reclamation Plan Components	
2023 Reclamation Plan Quarry Sub-components	

BENCHMARK RESOURCES

N

0 700 1,400 2,800 Feet

Reclamation Boundary and Components
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
Figure 7



Project Location
T07S, R02W Santa
Clara County, CA

Review
Prepared by CF on 2023-05-25
Final Review by HL on 2023-05-25

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GEOTECHNICAL
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Notes

1. Coordinate system: NAD 1983 StatePlane California III FIPS 0403 feet.
2. Topsoil locations may vary.

- PROPERTY BOUNDARY
- RPA BOUNDARY
- SURGE PILE BOUNDARY
- EXTENT OF AGGREGATES STOCKPILE
- SOIL STOCKPILE
- STORMWATER POND
- WELL LOCATION
- ABANDONED CONVEYOR
- TUNNEL
- SURFACE FLOW DRAINAGE
- PERMANENTE CREEK
- ROAD (RETAINED)
- ROAD (RECLAIMED)
- RECLAMATION COMPONENT
- 100 FT INDEX CONTOUR
- 20 FT CONTOUR

RECLAMATION GRADING PLAN
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
FIGURE 8

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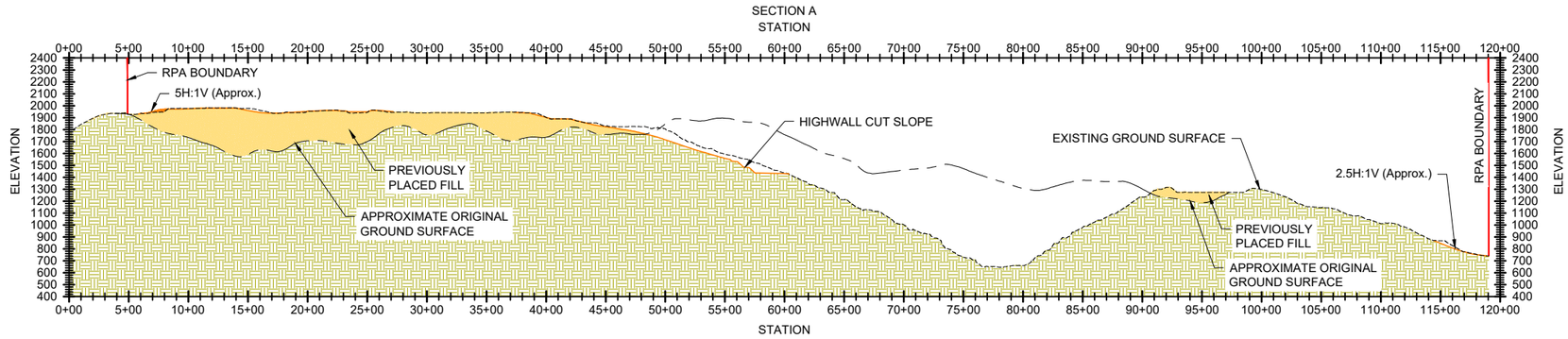
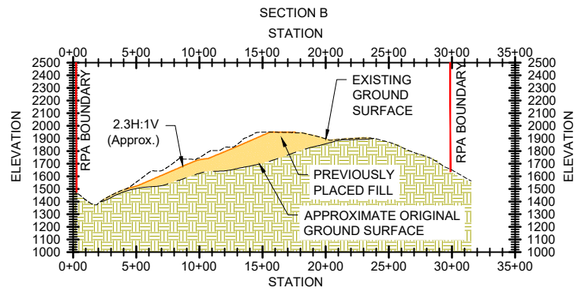
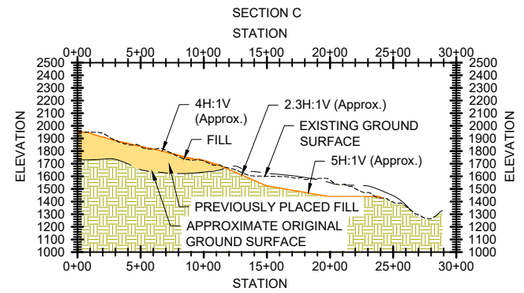
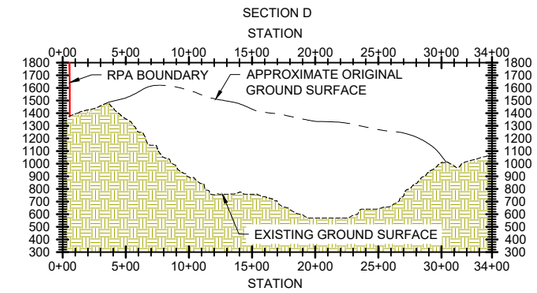
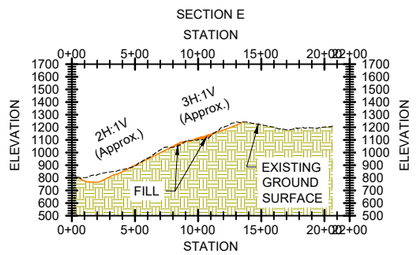
2023/05/26 11:01 AM By: Fowler, Camille

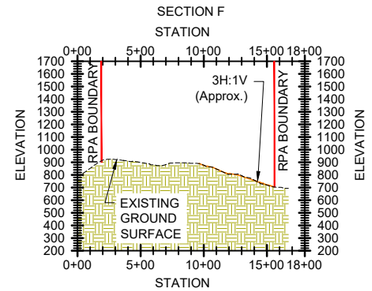


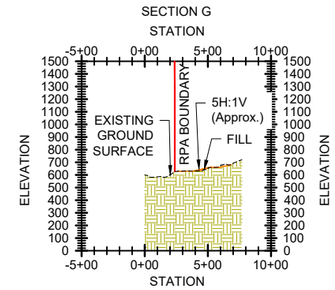












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T07S, R02W Santa
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Legend

- RPA OR PROPERTY BOUNDARY
- EXISTING GROUND SURFACE
- PLANNED GROUND SURFACE
- NATIVE GROUND
- PREVIOUSLY PLACED FILL
- PLANNED FILL

RECLAMATION GRADING CROSS SECTIONS
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
FIGURE 9

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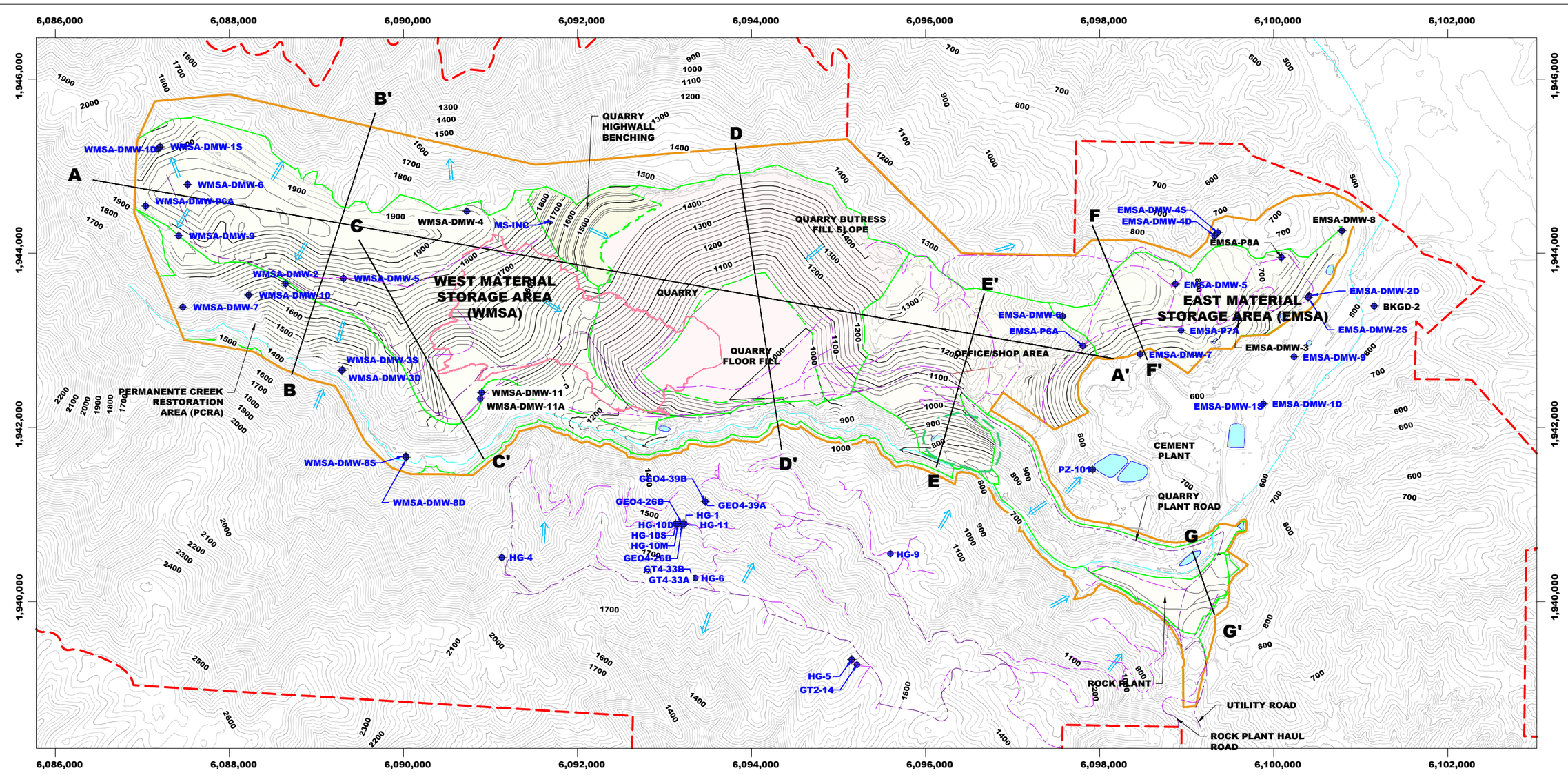
2023/05/26 10:28 AM By: Fowler, Camille



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Notes

1. **Coordinate system: NAD 1983 StatePlane California III FIPS 0403 feet.**
2. **This graphic represents the types of surfaces that would be reclaimed (e.g., overburden, backfill, highwall benches). The acreage and configurations shown are approximate and not intended to reflect goals for any particular surface type. Variation will be subject to field conditions and engineering requirements at the time of reclamation. The final configuration of the surfaces has no bearing on the reclamation success because reclamation would be completed according to treatment criteria for slope stability, cover materials and revegetation.**
3. **The planned reclamation surfaces assume a deviation of +/- 10 feet in elevation. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary.**

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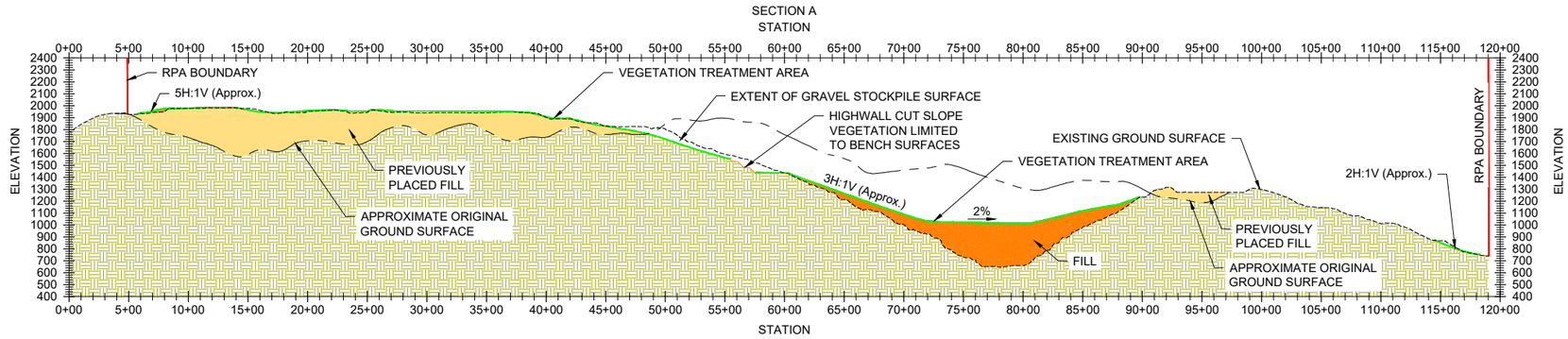
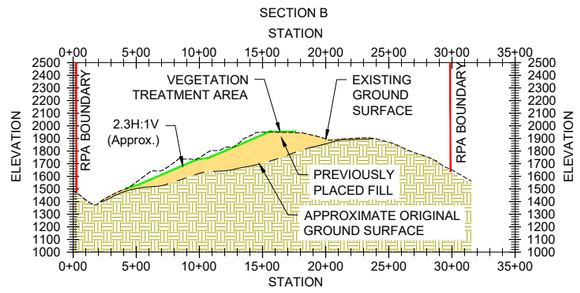
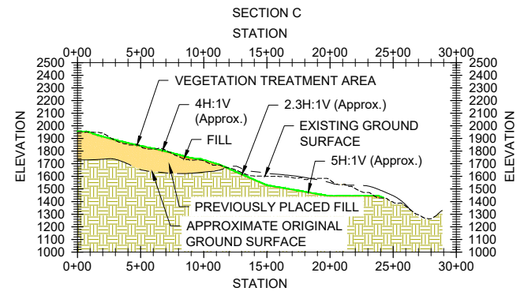
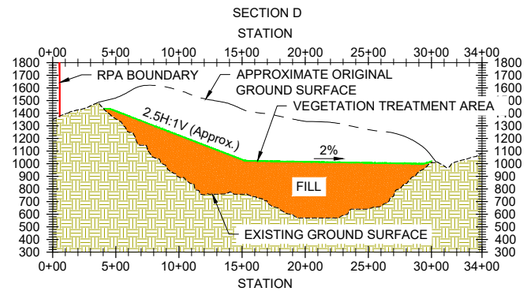
- PROPERTY BOUNDARY
- RPA BOUNDARY
- SURGE PILE BOUNDARY
- EXTENT OF AGGREGATES STOCKPILE
- STORMWATER POND
- IMPORTED COVER
- HIGHWALL BENCHES
- GENERAL COMPACTED SOILS
- SOIL BACKFILL AND IMPORTED COVER
- WELL LOCATION
- ABANDONED CONVEYOR TUNNEL
- CROSS SECTION
- SURFACE FLOW DRAINAGE
- PERMANENTE CREEK
- ROAD (RETAINED)
- ROAD (RECLAIMED)
- RECLAMATION COMPONENT
- BOUNDARIES
- 100 FT INDEX CONTOUR
- 20 FT CONTOUR

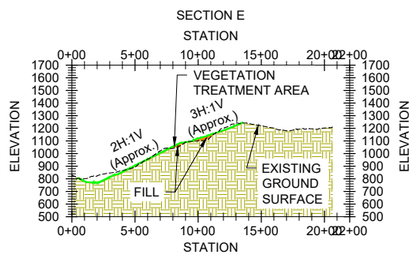
FILL AND CLOSURE CONDITIONS
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
FIGURE 10

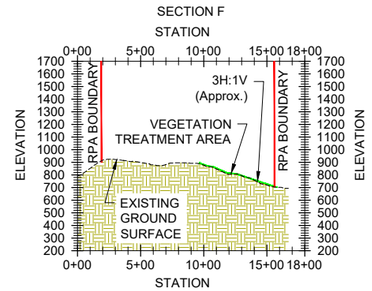


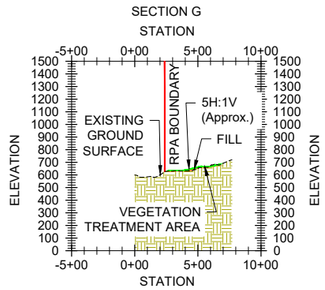












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Legend

- RPA OR PROPERTY BOUNDARY
- VEGETATION TREATMENT AREA
- EXISTING GROUND SURFACE
- PLANNED GROUND SURFACE
- NATIVE GROUND
- PREVIOUSLY PLACED FILL
- PLANNED FILL

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FILL AND CLOSURE CONDITIONS CROSS SECTIONS
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
FIGURE 11

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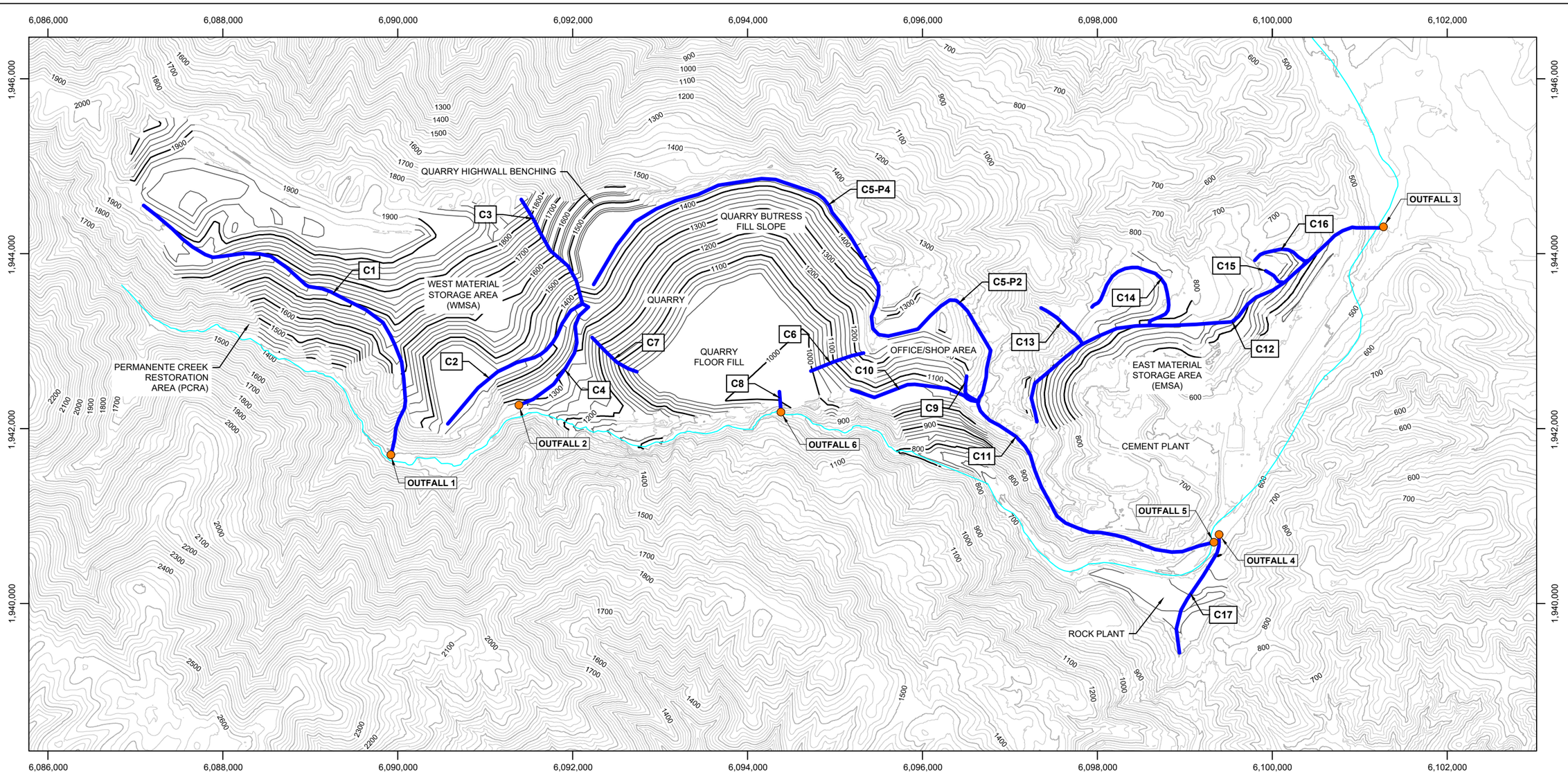
2023/05/26 10:30 AM By: Fowler, Camille



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Review
Prepared by CF on 2023-05-25
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Notes

1. Coordinate system: NAD 1983 StatePlane California III FIPS 0403 feet.
2. Major channel alignments and outfall locations are approximate and are commensurate with the current design surface for reclamation. Variations in channel alignment and outfall locations are subject to the final design surface.

100 FT INDEX CONTOUR
20 FT CONTOUR
PERMANENTE CREEK
MAJOR CHANNELS
OUTFALL LOCATIONS

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SURFACE WATER MANAGEMENT
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
FIGURE 12

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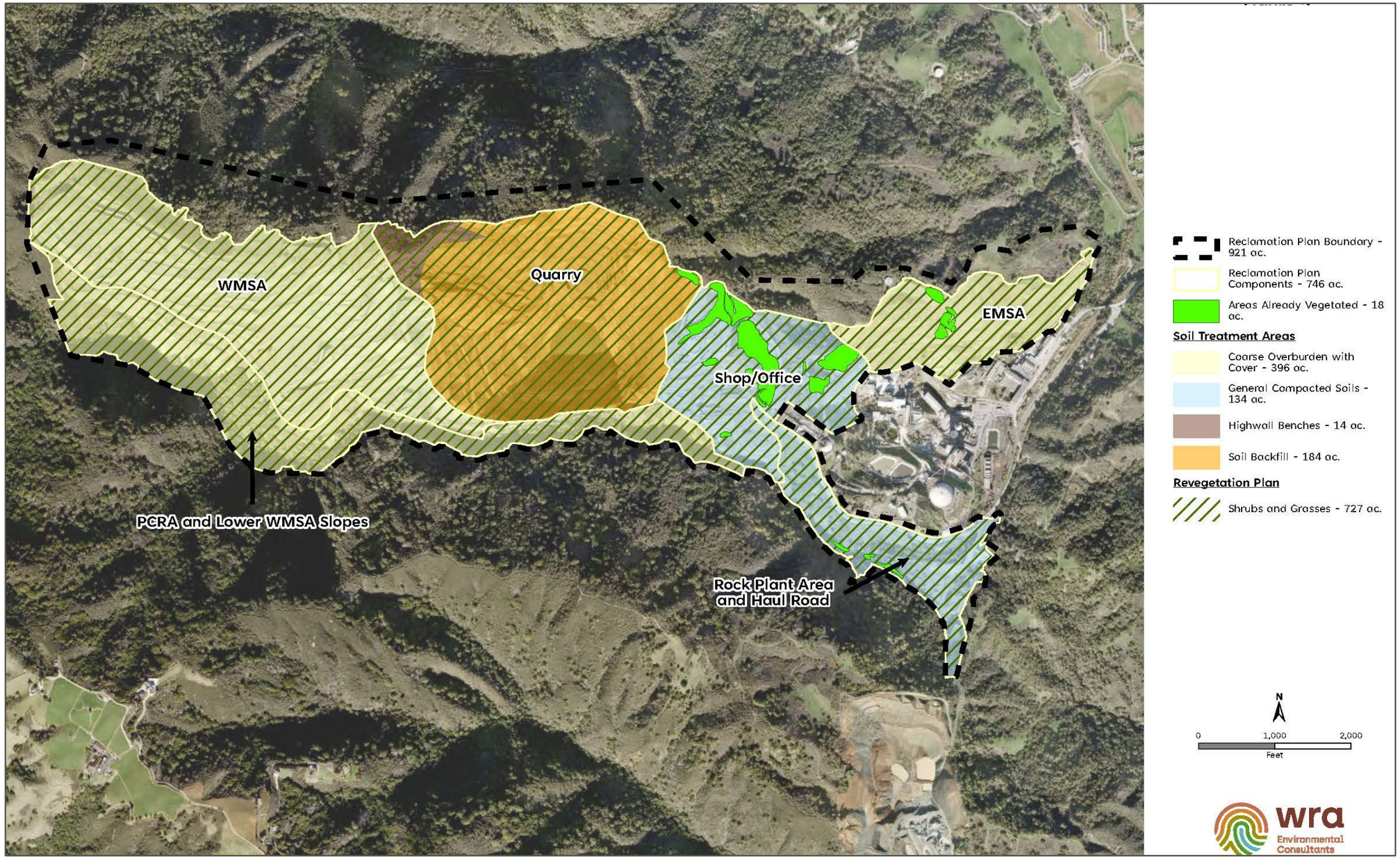
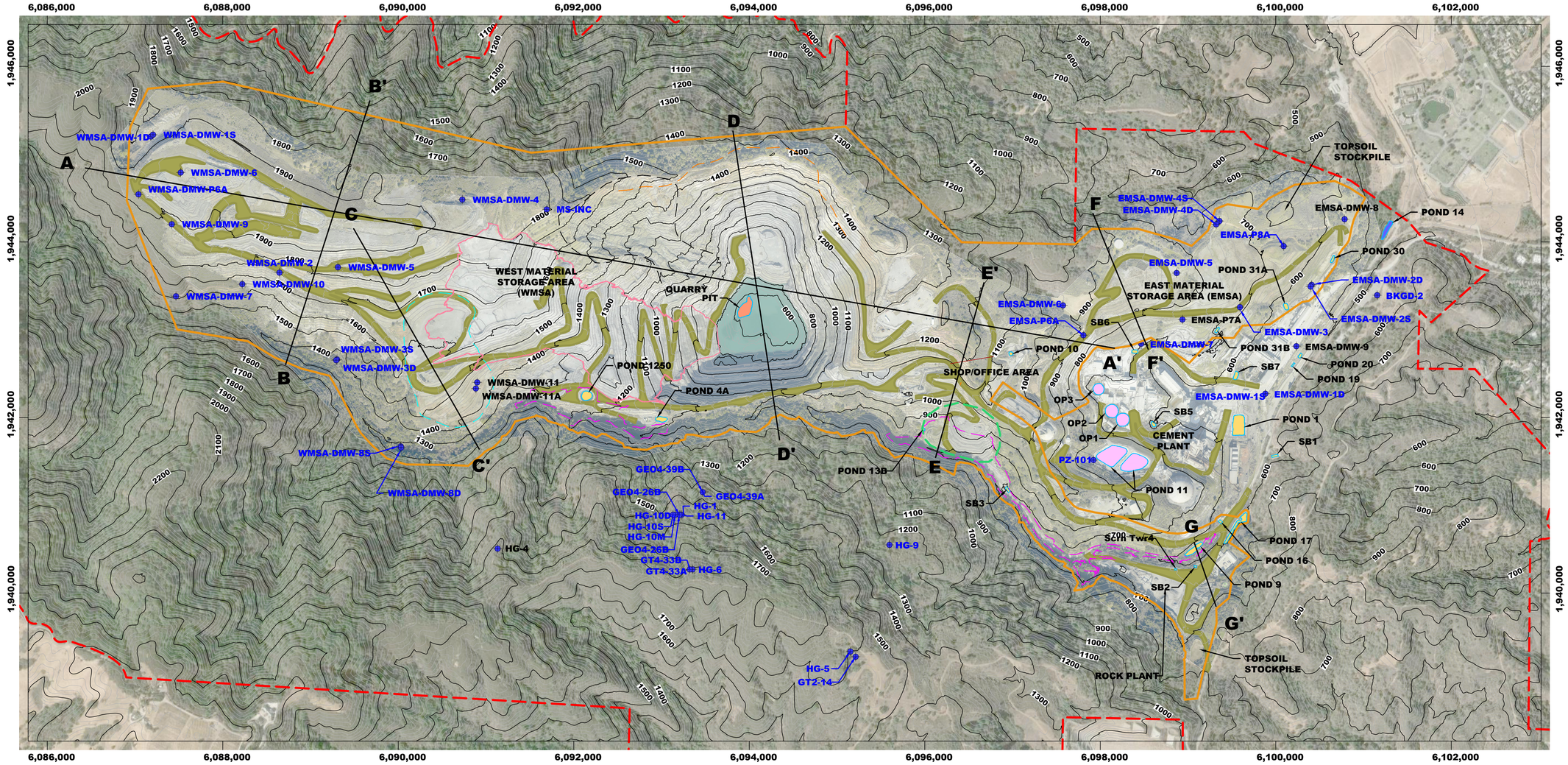
2023/05/26 10:53 AM By: Fowler, Camille



SOURCE: WRA, 2023; Modified by Benchmark Resources 2023
NOTES: Image is not printed to scale, See Figure 3 of Appendix H, "Revegetation Plan."

SHEETS



Legend

- PROPERTY BOUNDARY
- RPA BOUNDARY
- EXTENT OF AGGREGATES STOCKPILE
- PCRP BOUNDARY
- SCENIC EASEMENT
- SURGE PILE BOUNDARY
- GREENTONE SLIDE
- YEAGER YARD
- WELL LOCATION
- CONVEYOR TUNNEL
- CROSS SECTION

EXISTING TOPOGRAPHY

- 100 FT INDEX CONTOUR
- 20 FT CONTOUR
- IMPOUNDMENT OF JURISDICTIONAL WATERS
- OPERATIONAL POND
- QUARRY PIT
- SEDIMENTATION BASIN
- ACCESS / HAUL ROAD

Notes

1. Coordinate System: NAD1983 StatePlane California III FIPS 0403 feet.
2. Basemap Image: Google earth and client supplied 2023 flyover images.

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Permanente Quarry Reclamation Plan Amendment

Figure No.
Sheet 1

Title
Existing Conditions

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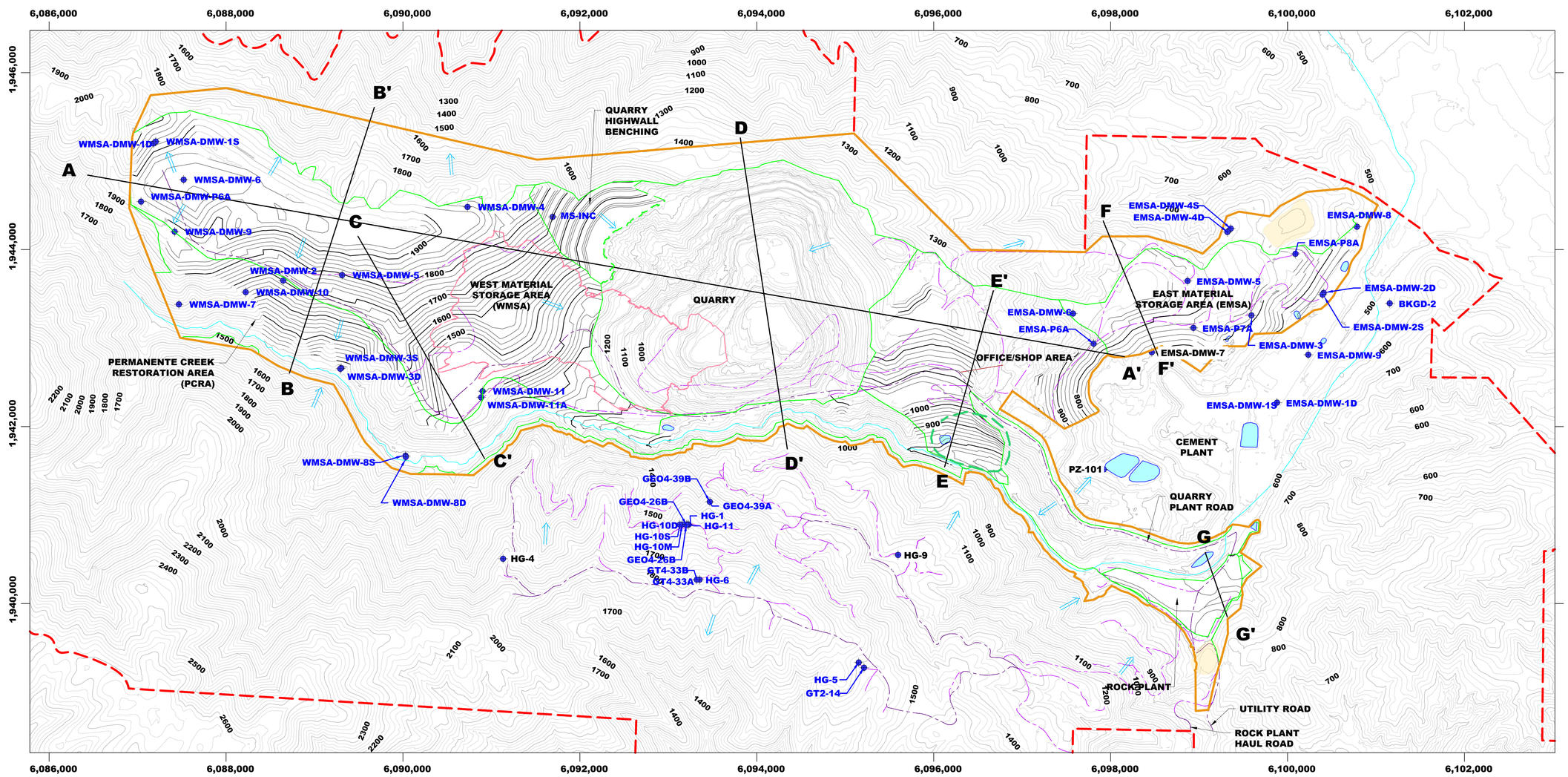

Legend

- WELL LOCATION
- ABANDONED CONVEYOR
- TUNNEL
- SURFACE FLOW DRAINAGE
- PERMANENTE CREEK
- ROAD (RETAINED)
- ROAD (RECLAIMED)
- RECLAMATION COMPONENT
- 100 FT INDEX CONTOUR
- 20 FT CONTOUR
- PROPERTY BOUNDARY
- RPA BOUNDARY
- SURGE PILE BOUNDARY
- EXTENT OF AGGREGATES STOCKPILE
- SOIL STOCKPILE
- STORMWATER POND

Notes

1. Coordinate system: NAD 1983 StatePlane California III FIPS 0403 feet.
2. Topsoil locations may vary.

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Permanente Quarry Reclamation Plan Amendment

Figure No.
Sheet 2

Title
Reclamation Grading Plan

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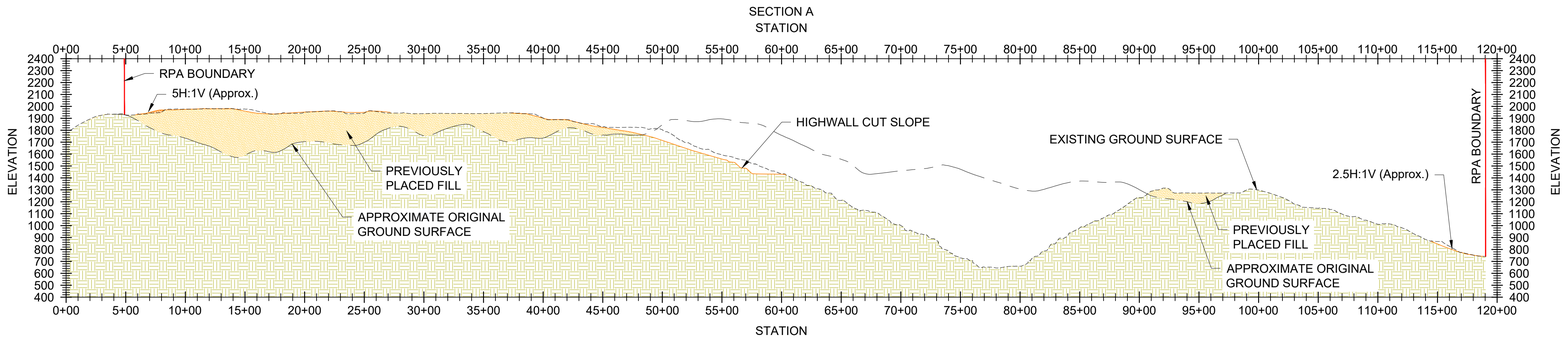

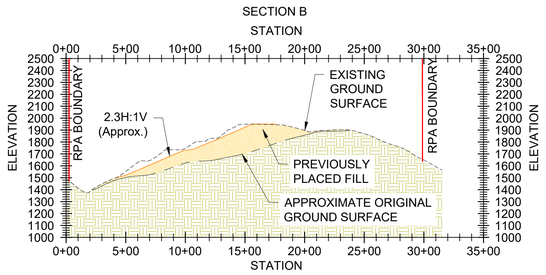

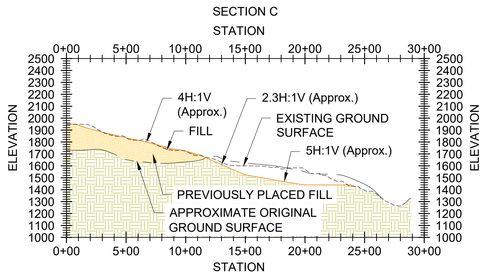

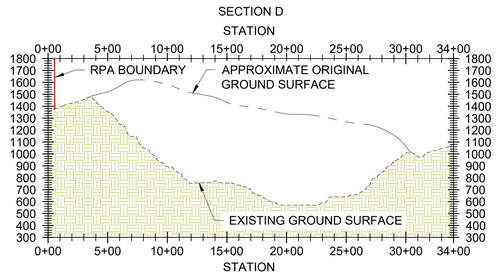

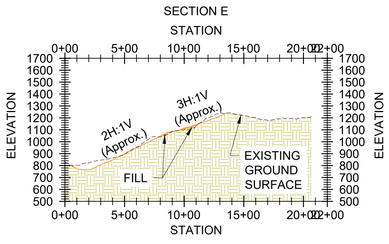

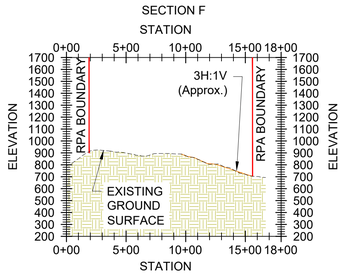

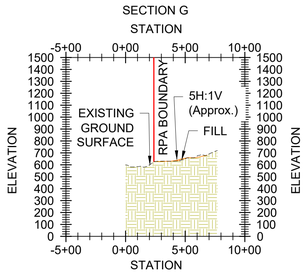

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Legend

- RPA OR PROPERTY BOUNDARY
- EXISTING GROUND SURFACE
- PLANNED GROUND SURFACE
- NATIVE GROUND
- PREVIOUSLY PLACED FILL
- PLANNED FILL

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Client/Project
Lehigh Southwest Cement Company
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Figure No.
Sheet 3

Title
Reclamation Grading Cross Sections

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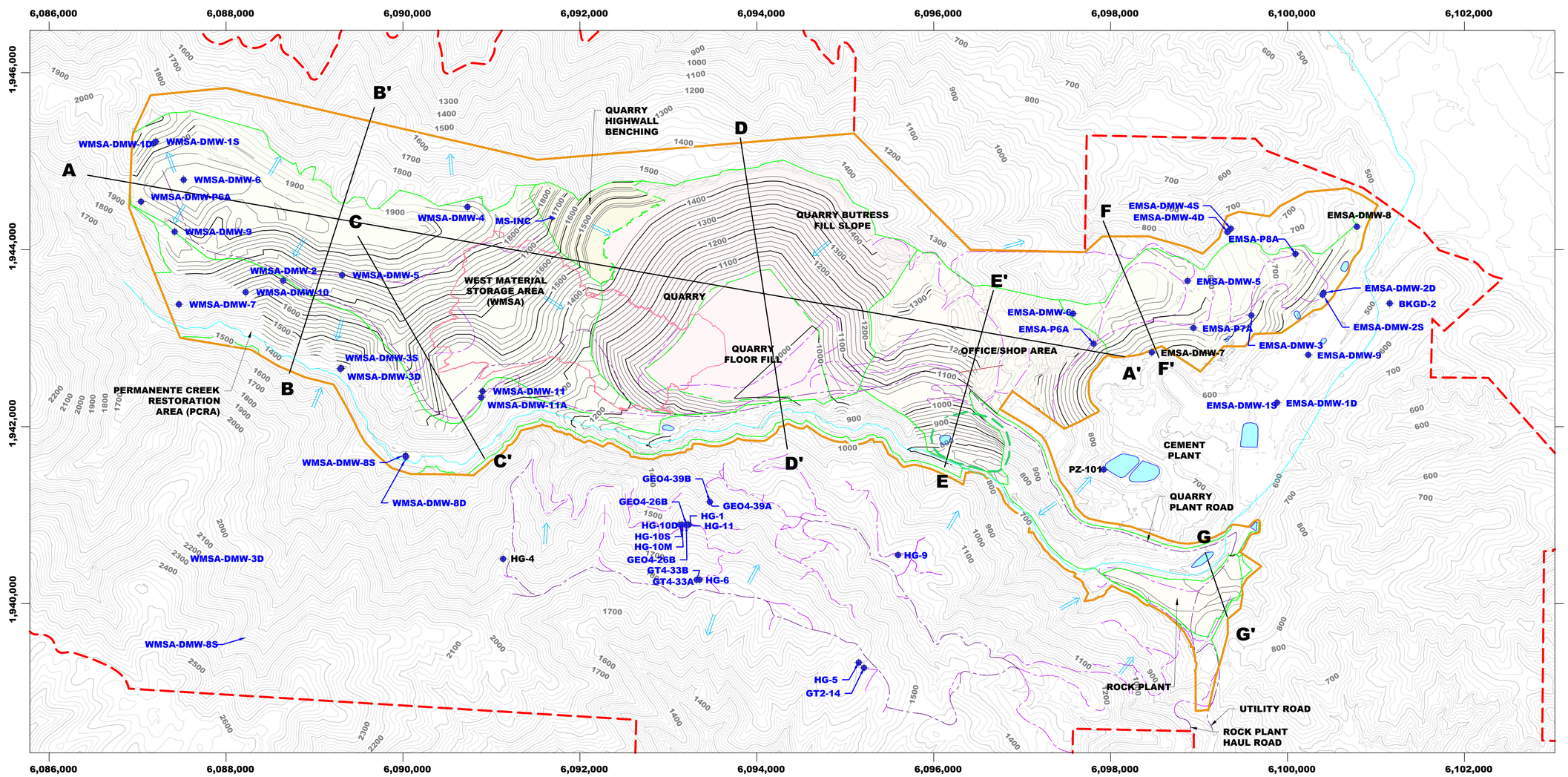

Legend

- WELL LOCATION
- ABANDONED CONVEYOR TUNNEL
- CROSS SECTION
- SURFACE FLOW DRAINAGE
- PERMANENTE CREEK
- ROAD (RETAINED)
- ROAD (RECLAIMED)
- RECLAMATION COMPONENT
- 100 FT INDEX CONTOUR
- 20 FT CONTOUR
- PROPERTY BOUNDARY
- RPA BOUNDARY
- SURGE PILE BOUNDARY
- EXTENT OF AGGREGATES STOCKPILE
- STORMWATER POND
- COURSE OVERBURDEN
- HIGHWALL BENCHES
- GENERAL COMPACTED SOILS
- SOIL BACKFILL

N

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Notes

1. Coordinate system: NAD 1983 StatePlane California III FIPS 0403 feet.
2. This graphic represents the types of surfaces that would be reclaimed (e.g., overburden, backfill, highwall benches). The acreage and configurations shown are approximate and not intended to reflect goals for any particular surface type. Variation will be subject to field conditions and engineering requirements at the time of reclamation. The final configuration of the surfaces has no bearing on the reclamation success because reclamation would be completed according to treatment criteria for slope stability, cover materials and revegetation.
3. The planned reclamation surfaces assume a deviation of +/- 10 feet in elevation. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary.

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Client/Project
Lehigh Southwest Cement Company
Permanente Quarry Reclamation Plan Amendment

Figure No.
Sheet 4

Title
Fill and Closure Conditions

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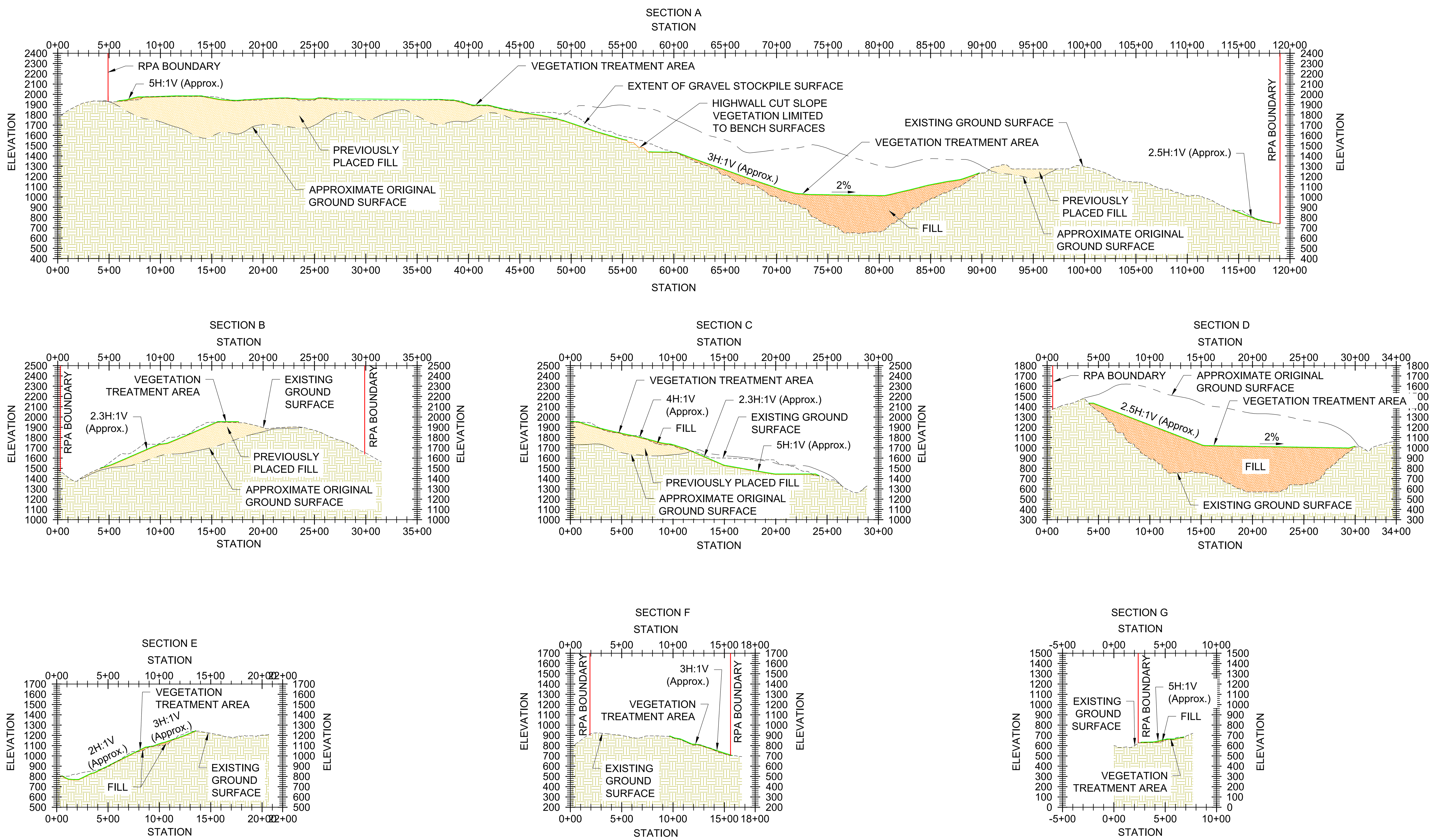

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Legend

- RPA OR PROPERTY BOUNDARY
- VEGETATION TREATMENT AREA
- EXISTING GROUND SURFACE
- PLANNED GROUND SURFACE
- NATIVE GROUND
- PREVIOUSLY PLACED FILL
- PLANNED FILL

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Lehigh Southwest Cement Company
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Figure No.
Sheet 5

Title
Fill and Closure Conditions Cross Sections

REFERENCES AND RESOURCES

REFERENCES AND RESOURCES

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GLOSSARY

GLOSSARY

ancillary facilities: Support structures and equipment.

backfill: Earth, overburden, mine waste, or imported material used to replace material removed during mining.

bedrock: A general term for the rock, usually solid, that underlies soil or other unconsolidated, bed material.

bench interval: The difference in vertical elevation between any two consecutive benches.

best management practices (BMPs): Methods or techniques found to be the most effective and practical means in preventing or reducing the amount of water pollution.

berm: An elongated earthen structure that acts as a barrier (e.g., to make it difficult for a vehicle to cross or to redirect the flow of water).

contamination: An impairment of the quality of waters of the state to a degree that creates a public health hazard through poisoning or the spread of disease.

cut and fill: The act of cutting into a slope and using the soil to backfill an area. A common example is the construction of a roadway on a slope, where earth is removed from the upper side of the cut into the hill and used to fill the lower or outer edge of the cut to widen the road.

drainage: A natural channel through which water flows at some time of the year. A natural or artificial system of surface and subsurface passages by which water discharges.

easement: A right to cross or use someone else's land for a specified purpose.

economic: Profitable under defined investment assumptions established, analytically demonstrated, or assumed with reasonable certainty.

entitlement: A permit or other instrument typically granted by local governments entitling the holder to develop or improve land and/or existing structures and facilities consistent with the terms granted.

environment: The physical conditions that exist within the area proposed to be affected by a project or alternative, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance (California Environmental Quality Act Section 21060.5). The environment includes both natural and artificial conditions.

ephemeral stream: A stream or portion of a stream that flows temporarily in direct response to nearby precipitation and has a channel that is above the water table at all times.

erosion: The wearing away of soil and rock by weathering, mass wasting, and the action of streams, glaciers, waves, wind, and underground water.

factor of safety: The ratio of resisting force to driving force in a slope stability problem. A factor of safety of 1.0 represents the minimum factor of safety for which a slope is stable.

financial assurance cost estimate: The amount of money necessary to conduct and complete reclamation on the mined lands in accordance with the approved reclamation plan, plus a reasonable estimate of the administrative costs and expenses that would be incurred by the lead agency or the California Department of Conservation, the total of which must be calculated in accordance with California Code of Regulations Section 3804, and constitutes an obligation to pay by the operator.

final treatment system: A Permanente system used to treat water generated by and stored in the Quarry and Cement Plant water from the Reclaim Water System that is implemented before the water is discharged to Permanente Creek under an existing discharge permit. The treatment system was

installed to meet the surface water effluent limits provided by the National Pollution Discharge Elimination System permit. See Appendix F, "Hydrologic Investigation," for additional details.

greenstone: A term applied to metabasalts within the Franciscan Complex. Unweathered greenstone is dark green to black and weathered greenstone is reddish brown.

Greenstone Slide: A mass of greenstone rock located on the Quarry's northwest highwall. The slide, which covers about 50 acres, occurred in the early 1980s and was due to a combination of geologic conditions involving faulting and dipping limestone.

groundwater: Subsurface water that is below the water table.

groundwater recharge: Replenishment of groundwater by precipitation, runoff, or artificial methods.

growth media: Geologic and organic materials, including soils, that are suitable for use in growing plants.

habitat: The place where an organism or a community of organisms lives, including all living and nonliving factors or conditions of the surrounding environment.

haul road: A road used by large-capacity, off-road trucks to haul ore and overburden from the open pit to other locations.

hazardous material: Material that, because of its quantity, concentration, or physical/chemical characteristics, poses a significant present hazard to human health and safety or to the environment. Hazardous materials include hazardous substances, hazardous waste, radioactive materials, and any material that a handler or the administering agency has a reasonable basis for believing would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment (California Health and Safety Code Section 2550.1).

highwall: The unexcavated face of exposed overburden and ore in a surface mine.

hydrology: The study of the properties, distribution, and circulation of water on the surface of the land, in the soil, and in the atmosphere.

infrastructure: The basic framework or underlying foundation of a community or project, including road networks, electric and gas distribution, water and sanitation services, and facilities.

jurisdictional wetlands: A wetland area identified and delineated by specific technical criteria, field indicators, and other information for purposes of public agency jurisdiction. The public agencies that administer jurisdictional wetlands are the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S Natural Resources Conservation Service.

lead agency: The state, county, or city agency with the authority to approve projects. In this case, Santa Clara County is the lead agency for reclamation plan approval.

mine: An opening or excavation in the earth for extracting specific minerals.

mineral resource: A concentration of naturally occurring solid, liquid, or gaseous material in or on the Earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible. The terms "resource" and "mineral resource" are synonymous in this report.

mineral reserve: The part of the resource base that could be economically extracted or produced at the time of determination. For the purposes of this report, the term "reserves" has been further restricted to include only those deposits for which a valid mining permit has been granted by the appropriate lead agency or mining is allowed pursuant to a vested right.

Mineral Resource Zone (MRZ) categories: The California Geological Survey (formerly the Division of Mines and Geology) has regions of the state classified according to the presence or absence of significant concrete-grade aggregate deposits. The land classification is presented in the form of Mineral Resource Zones, or MRZs. See Table 1, "California Mineral Land Classification Diagram."

mining: The process or business of taking mineral substances from a pit, quarry, or excavation in conjunction with other permitted construction activities.

monitor: To systematically and repeatedly watch, observe, or measure environmental conditions to track changes.

native species: Plant species indigenous to California, using pre-European as the historic time reference.

noxious weeds: Any species of plant that is or is likely to become destructive or difficult to control or eradicate and is termed to be so by the director of the California Department of Food and Agriculture, Section 4500, Title 3 of the California Code of Regulations, pursuant to the Food and Agriculture Code Section 5004 et seq.

National Pollution Discharge Elimination System (NPDES): The NPDES permit program addresses water pollution by regulating point sources that discharge pollutants to waters of the United States.

native soil: Unconsolidated material present at the surface before mining operations began.

ore: Rock that can be mined for extraction of a mineral commonly under conditions that allow a profit to be made.

overburden: Rock that contains mineral resources in quantities that cannot be economically extracted. Because such rock either lies on top of ore or is mixed in with the ore, overburden must be before or at the same time the ore is mined.

Permanente Ridge: The crest of topography that extends from east to west nearly 4 miles along the northerly portion of the Permanente property.

permeability: A measure of the ease with which a porous medium can transmit a liquid; the property of a soil that permits the passage of water.

project: As defined in California Environmental Quality Act (Public Resources Code Section 21065), and as applicable to Permanente Reclamation Plan Amendment, "project" means an activity that may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment that involves the issuance of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies. In this instance, the project is approval of a reclamation plan amendment.

property: All parcels at this location owned by Hanson Permanente Cement, Inc.

pseudostatic slope-stability analysis: Assesses the effects of earthquake shaking on artificial or natural slopes and the equilibrium conditions. The "limit equilibrium method" is used to investigate the dynamic effects of earthquake loading on a soil or slope. The output of the analysis is a factor of safety.

pseudostatic analysis: Used in earthquake engineering to analyze the seismic response of soil embankments and slopes. It involves using the static analysis of slope stability and incorporating a simulated horizontal force equal to the horizontal acceleration of the design earthquake multiplied by the mass of the potential sliding material.

pseudostatic factor of safety: The ratio of forces contributing to slope stability (e.g., intergranular friction and cohesion) versus forces working against slope stability (e.g., gravity, seismic acceleration) for a simulated seismic load. A pseudostatic factor of safety equal to 1.0 indicates that these forces are equal and slope movement may occur.

quarry: An open pit, mine, or excavation where stone, sand, gravel, or mineral is obtained from open faces. Permanente Quarry is named for this feature, although there are other components of the operation. The quarry itself is termed Quarry.

reclamation plan: The operator's completed and approved plan for reclaiming the lands affected by surface mining operations conducted after January 1, 1976, as called for in Section 2772 of the California Surface Mining and Reclamation Act.

reclamation boundary: The reclamation boundary demarcates the area of operations for which reclamation under California Surface Mining and Reclamation Act (SMARA) is required. The requirement to delineate a "reclamation plan boundary" first appeared in SMARA effective January 1, 2017 (see CCR 2772 [c][5][B]). The term is not defined by law or regulation.

registered civil engineer or certified engineering geologist: A civil engineer or engineering geologist registered or certified in the state of California.

regulation: A rule or order prescribed by government.

reserve: Mineral reserves are resources known to be economically feasible for extraction.

resoiling: The process of artificially building or reconstructing a soil profile.

Ridgeline Protection Easement Deed: An agreement Kaiser Cement & Gypsum Corporation granted to Santa Clara County on August 18, 1972. The intent of the deed was to preclude mining such that the northeast slope remained and views from northerly communities into the quarry were not created. The easement lies along the rim of the Quarry for a distance of approximately two-thirds mile.

riparian: Pertaining to or situated on the bank of a river, stream, or other body of water. Riparian is normally used to refer to plants that grow along streams, rivers, or at spring and seep sites.

riparian habitat: The area where land and a river or stream interface and provide habitats and communities for hydrophilic plants.

riparian vegetation: Hydrophilic plants along the river or stream margins and banks.

sediment: (1) Particles derived from rocks or biological materials that have been transported by a fluid. (2) Solid material (sludges) suspended in or settled from water. A collective term meaning an accumulation of soil, rock, and mineral particles transported or deposited by flowing water.

sedimentation: The process of settling or being deposited as a sediment.

sensitive species: A plant or animal species recognized by the federal or state government as threatened, endangered, or a species of special concern.

shall: That which is obligatory or necessary.

should: Signifies a directive to be honored if at all possible.

siltation: A process by which water becomes dirty as a result of fine mineral particles in the water. When sediment, or silt, is suspended in water, this is an example of siltation.

site: The area encompassed by the amended reclamation boundary.

slope ratio: The ratio of change in horizontal distance to the change in vertical elevation expressed as two numbers separated by a colon (e.g., 2:1, or 2H:1V)

soil erosion: Movement of soil through the action of natural physical processes primarily associated with the action of wind and water. Soil erosion includes detachment, transport, and subsequent deposition of soil particles.

special-status species: Special-status species include:

- designated (rare, threatened, or endangered) and candidate species listed by the California Department of Fish and Wildlife (CDFW);
- designated (threatened or endangered) and candidate species listed by the U.S. Fish and Wildlife Service (USFWS);
- species considered to be rare or endangered under the conditions of Section 15380 of the California Environmental Quality Act Guidelines, such as those identified on lists 1A, 1B, and 2 in the 2001 Inventory of Rare and Endangered Plants of California by the California Native Plant Society (CNPS); and
- possibly other species considered sensitive or of special concern because of limited distribution or lack of adequate information to permit listing or rejection for federal or state status, such as those included on list 3 in the CNPS Inventory or identified as animal "California Special Concern" (CSC) species by CDFW. Species designated as CSC have no legal protective status under the California Endangered Species Act but are of concern to CDFW.

species of special concern: Per the California Department of Fish and Wildlife: [A] species, subspecies, or distinct population of an animal [i.e., fish, amphibian, reptile, bird and mammal] native to California that currently satisfies one or more of the following (not necessarily mutually exclusive) criteria:

- is extirpated from the State or, in the case of birds, is extirpated in its primary season or breeding role;
- is listed as Federally-, but not State-, threatened or endangered; meets the State definition of threatened or endangered but has not formally been listed;
- is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status;
- has naturally small populations exhibiting high susceptibility to risk from any factor(s), that if realized, could lead to declines that would qualify it for State threatened or endangered status.

static slope-stability analysis: Assesses the safe design of a human-made or natural slopes and the equilibrium conditions. The "limit equilibrium method" is used to investigate the equilibrium of a soil mass tending to slide down under the influence of gravity. The output of the analysis is a factor of safety.

stockpile: Material placed to create a reserve for loading, to use for sale, as topsoil, or other purposes.

topsoil: The upper part of the soil profile that is relatively rich in humus, which is technically known as the A-horizon of the soil profile.

vegetative cover: The vertical projection of the crown or shoot area of a species to the ground surface expressed as a percentage of the reference area.

vested: A vested mine is an operation that was established legally within the regulations in place at that time. These mines are "grandfathered" and do not require use permits for certain types of future expansions. The County Board of Supervisors recognized Permanente Quarry's vested rights at a public hearing on February 8, 2011. A vested operation is recognized under the California Surface Mining and Reclamation Act as having authorization to mine.

waste discharge requirements (WDRs): Waste discharges that can be exempted from the California Code of Regulations requirements are issued WDRs and are regulated by the WDR Program. Typical

discharge types include domestic or municipal wastewater, food processing–related wastewater, and industrial wastewater.

waste rock: *See overburden.*

watershed: The geographic region from which water drains into a particular stream, river, or body of water. A watershed includes hills, lowlands, and the body of water into which the land drains. Watershed boundaries are defined by the ridges or divides separating them. Also called a “drainage area.”

water table: The level below the surface of the ground where water can be found.

wetlands: Lands that may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, fens, and vernal pools (California Fish and Game Code, Section 2785, Subdivision g).

TABLE 1
CALIFORNIA MINERAL LAND CLASSIFICATION DIAGRAM

Increasing Economic Value→

	AREAS OF IDENTIFIED MINERAL RESOURCE SIGNIFICANCE		AREAS OF UNDETERMINED MINERAL RESOURCE SIGNIFICANCE		AREAS OF UNKNOWN MINERAL RESOURCE SIGNIFICANCE
	Demonstrated Measured/ Indicated	Inferred			
ECONOMIC	**MRZ-2a** Reserves	**MRZ-2b** Inferred Resources	**MRZ-3a** KNOWN MINERAL OCCURENCE	**MRZ-3b** INFERRED MINERAL OCCURENCE	**MRZ-4** NO KNOWN MINERAL OCCURENCE
MARGINALLY ECONOMIC	**MRZ-2a** Marginal Reserves	**MRZ2b** Inferred Marginal Resources			
SUB-ECONOMIC	**MRZ-2b** Demonstrated Subeconomic Resources	**MRZ-2b** Inferred Subeconomic Resources			
NON-ECONOMIC	AREAS OF NO MINERAL RESOURCE SIGNIFICANCE **MRZ-1**				

←Increasing Knowledge of Resources

Mineral Land Classification Diagram Nomenclature:

MINERAL DEPOSIT: A mass of naturally occurring mineral material, e.g., metal ores or nonmetallic minerals, usually of economic value, without regard to mode of origin. The mineral material may be of value for its chemical and/or physical characteristics.

MINERAL OCCURRENCE: Any ore or economic mineral in any concentration found in bedrock or as float; especially a valuable mineral in sufficient concentration to suggest further exploration.

ECONOMIC: This term implies that profitable extraction or production under defined investment assumptions has been established, analytically demonstrated, or assumed with reasonable certainty.

MINERAL RESOURCE: A concentration of naturally occurring solid, liquid, or gaseous material in or on the Earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible. The terms resource and mineral resource are synonymous in this report.

RESERVES: That part of the resource base which could be economically extracted or produced at the time of determination. For the purposes of this report, the term reserves has been further restricted to include only those deposits for which a valid mining permit has been granted by the appropriate lead agency.

IDENTIFIED MINERAL RESOURCES: Resources whose location, grade, quality, and quantity are known or estimated from specific geologic evidence. Identified mineral resources include economic, marginally economic, and subeconomic components. To reflect varying degrees of geologic certainty, these economic divisions can be subdivided into demonstrated and inferred.

DEMONSTRATED: A term for the sum of measured plus indicated.

MEASURED: Quantity is computed from dimensions revealed in outcrops, trench workings, or drill holes; grade and/or quality are computed from the results of detailed sampling. The sites for inspection, sampling, and measurement are spaced so closely and the geologic character is so well defined that size, shape, depth, and mineral content of the resource are well established.

INDICATED: Quantity and grade and/or quality are computed from information similar to that used for measured resources, but the sites for inspection, sampling, and measurement are farther apart or otherwise less adequately spaced. The degree of assurance, although lower than that for measured resources, is high enough to assume continuity between points of observation.

INFERRED: Estimates are based on an assumed continuity beyond measured and/or indicated resources, for which there is geologic evidence. Inferred resources may or may not be supported by samples or measurements.

MARGINAL RESERVES: That part of the demonstrated reserve base that, at the time of determination, borders on being economically producible. The essential characteristic of this term is economic uncertainty. Included are resources that would be producible, given postulated changes in economic or technologic factors.

MARGINAL RESOURCES: That part of the inferred resource base that, at the time of determination, would be economically producible, given postulated changes in economic or technologic factors.

SUBECONOMIC RESOURCES: The part of identified resources that does not meet the economic criteria of marginal reserves and marginal resources.

Source: California Mineral Land Classification Diagram. Diagrammatic relationship of mineral resource zone categories to the resource/reserve classification system. Adapted from U.S. Bureau of Mines/U.S. Geological Survey (1980).