SANTA CLARA COUNTY, CALIFORNIA

PERMANENTE QUARRY

APPLICATION PACKAGE

BINDER 2 OF 2: PROJECT DESCRIPTION AND SUPPLEMENTAL ENVIRONMENTAL INFORMATION

CA MINE ID 91-43-0004



MAY | 2019

Lead Agency:
Santa Clara County
Department of Planning and Development

Operator:
Lehigh Southwest Cement Company

Lehigh Hanson
HEIDELBERGCEMENT Group

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70 West Hedding Street, East Wing, 7th Floor, San Jose, CA 95110

Operator:
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24001 Stevens Creek Blvd., Cupertino, CA 95104

APPLICATION PACKAGE CONTENTS

BINDER 1: PERMANENTE QUARRY AMENDED RECLAMATION PLAN
(provided under separate cover)

BINDER 2: PROJECT DESCRIPTION AND SUPPLEMENTAL ENVIRONMENTAL INFORMATION

PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT PROJECT DESCRIPTION

SUPPLEMENTAL ENVIRONMENTAL INFORMATION:

Permanente Quarry Ridgeline Protection Easement Analysis

Suitable Surplus Soil Availability Study for Permanente Quarry

Aesthetics:

- *Permanente Quarry Reclamation Plan Amendment Aesthetics Technical Study*

Air Quality:

- *Air Quality Impact Assessment for the Permanente Quarry Reclamation Plan Amendment*

Biological Resources:

- *Biological Resources Report Permanente Quarry Reclamation Amendment—Rock Plant Reserve Component*
- *Biological Resources Report Permanente Quarry Reclamation Amendment—North Highwall Lay-Back Component*

Culural Resources:

- *Archaeology Inventory Report Permanente Quarry Reclamation Plan Amendment—Rock Plant Reserve Component*
- *Archaeology Inventory Report Permanente Quarry Reclamation Plan Amendment—North Highwall Lay-Back Component*

Noise:

- *Permanente Quarry Reclamation Plan Amendment Noise and Vibration Study*

Traffic & Transportation:

- *Permanente Quarry Soil Import Transportation Impact Analysis*

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1. SUMMARY

Permanente Quarry (Quarry) is a mining operation producing cement-grade limestone and construction aggregates. The Quarry is located in the Santa Clara County foothills west of the city of Cupertino (see Figure 1, "Regional Location," and Figure 2, "Site Location"). Lehigh Southwest Cement Company (Lehigh) manages site conditions and reclamation activities at the Quarry in accordance with the *Reclamation Plan Amendment for Permanente Quarry* (2012 Reclamation Plan), which Lehigh Southwest Cement Company (2011) prepared and Santa Clara County (County) approved in 2012. The County is the lead agency for the Quarry under the California Surface Mining and Reclamation Act (SMARA) and California Environmental Quality Act.

A key component of the amended 2012 Reclamation Plan was to reclaim the central mining excavation, known as the North Quarry, by backfilling the excavation with the 48 million tons of overburden material currently stockpiled on-site in an area known as the West Materials Storage Area (WMSA). The purpose behind this strategy was to avoid the creation of a lake in the quarry after groundwater levels return. Thus, backfilling would better meet water quality and slope stability requirements.

This application for a reclamation plan amendment incorporates the results of additional hydrologic and geotechnical investigations that have occurred since 2012. The amended backfill plan would be superior to the approved plan and provide updated reclamation planning for continued mineral production. The following activities are included in this amended reclamation plan (the "project"):

- development and reclamation of the Rock Plant Reserve (a new area of continued mining within the vested property);
- regrading and mining of the upper slopes of the north highwall to recover limestone, eliminate the need for a large fill buttress, and achieve long-term slope stability;
- reclamation of the majority of the WMSA in place;
- backfill of the North Quarry using a combination of imported surplus construction soil that meets site-specific acceptance criteria and greenstone overburden to protect water quality.

County approvals required for the project include approval of the proposed amended reclamation plan and approval of a modification to the 1972 *Ridgeline Protection Easement Deed* (1972 Easement) (Kaiser Cement & Gypsum Corporation 1972) to reflect current and planned final conditions.

2. PROJECT PURPOSE

The primary purposes of the proposed project are summarized below. These allow Lehigh to meet its site objectives and regulatory requirements while providing environmental benefits to the region.

1. *Ongoing Materials Production with Economic and Environmental Benefits to the Region:* The Quarry is an important supply of cement-grade limestone and construction aggregates to local and regional markets. Lehigh provides roughly 80 percent of the cement in the County and 50 percent in the San Francisco Bay Area. This unique local supply provides regional economic and environmental advantages by reducing travel time and vehicle miles traveled, which reduces air pollutant and greenhouse gas

emissions. Implementing the project will enable Lehigh to continue producing this important resource.

2. *Ensuring Long-Term Protection of Water Quality:* Implementation of the project will ensure interim and long-term water quality. The proposed reclamation plan amendment incorporates information from post-2012 studies and offers water quality–related improvements. Since 2012, additional studies have been conducted and a substantial amount of new data has been developed regarding hydrologic conditions at the Quarry, including the underlying mechanisms affecting surface water and groundwater quality. Lehigh commissioned an expanded set of investigations to meet its sampling and reporting obligations under the County's 2012 conditions of approval and more-recent investigation requirements imposed by the San Francisco Bay Regional Water Quality Control Board (RWQCB) under Water Code Sections 13260 and 13267. The project provides greater protection to surface and groundwater quality by backfilling with nonlimestone materials from on-site sources and using imported surplus construction soil from regional construction projects that meets site-specific acceptance criteria to protect water quality. Leaving the WMSA largely in place rather than moving it in its entirety to backfill the North Quarry will prevent reexposing limestone materials and placing these materials below future groundwater levels in the Quarry. The amended reclamation strategy also incorporates guidance from the RWQCB that did not exist in 2012 and advances closure plans adopted by the RWQCB under recent waste discharge requirements (WDRs). Providing a location for the beneficial reuse of excess soil will incidentally address a regional need for disposal sites and reduce vehicle miles traveled, air pollutants, and greenhouse gas emissions on a regional scale.
3. *Improve North Quarry Highwall Stability and Ridgeline Appearance:* The project will allow Lehigh to improve the aesthetic appearance and geotechnical stability of the Permanente Ridge and North Quarry. This will involve a marginal reduction in elevation along approximately 3,000 linear feet of the ridgeline to stabilize areas of erosion and improve the aesthetic quality of the existing unvegetated highwall. Without this component of the project, portions of the highwall would continue to locally erode and could destabilize portions of the ridgeline. In its existing condition, the highwall cannot be vegetated and reconfiguring this portion of the highwall and ridgeline will enable Lehigh to revegetate the highwall benches and provide long-term protection of the ridgeline integrity.

3. OBJECTIVES

The project includes the following basic objectives:

- Maintain a local, reliable, and economic source of cement-grade limestone and construction aggregate to serve market demands in Santa Clara County, the San Francisco Bay Area and northern California.
- Continue operations at an existing limestone quarry that is uniquely situated to provide for regional needs and that lies in a state-classified MRZ-2 resource area meeting the requirements of SMARA and County Code Section 4.10.370.
- Backfill the North Quarry with material that will best satisfy surface water and groundwater criteria during interim and final reclamation phases.
- Reclaim the WMSA in place to avoid risks to water quality inherent in reexposing and relocating large volumes of limestone-enriched overburden.
- Address grading and revegetation needs at the northern ridgeline in a manner that is stable, visually appealing, and conforms to the surrounding topography.

- Implement a reclamation strategy that is consistent with preliminary closure plans developed pursuant to WDRs adopted by the RWQCB for the Quarry.

4. PROPERTY AND SURROUNDING FEATURES

The Quarry is an approximate 630-acre operations area within the approximately 3,510-acre property managed by Lehigh. Of the total property, 2,656 acres are within unincorporated Santa Clara County. The remaining 854 acres of the property are located within the city boundaries of Palo Alto and Cupertino. The Permanente Cement Plant, which is also on the property, is separately permitted and is not regulated under SMARA as part of the Quarry.

The majority of the property not developed for mining is relatively undisturbed, steep, heavily vegetated, and has limited access. The property is bordered by large open space areas to the north, south, and west, and is near urban areas to the east. To the north and northeast are Rancho San Antonio County Park and Midpeninsula Regional Open Space District land. The closest communities are in the cities of Cupertino, Los Altos, Palo Alto, Saratoga, and the unincorporated areas of Loyola and Los Altos Hills. A separate mining operation, Stevens Creek Quarry, is adjacent to Lehigh's property on the south (as shown in Figure 3, "Existing Conditions").

5. BACKGROUND

5.1 Operations Overview

Minerals are excavated by drilling, blasting, and using loaders or excavators. Once extracted, minerals are hauled to a processing area. Materials destined for the cement plant are processed using crushers and conveyors located southeast of the North Quarry. Mined materials that will be used as construction aggregates are either hauled directly off-site or further processed and stockpiled at the Rock Plant located in the far southeast portion of the site, as shown in Figure 3.

Overburden (i.e., materials not suitable for use as cement-grade limestone or construction aggregate) has been placed in designated areas: the WMSA (west of the North Quarry) and the East Materials Storage Area (EMSA) in the northeastern portion of the property.

Ancillary facilities include haul roads, property access and maintenance roads, an administration area, maintenance and parking areas, drill roads for exploration and materials sampling, stormwater ponds, and water conveyances. A series of groundwater monitoring wells and a water treatment facility and related system (designed to capture and convey stormwater and remove selenium, a naturally occurring element in the limestone reserves) ensure that discharges to Permanente Creek comply with water-quality standards established by the RWQCB.

5.2 Existing Entitlements and Approvals

5.2.1 Vested Rights Determination

Permanente Quarry is a vested operation, which does not require a use permit for mining to occur as recognized under SMARA. The parcels where mineral production occurs under this plan are part of the vested operation. The County Board of Supervisors (Board) affirmed the quarry's vested status in a February 8, 2011, public hearing. The vested parcels are shown in Figure 3. The Board's 2011 resolution (Resolution No. 2011-85) 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.

As with quarry operations subject to use permits, a vested quarry operation must have a reclamation plan that ensures that planned mining areas will be reclaimed pursuant to SMARA and the County's surface mining ordinance. The County has discretionary authority over the content and processing of reclamation plans, but pursuant to SMARA must approve a reclamation plan, and cannot deny the right to access minerals within a vested right.

The initial reclamation plan for the quarry 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 has caused the 2012 Reclamation Plan to become outdated in its descriptions of the mineral reserves, the timing of completion, the topography of final surfaces, and the best methods to reclaim and meet long-term water quality objectives. The proposed reclamation plan amendment addresses current conditions in accordance with SMARA and incorporates all new and applicable statutory and regulatory requirements.

5.2.2 Vested Rights Consistency

All surface mining operations planned in connection with the project would occur within the geographic boundaries of the Quarry's vested rights as determined by Resolution No. 2011-85. As it has throughout its history, the Quarry will continue to produce cement-grade limestone to supply the adjacent cement plant and construction aggregates to serve market demand.

5.3 Approved Reclamation Plan

SMARA requires that every surface mining operation have a lead agency–approved reclamation plan (Public Resources Code Section 2770[d]). The initial reclamation plan for the Quarry was approved in 1985. The plan was comprehensively revised in 2012, reflecting the known and planned development of mineral reserves at that time. The 2012 Reclamation Plan specifies placement of materials in the WMSA and EMSA and mining of the North Quarry reaching a depth of 440 mean sea level (msl). Final North Quarry elevations (following backfill with the WMSA materials) would range between 990 and 1,800 feet msl, and final slope angles would be a maximum of 2.5 horizontal:1 vertical (2H:1V). Backfilling the North Quarry would require approximately 60 million tons of material, comprising 12 million tons from ongoing operations and 48 million tons from the WMSA. Final drainage would reestablish runoff that would flow to Permanente Creek.

Reclamation activities would consist of grading slopes to final contours, applying growth media, installing erosion control measures, reseeding and planting the area, and then beginning maintenance and monitoring activities. Where mining activities, including activities related to the relocation of stored materials, have resulted in compacted soil, ripping or disking would be used to establish a suitable rooting zone in preparation for planting. Revegetation would consist of a minimum of 6 to 12 inches of topsoil medium over areas of overburden, and in other areas according to the slopes, exposures and type of vegetation. Following installation of erosion controls, the surfaces would be reseeded with native plants. Maintenance and monitoring would continue until the reclamation standards are achieved. The reclamation activities were

projected to take place over 20 years. The postreclamation land condition would be suitable for open space uses.

5.4 Cement Plant

The Permanente Cement Plant operates under a use permit (County File No. 173.023) issued on May 8, 1939. The use permit has been modified on a number of occasions to expand and modernize the plant. The use permit has no expiration date. The plant is a separately permitted industrial use, is not subject to SMARA or the reclamation plan, and is outside of the existing and proposed reclamation plan boundary.

5.5 1972 Ridgeline Protection Easement Deed

Permanente Ridge is a topographic feature of the property extending nearly 4 miles (21,000 feet) from the eastern to the western property boundaries. It has long been recognized as an important feature that screens views of the quarry from communities to the north. In 1972, a prior Quarry owner, Kaiser Cement & Gypsum Corporation, conveyed the *Ridgeline Protection Easement Deed* (1972 Easement) to the County. The 1972 Easement restricts the lowering of the ridgeline along an approximately 3,000-foot segment below a "proposed Future Ridgeline" (as shown in Figure 3) and prohibits mining on the "northeast slope" that would be visible from communities to the north. Lehigh and its predecessors have effectively implemented the intent and terms of the agreement for more than 40 years. The proposed modifications will similarly meet the original aesthetic intent of the 1972 Easement.

5.6 Permanente Creek Reclamation Area

The Permanente Creek Reclamation Area (PCRA) includes approximately 49 acres of historic mining disturbance north of Permanente Creek (see Figure 3). This disturbance adjacent to the WMSA is associated with overburden storage operations beginning in the 1950s. Historic aerial photographs indicate that the full extent of the storage-related disturbance on the WMSA's southern edge occurred by 1975 (before SMARA's effective date on January 1, 1976). The 2012 Reclamation Plan documents that either approximately 15 acres in the PCRA were redisturbed or additional surfaces were disturbed after 1975. SMARA requires "proportional" reclamation for this area. In addition to SMARA requirements, other laws protecting surface waters and biological resources require ongoing attention to the PCRA. An ongoing limitation is accessibility to these areas without compromising safety or creating other environmental damage.

The 2012 Reclamation Plan provides some flexibility so that reclamation activities would take place concurrent with and in a manner consistent with plans for Permanente Creek restoration (see the location of the restoration area in Figure 3) under the jurisdiction of the RWQCB. Reclamation treatment would also be refined during necessary permitting processes of all jurisdictional agencies including the RWQCB, the U.S Army Corps of Engineers (USACE) and the California Department of Fish and Game (CDFG). In no event would the treatments be less stringent than those required under SMARA. The proposed reclamation plan amendment would not change the reclamation approach or requirements for the PCRA.

6. PROPOSED PROJECT

Mine planning and drilling to determine reserve quality and quantity is an ongoing process at any mining operation. Reserves are proven by detailed drilling and testing that are time consuming and expensive. The ratio of ore and overburden can also change based on changed

specifications, market demand, and commodity prices. Thus, mine and reclamation planning at any point in time is based on the available data, business plans, and regulatory requirements for the reasonable and foreseeable future.

Since 2012, Lehigh has invested considerable effort in assessing reserves and further planning for reclamation and closure. The results show that continued material extraction is available within the vested areas of Lehigh's property. Approximately 60 million tons of limestone, aggregates, and overburden are identified for production under the proposed reclamation plan amendment. Backfill of the North Quarry using imported fill would extend through 2055, with final reclamation completed by 2060. Additionally, water quality monitoring and materials testing have allowed Lehigh to develop reclamation strategies that ensure the Quarry will meet interim and long-term water quality objectives without the need for continued active water treatment.

SMARA encourages reclamation plans to be amended as mining progresses, conditions change, and better reclamation strategies are developed. The proposed reclamation plan amendment is a comprehensive update to the 2012 Reclamation Plan. It incorporates current SMARA requirements, including those resulting from the 2017 SMARA amendments, and modifies the approved reclamation plan consistent with the above purposes and objectives.

The following sections describe the primary components of the proposed project. Figure 4, "Amended Reclamation Plan Components," shows a map of the areas and acreages of these components. All mining and reclamation activities that would occur under the proposed project would be within vested parcels on the property. The project includes modification of the reclamation boundary as shown in Figure 4, adding approximately 73 acres to provide for reclamation of planned mining operations. The amended reclamation plan is shown in Figure 5, "Amended Reclamation Plan." The key areas where proposed final reclaimed conditions differ from the 2012 Reclamation Plan are summarized in the sections that follow.

6.1 Reclamation for Limestone Reserves

Ongoing geologic investigation and mine engineering has identified two areas for continued mining of limestone reserves that are addressed in the proposed reclamation plan amendment. These areas include portions of the walls of the North Quarry (North Highwall Reserve) and a reserve located adjacent to the existing rock plant (Rock Plant Reserve); both are shown in Figures 4 and 5.

6.1.1 North Highwall Reserve and Ridgeline Lay-back

The 2012 Reclamation Plan documented that the upper slopes of the North Quarry would meet SMARA slope stability standards. However, the 2012 Reclamation Plan left two related issues unresolved with regard to the North Quarry slopes and the 1972 Easement. The 2012 Reclamation Plan does not provide a solution to ridgeline conditions that deviate from the intended conditions of the 1972 Easement due to natural erosion, and it does not provide a solution to reconcile the ridgeline conditions with the 1972 Easement.

The planned mining and reclamation activities include regrading the North Highwall Reserve at a flatter slope angle affording better long-term stability as illustrated in Figure 6, "North Highwall Photograph and Lay-Back Cross Section." The plan for regrading the North Quarry and removing the mass of greenstone slide material is shown in Figure 7, "North Highwall and Reclamation Grading." Regrading the greenstone slide to a 1H:1.25V (38 degree) slope angle for long-term stability will eliminate the need for the buttress proposed in the 2012 Reclamation

Plan. Limestone will be mined from the reserve to an elevation no deeper than approved under the 2012 Reclamation Plan (440 feet msl). Slide waste (greenstone) not suitable for aggregate production will be placed permanently on the North Quarry floor and/or the WMSA.

The slope lay-back will result in a slightly lower crest elevation by an average of 100 feet. A portion of this work necessitates that the Board accommodate an update to the 1972 Easement. In general, the agreement has served its purpose and the northeast slope remains as a visual screen of the quarry from views from north of the site. However, an unintended consequence of the lines drawn in 1972 is that production of highwall reserves is inhibited and access for effective final reclamation and revegetation is precluded. A simulation of the completed ridgeline is shown in Figure 7, "Existing and Simulated Project Ridgeline." The slope crest will be contour graded to blend with ridgeline topography, resoiled, and planted with native trees as a first phase of the project (within approximately 18–24 months).

6.1.2 Rock Plant Reserve (New Mining Area)

A limestone reserve adjacent to the Rock Plant (see Figure 5) is within the vested property and within the 2012 Reclamation Plan. This approximately 60-acre reserve will be one of the most substantial new mining areas opened at the Quarry in several decades. This reserve has the benefit of modern engineering and environmental considerations and reclamation planning (e.g., geotechnical design, surface water control, topsoil salvage) that was not developed for the North Quarry, which was initiated decades before SMARA and current environmental regulation.

The mining and reclamation activities specifically include development of the highwall at an approximately 1H:1V overall slope angle (45 degree) to a floor elevation of approximately 915 feet msl. Each bench will be reclaimed as soon as it receives final grading and operational safety permits. No quarry to capture surface water will remain. Site preparation and mining will require 5–10 years to complete, with final reclamation grading and revegetation completed after an additional 5 years.

6.2 North Quarry Backfill Sources

Under the 2012 Reclamation Plan, the North Quarry would be backfilled to 990 feet msl to ensure a pit lake is not present at reclamation. The fill for the North Quarry is currently to be moved entirely from the WMSA. However, post-2012 investigations and studies have resulted in plans to avoid the water-quality risks associated with exposing and relocating up to 48 million tons of overburden material. Some WMSA material may be used for North Quarry backfill. Greenstone material produced from reclamation of the ongoing mining will be redirected to the North Quarry. The primary backfill material is proposed to come from imported fill generated from off-site sources. Backfilling the quarry using surplus soil from regional construction projects will be beneficial to long-term water quality. The use of 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 after North Quarry dewatering activities cease and groundwater levels are restored. This practice is common in the Bay Area and statewide. Mining operations that involve lands already disturbed by grading and have capacity to accept such fill provide an ideal solution for disposing of excess clean construction fill. By doing so, compliance with water quality objectives and the WDR mandates can be achieved with greater certainty, with limited interim impacts, and in an expedited time frame.

Lehigh proposes to accept up to 1 million cubic yards per year of imported surplus construction soil. This soil would be subject to site-specific acceptance criteria developed in coordination with regulatory agencies according to the following guidelines:

1. *California Environmental Protection Agency Department of Toxic Substances Control (DTSC) Information Advisory on Clean Imported Fill Material* guidance document (DTSC 2001);
2. constituents of concern limits established via the RWQCB environmental screening levels and California Human Health Screening Levels (to establish whether the material is considered a "designated waste" under the California Water Code, in which case it would not meet the Quarry's acceptance criteria);
3. federal and state hazardous and nonhazardous waste criteria; and
4. Background concentration data using DTSC, U.S. Environmental Protection Agency Commercial Regional Screening Levels, and federal Resource Conservation and Recovery Act guidelines.

Acceptance of soil will be determined for each individual source location (e.g., construction project), and all soil imported to the Quarry will be subject to testing and quality controls to ensure it meets the Quarry's site-specific acceptance criteria. Imported soil is anticipated to be received and unloaded near the Rock Plant. From there, it will be loaded for transport to the North Quarry for placement.

A detailed study of the surplus construction soil market in the project region concluded that approximately 2 million cubic yards of surplus construction soil meeting the Quarry's acceptance criteria will be available within the region annually and that the Quarry is positioned to receive an average of approximately 1 million cubic yards annually. The study also found that there is a diminishing capacity at soil reuse sites within the region and that the Quarry will provide an important reuse option for surplus soil generated within the region. As a result, use of surplus construction soil for reclamation of the Quarry will substantially reduce vehicle miles traveled and air pollutant and greenhouse gas emissions associated with soils transport as compared to future conditions that would exist without the use of suitable surplus soils for Quarry reclamation.

6.3 WMSA

Post-2012 investigations and studies have identified backfill options that would allow for reclaiming the WMSA in place, thereby avoiding the water-quality risks associated with exposing and relocating up to 48 million tons of overburden material. While some WMSA material may be used, the intent is to finalize grading and revegetation for the WMSA earlier than forecast in the approved reclamation plan. Overburden from mining the North Quarry will be added to the WMSA. Figure 6 provides the revised design elevations for the WMSA, which will increase from the maximum final elevation of approximately 1,900 feet msl to approximately 2,060 feet msl. The final WMSA surface will be contoured to blend in with the surrounding topography and revegetated with native plants.

7. OTHER AMENDED PLAN COMPONENTS

7.1 Construction Aggregate Materials and Off-Road Haul Routes

Permanente Quarry produces construction aggregates from rock not suitable for cement production, including greenstone. Production of these materials will continue and extend beyond limestone operations from stockpiles. Opportunity and efficiency also exists to reduce vehicle emissions and local roadway traffic by providing for customer access from the adjacent Stevens Creek Quarry. Customer access could be achieved by one of two off-road haul routes,

known as the "Utility Road" and "Rock Plant Haul Road," connecting the two sites. Reclamation planning for either footprint is incorporated.

7.2. Revegetation Enhancements

7.2.1 Resoiling Improvements

SMARA regulations provide guidance to developing site-specific performance standards for topsoil salvage, maintenance, and redistribution. The regulations include salvaging soil before mining begins; however, they also provide for other suitable material capable of sustaining vegetation if the amount of topsoil needed to cover all surfaces to be revegetated is not available on site. Permanente Quarry is such a site. Operations here were initiated almost a century before these regulations were developed, when the concept of mine reclamation did not exist. Consequently, as reclamation planning is employed, creative options must be available for dealing with the shortcomings of surfaces that do not have the proper water-holding capacity and nutrients for rapid establishment of vegetation. The amended reclamation plan improves recommendations for resoiling based on revegetation test plots and characterization of the different types of surface conditions.

7.2.2 Aesthetics Incorporated in Revegetation Planning

Visual analysis was undertaken in the reclamation planning process following and expanding on the County's efforts in the 2012 environmental impact report. Areas of the site identified as visible from urbanized or public visitation areas were given special consideration in terms of the revegetation structure, adding additional trees and shrubs and scheduling for revegetation at the earliest possible date. These sites are located along the ridgeline, north-facing slopes of the WMSA and the Rock Plant Reserve, and east-facing slopes of the EMSA and North Quarry Highwall. These areas will be planted with thickly vegetated communities whenever solar radiation conditions permit, though revegetation managers may opt for special revegetation treatments in these areas to hasten vegetative establishment to more quickly obscure regraded and barren slopes. Options to speed plant growth include irrigation, increased ratios of organic material in the growth media, and planting larger plants.

8. RECLAMATION PHASING

Table 1, "Reclamation Phasing," provides the anticipated timing for completion of the various reclamation components. Final revegetation will occur as soon as each area receives final grading. Thus, the upper areas of both the North Highwall Reserve and the Rock Plant Reserve will be revegetated before mining is completed at the lower areas.

TABLE 1
RECLAMATION PHASING[1]

Phase	Reclamation Component	Time Frame[2]	Description
I	North Highwall Reserve	10–20	• Ridgeline mining, grading, and stabilization (within approximately 18–24 months) followed immediately by ridgeline revegetation and monitoring • Placement of greenstone slide material on quarry floor • North Highwall Reserve concurrently mined and reclaimed with slopes meeting geotechnical specifications
	North Quarry		• Placement of on-site and imported fill where no conflict with access to reserves will occur
	West Materials		• Placement of final fill and regrading of surfaces to

Phase	Reclamation Component	Time Frame[2]	Description
	Storage Area		geotechnical specifications • Revegetation and monitoring
	PCRA		• Permitting process completed; project completed and reclamation initiated
II	North Quarry	15–30	• Mining completed • Continued backfill with on-site and imported fill
	East Materials Storage Area		• Final surface preparation, revegetation, and monitoring
	Rock Plant Reserve		• Mining and reclamation of highwalls concurrently • Installation of drainage controls • Grading and revegetation of floor • Overburden placed in North Quarry • Vegetation monitoring
III	North Quarry	30–40	• Final fill elevation reached (+/-990 mean sea level) • Completion of removal of construction aggregate stockpiles • Installation of final drainage controls • Revegetation and monitoring
	Operations Areas		• Reclamation of the conveyor tunnel after the conveyor is dismantled and removed • Completion of removal of construction aggregate stockpiles • Revegetation of all remaining areas • Monitoring all areas for erosion and vegetation until success criteria is met

Notes:
[1] Phasing, tasks, and timing subject to specifications and future updates to waste discharge requirements by the San Francisco Bay Regional Water Quality Control Board.
[2] Years after approval of the reclamation plan amendment.

9 ENVIRONMENTAL CONSIDERATIONS INCORPORATED INTO THE PROJECT

The amended reclamation plan resulted not only from ongoing mineral development, but from the efforts invested in detailed site investigations, characterization, and engineering designed to understand the characteristics of materials placed over the past century and to forecast the reclaimed conditions after site closure. Additionally, early environmental analysis provided input to the reclamation design. Many measures were thereby incorporated into the project to the benefit of the site and surrounding environment. Some of these measures, many of which are fully explained in the environmental and technical reports that accompany the application, include:

- continuing the supply of locally sourced construction and maintenance cement and aggregate, reducing emissions otherwise produced from imports;
- fully removing the greenstone slide, an improvement to the approved reclamation plan buttress for postreclamation land use;
- increasing slope stability in the North Quarry by regrading slopes to current standards, benefitting postreclamation land uses;
- improving approved conditions at the ridgeline, with improved grading and enhanced revegetation as a first phase of reclamation;
- reducing the environmental risks of moving and reexposing WMSA materials to precipitation and surface runoff by reclaiming the stockpile in place;
- reducing the long-term risks of WMSA materials containing low-grade limestone placed as backfill and determining what materials would best meet requirements;

- improving the projected groundwater and backfill conditions in the North Quarry and determining how long-term water quality objectives are best met by import of clean fill;
- engineering all slopes for long-term stability according to current requirements;
- assessing the limitations of soils availability and adjusting the reclamation requirements to appropriately supplement growth media;
- revising revegetation standards to incorporate aesthetic considerations where surfaces are viewed from off-site communities;
- minimizing ridgeline changes while improving overall reclamation; and
- revising the reclamation boundary to incorporate more surfaces within the vested properties where existing or planned activities should be subject to SMARA requirements.

10. PERMITS AND APPROVALS

The County will decide what land use approvals are needed. The proposed reclamation plan amendment is not expected to require subsequent permits from the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, California Department of Fish and Wildlife, or other agencies responsible for environmental protection. The County will require at least the following entitlements and approvals:

1. *Reclamation Plan Amendment*: An amendment to the 2012 Reclamation Plan is required under SMARA and the County ordinance to provide for reclamation of components not addressed or modified from the 2012 Reclamation Plan. These amendments generally include the new mining at the Rock Plant Reserve, the modifications to the North Quarry ridgeline, import and placement of fill materials at the site, potential changes for the final grading and reclamation of the WMSA, and other changes from the 2012 Reclamation Plan phasing and timing. See Figures 5 and 6.
2. *Modification to 1972 Easement*: The 1972 Easement is proposed to be modified to accommodate final grading, stabilization, and revegetation along the North Highwall Reserve. See Figures 7, 8, and 9.

The RWQCB adopted updated WDRs in 2018. Pursuant to the 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 at the North Quarry, including the underlying mechanisms affecting surface water and groundwater quality. Data has also been generated to evaluate use of the WMSA materials as the sole source of backfill material for the North Quarry. While fill placement will be consistent with the 2012 Reclamation Plan, characterization of the materials and the conditions in which they are placed will be governed by the RWQCB. The amended reclamation plan incorporates these considerations.

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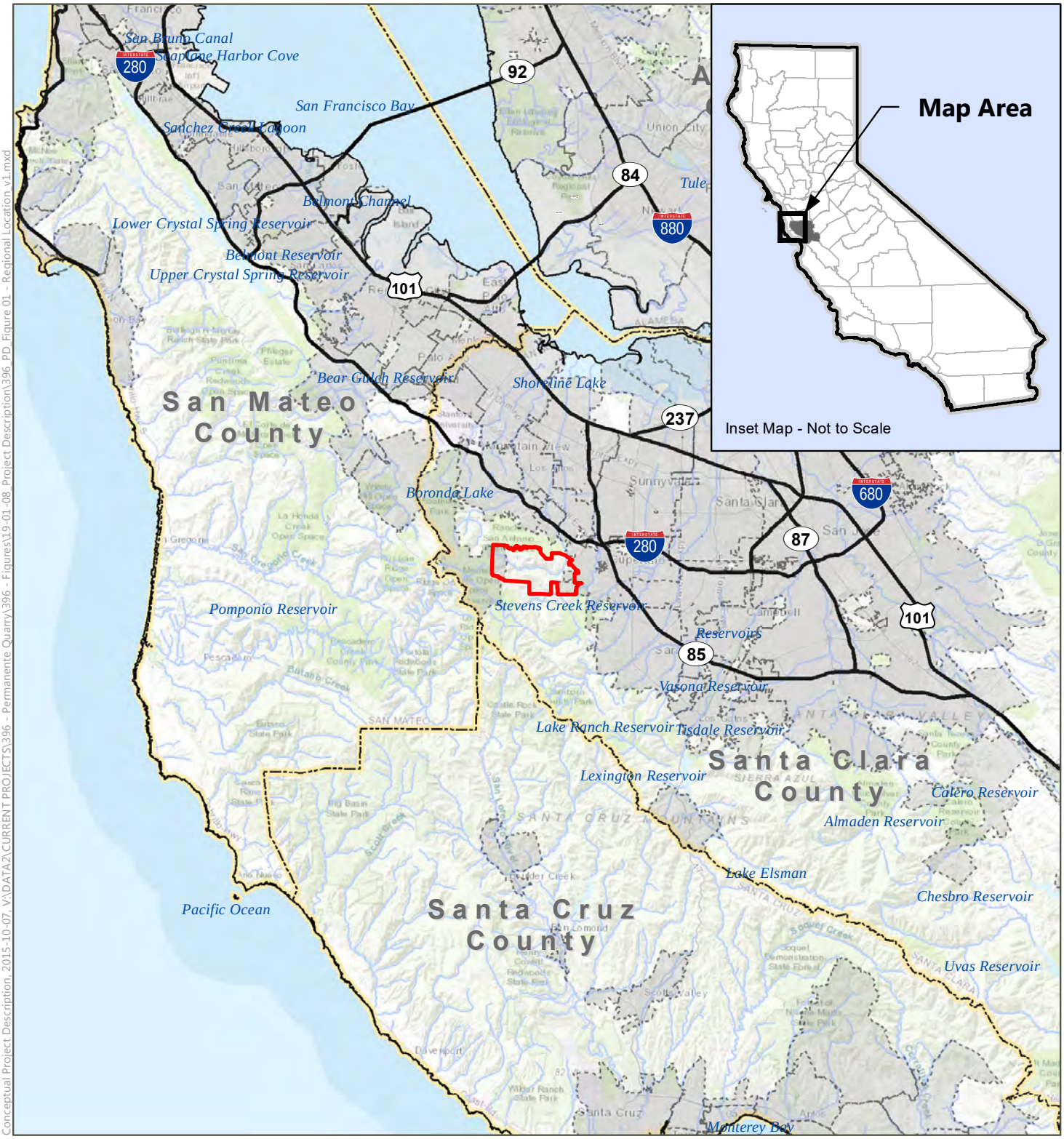
FIGURES



Conceptual Project Description, 2015-10-07, V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\19-01-08_Project Description\396_PD_Figure 01 - Regional Location v1.mxd

SOURCES: ESRI World Shaded Relief accessed Jan. 2019, ESRI World Topographic Map accessed Jan. 2019; ESRI World Streetmap, 2009; compiled by Benchmark Resources in 2019

NOTES: 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
City Boundary
County Boundary
Major Highway
River
Water Body

BENCHMARK RESOURCES

N

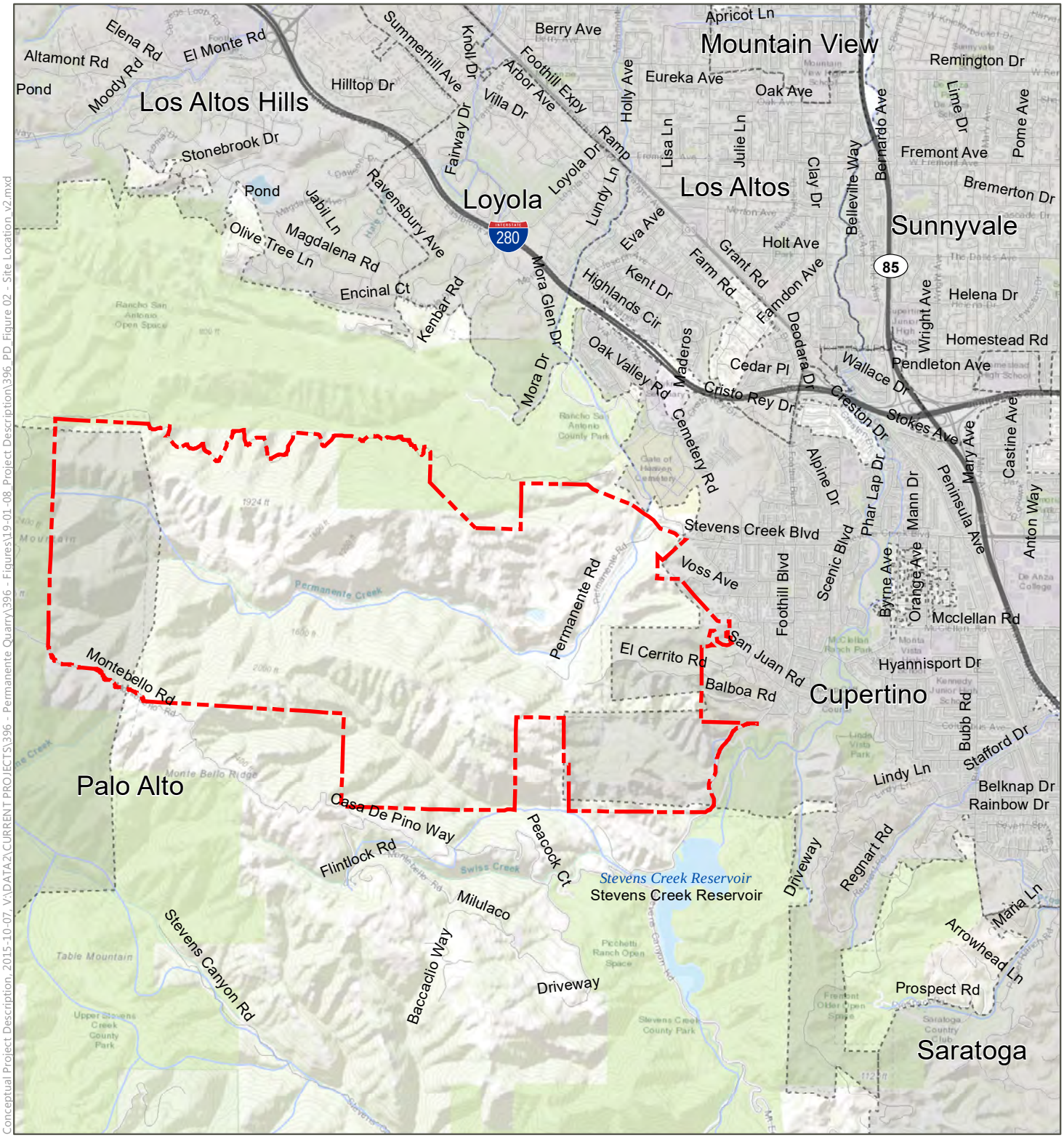
0 3 6 12 Miles

Regional Location

PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

PROJECT DESCRIPTION

Figure 1



Conceptual Project Description, 2015-10-07, V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\19-01-08_Project Description\396_PD_Figure 02 - Site Location_v2.mxd

SOURCES: ESRI World Shaded Relief accessed Jan.l 2019, ESRI World Topographic Map accessed Jan 2019; ESRI World Streetmap, 2009; adapted by Benchmark Resources in 2019

NOTES: 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.

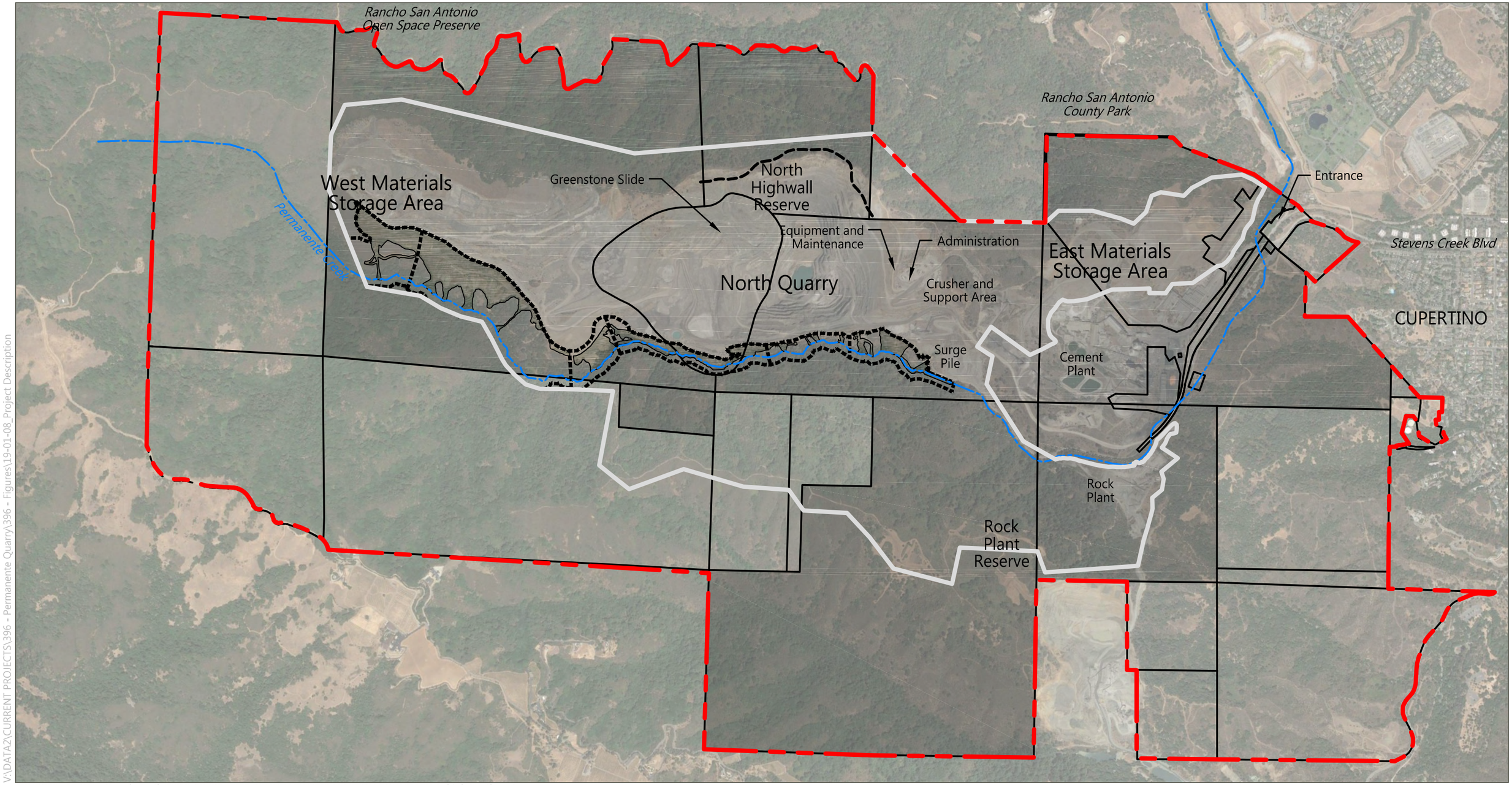
Property Boundary
City Boundary
Water Body
Interstate
Street
River

BENCHMARK RESOURCES

N

0 2,000 4,000 8,000 Feet

Site Location
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
PROJECT DESCRIPTION
Figure 2



V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\19-01-08_Project Description

SOURCES: AERIAL: Google Earth (2018-08-09); SITE BOUNDARY/RECLAMATION BOUNDARY: Lehigh Southwest Cement Company, generated in 2018; PARCELS: Santa Clara County parcel data accessed in 2018; compiled by Benchmark Resources in 2019

NOTES:

1. ac = acres
2. The Permanente Creek Restoration Area is being reclaimed under the Permanente Creek Restoration Plan, which has been prepared, in part, to fulfill the requirements set forth in an Amended Consent Decree, lodged February 22, 2016.

Property Boundary	±3,510 acres	
Existing Reclamation Plan Boundary	±1,239 acres	
1972 Easement "Finished Ridge"		
Permanente Creek Reclamation Area		
Permanente Creek		
Permanente Parcels		
		Vested Parcels
		Permanente Creek Reclamation Plan and Restoration Plan Areas

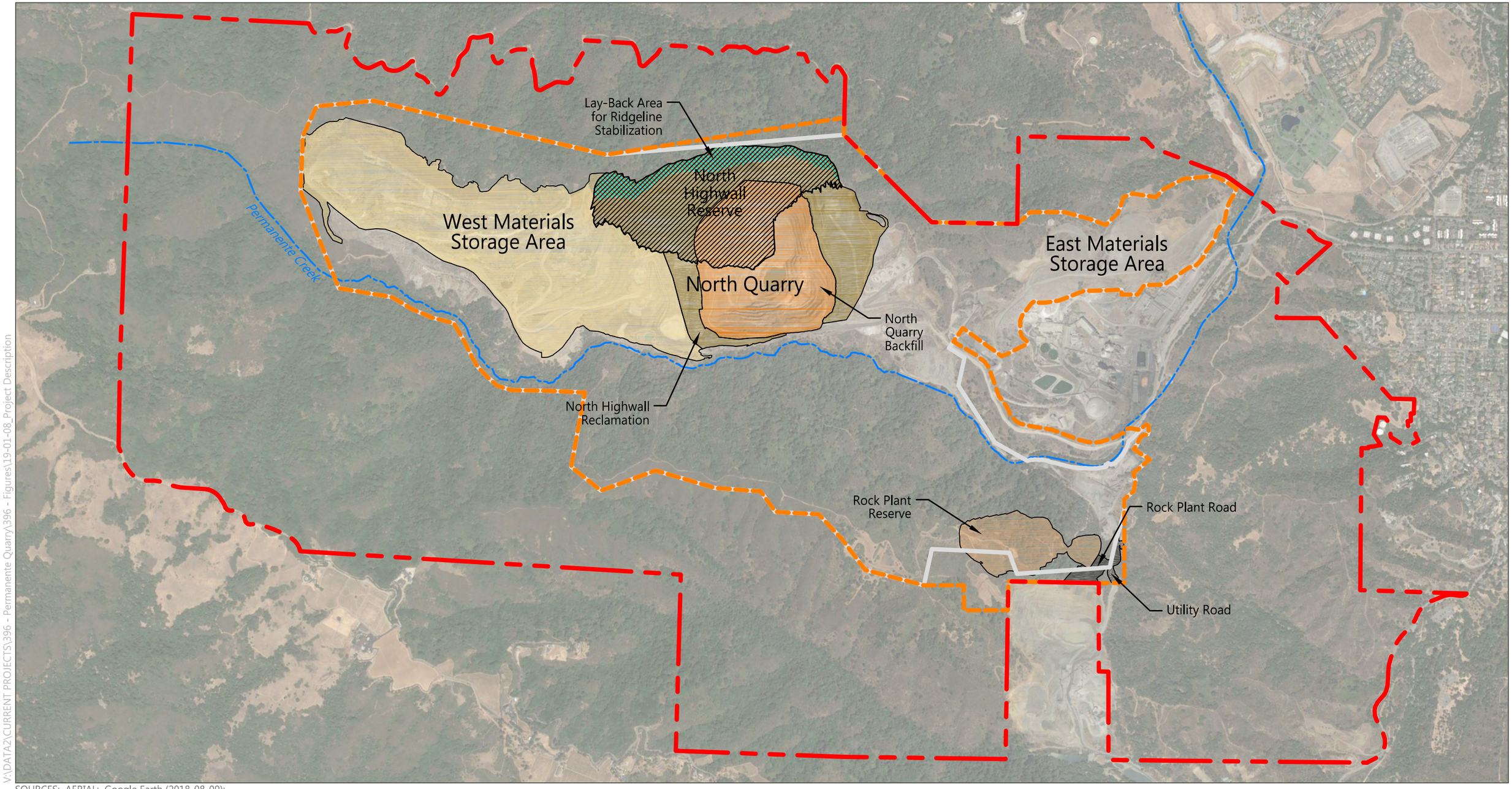
BENCHMARK RESOURCES

N

0 700 1,400 2,800 Feet

Existing Conditions

PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
PROJECT DESCRIPTION
Figure 3



V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\19-01-08_Project Description

SOURCES: AERIAL: Google Earth (2018-08-09); SITE BOUNDARY/RECLAMATION BOUNDARIES/RESERVES: Lehigh Southwest Cement Company, generated in 2018; compiled by Benchmark Resources in 2019

Property Boundary	(±3,510 acres)
Amended Reclamation Boundary	(±1,312 acres)
Existing Reclamation Plan Boundary	
Permanente Creek	

Highwall Reclamation	(±113 acres)
North Quarry Backfill	(±93 acres)
West Materials Storage Area	(±218 acres)
Rock Plant Reserve	(±31 acres)
Haul Plant Road/Utility Road	(±5 acres)

Lay-Back Area	(±20 acres)
North Highwall Reserve	(±101 acres)

BENCHMARK RESOURCES

N

0 700 1,400 2,800 Feet

Amended Reclamation Plan Components
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
PROJECT DESCRIPTION
Figure 4

V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\19-01-08_Project Description

WMSA-DMW-1D
WMSA-DMW-1S
WMSA-DMW-6
WMSA-P6A
WMSA-DMW-9
WMSA-DMW-4
MS-INC
WMSA-DMW-2
WMSA-DMW-5
WMSA-DMW-10
WMSA-DMW-7
WMSA-DMW-3S
WMSA-DMW-3D
WMSA-DMW-11
WMSA-DMW11A
WMSA-DMW-8S
WMSA-DMW-8D
GEO4-39B
GEO4-39A
GEO4-26A
HG-1
HG-10D
HG-11
HG-10S
HG-10M
GEO4-26B
HG-4
HG-9
GT4-33B
GT4-33A
HG-6
HG-5
GT2-14
EQUIPMENT AND MAINTENANCE
ADMINISTRATION
EMSA-DMW-4D
EMSA-DMW-4S
EMSA-DMW-8
EMSA-P8A
EMSA-DMW-5
EMSA-DMW-2S
EMSA-DMW-2D
BKGD-2
EMSA-DMW-6
EMSA-DMW-3
EMSA-P7A
EMSA-P6A
EMSA-DMW-7
EMSA-DMW-9
EMSA-DMW-1S
EMSA-DMW-1D
PZ-101
CEMENT PLANT
QUARRY-PLANT ROAD
UTILITY ROAD
ROCK PLANT HAUL ROAD
A
A'
B
B'
C
C'
D
D'
E
E'

Surface Condition	Revegetation	Average Slope (%)	Acres
Coarse Overburden	Woodland	23.90%	104.8
	Shrubs and Grasses	29.90%	174.5
General Compacted Soils	Shrubs and Grasses	32.80%	119.5
Highwall Benches	Woodland	56.40%	64.5
	Shrubs and Grasses	60.60%	69.2
Soil Backfill	Shrubs and Grasses	5.10%	92.8

Project Location
T07S, R02W
Santa Clara County, CA

Review
Prepared by CBB on 2019-02-21
Final Review by PK on 2019-05-20

Notes

1. Coordinate System: NAD 1983 StatePlane California III FIPS 0403 Feet

2. Background: Phase 4 - Reclamation Topography

3. The planned surface disturbance boundary and depth are shown; however, the extent of operations may or may not reach these limits. Total acreage to be disturbed and reclaimed will be within the limits of the reclamation plan boundary. Facilities and configurations within this boundary are approximate. All acreages are approximate and not intended to reflect goals for any particular surface type. Variations are subject to actual mined conditions and will not affect success of postmining land uses.

4. Some mined materials will be unusable and varying market conditions may result in additional unsaleable materials (e.g., greenstone). Thus, the volumes of overburden and fill material and, therefore, the ultimate configuration of the reclaimed quarry may vary from the configuration shown. The graphic represents the types of surfaces that would be reclaimed (e.g., overburden, backfill, highwall benches). The final configuration of these surfaces has no bearing on the success of mine reclamation because reclamation would be completed according to plan surface treatment criteria.

5. See Sheet 4 for full size drawing and engineer stamp and signature.

6. Figure modified and adapted by Benchmark Resources in 2019.

Stormwater Pond
RPA Boundary
Property Boundary
Coarse Overburden (Woodland)
Coarse Overburden (Shrubs and Grasses)
General Compacted Soils (Shrubs and Grasses)
Highwall Benches (Woodland)
Highwall Benches (Shrubs and Grasses)
Soil Backfill (Shrubs and Grasses)

Well Location
Surface Flow Drainage
Permanente Creek
Abandoned Conveyor Tunnel
Road (Retained)
Road (Reclaimed)
Cross-Section
Phase 4 - Reclamation Topography
100 ft Index Contour
20 ft Contour

Stantec

N

0 500 1,000 2,000 Feet

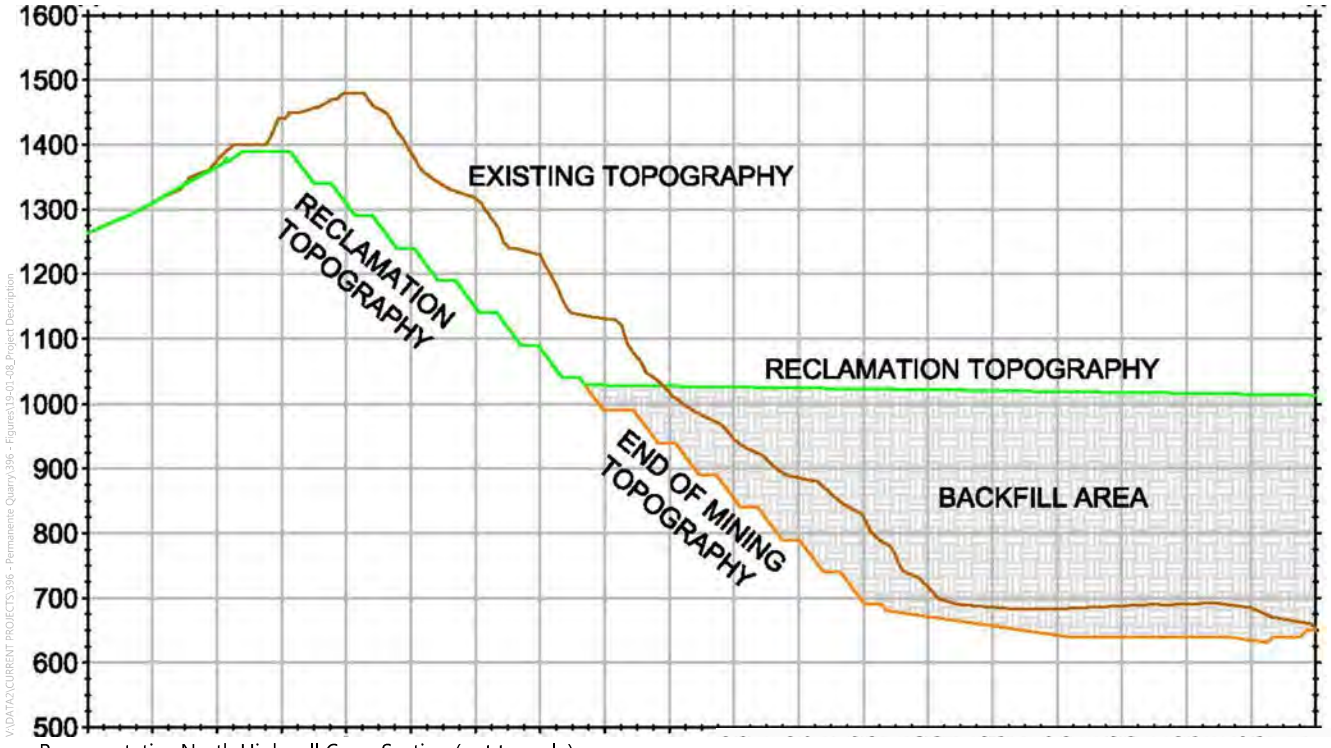
Amended Reclamation Plan

PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
PROJECT DESCRIPTION
Figure 5

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.



Photograph of North Highwall Conditions.



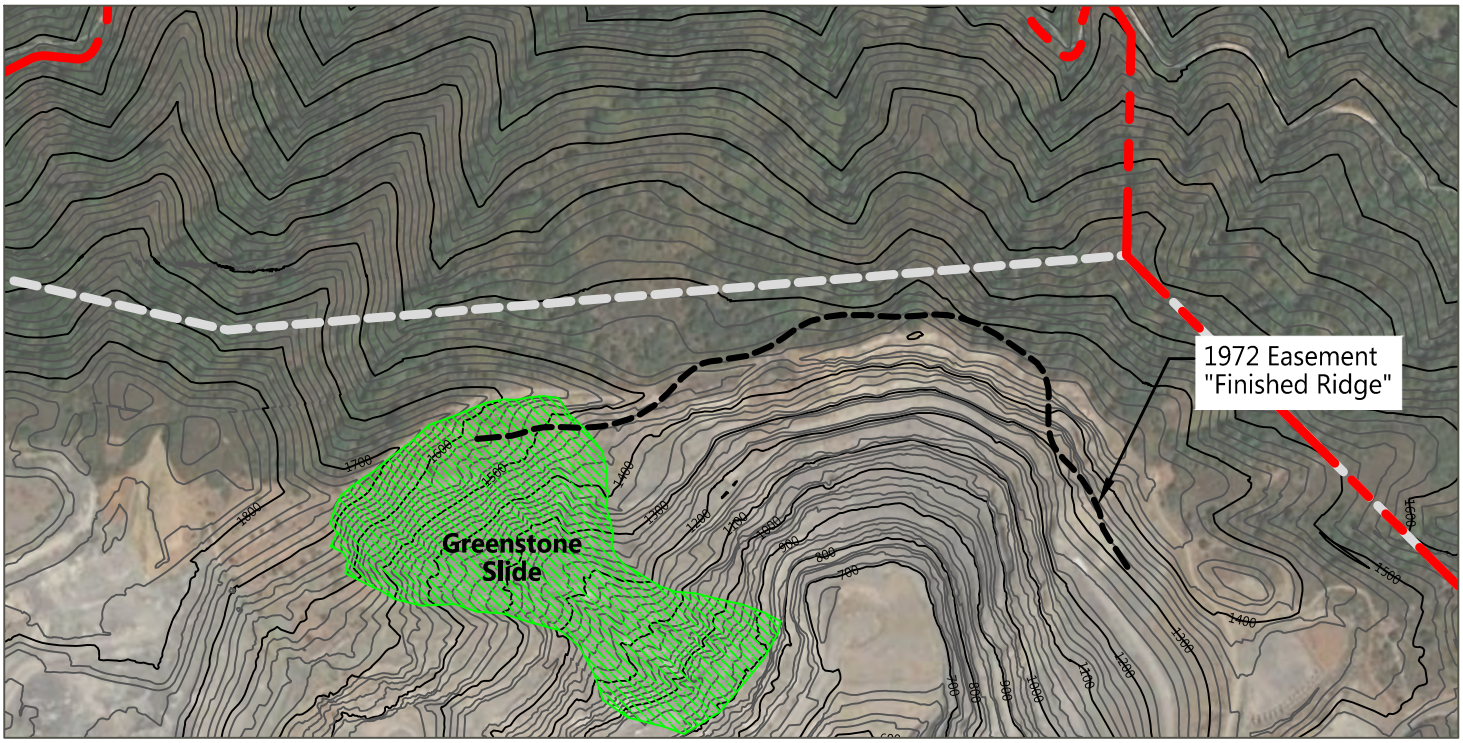
Representative North Highwall Cross Section (not to scale).

SOURCES: PHOTOGRAPH/CROSS SECTION: Lehigh Southwest Cement Company, generated in 2019; compiled by Benchmark Resources in 2019

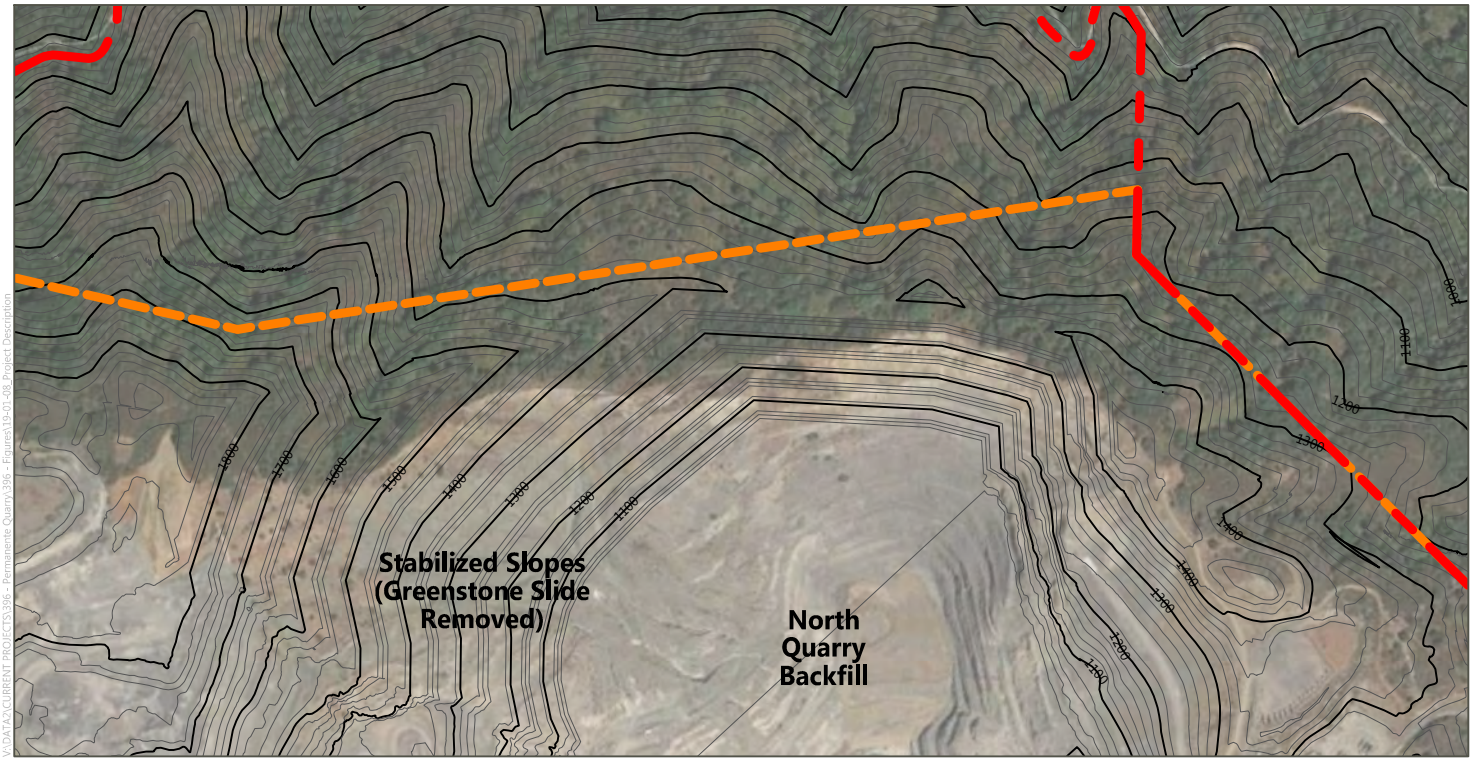
North Highwall Photograph and Lay-back Cross Section

PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
PROJECT DESCRIPTION
Figure 6

BENCHMARK RESOURCES



Existing conditions.



Amended Reclamation Plan Grading.

Property Boundary

Existing Reclamation Boundary

Amended Reclamation Boundary

1972 Easement "Finshed Ridge"

Approximate Greenstone Slide Area

SOURCES: AERIAL: Google Earth (2018-08-01); SITE BOUNDARY/RECLAMATION BOUNDARIES/RESERVES/HAUL ROUTE AREAS/VESTED RIGHTS AREAS: Lehigh Southwest Cement Company, generated in 2018; PARCELS: County of Santa Clara Assessor's Parcel data download, accessed in 2018/ParcelQuest maps, accessed in January 2019/parcels compiled and modified to fit site boundary by Benchmark Resources in 2019; compiled by Benchmark Resources in 2019

BENCHMARK RESOURCES

N

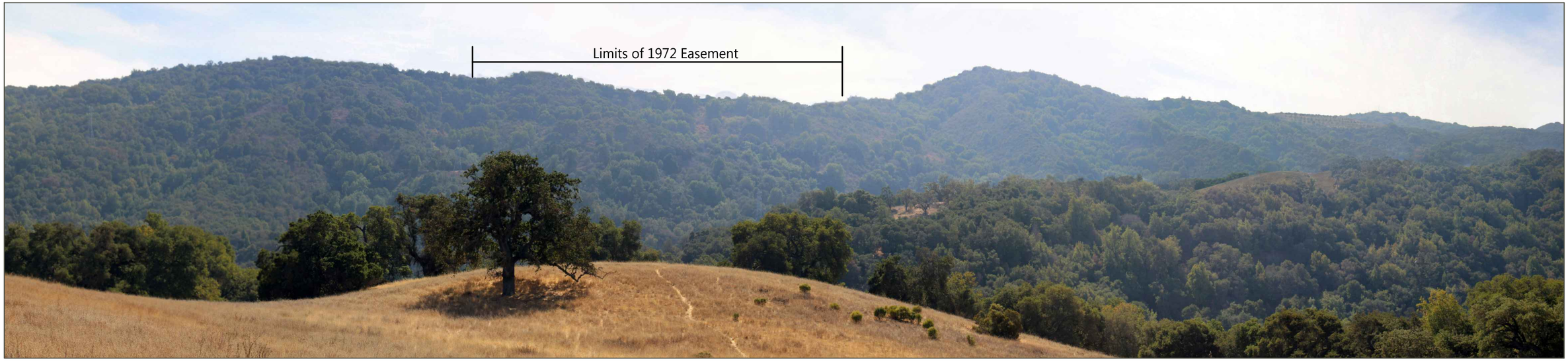
0 1,000 2,000 4,000 Feet

North Highwall and Reclamation Grading

PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
PROJECT DESCRIPTION
Figure 7



View of Existing Ridgeline from Mora Drive and Mora Trail in Los Altos Hills (photograph taken September 2018).



Project simulation and modified ridgeline.

Existing and Simulated Ridgeline
PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT
PROJECT DESCRIPTION
Figure 8

BENCHMARK RESOURCES

ABBREVIATIONS AND TERMS

ABBREVIATIONS AND TERMS

1972 Easement	*Ridgeline Protection Easement Deed* (Kaiser Cement & Gypsum Corporation 1972)
2012 Reclamation Plan	*Reclamation Plan Amendment for Permanente Quarry* (Lehigh Southwest Cement Company 2011)
County	Santa Clara County
CUP	conditional use permit
DTSC	California Department of Toxic Substances Control
EMSA	East Materials Storage Area
greenstone slide	Slide waste on the North Quarry's northwest highwall
Lehigh	Lehigh Southwest Cement Company
highwall	The unexcavated face of exposed overburden or minerals
North Highwall Reserve	Portions of the walls of the North Quarry where continued mining of limestone reserves is feasible
North Quarry	General area where mining has and will continue to occur as represented in the approved reclamation plan
project	As defined in the 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.
Quarry	Permanente Quarry
Rock Plant Reserve	A vested mining area
RWQCB	San Francisco Bay Regional Water Quality Control Board
site	The area encompassed by the amended reclamation boundary
SMARA	California Surface Mining and Reclamation Act
WDRs	waste discharge requirements
WMSA	West Materials Storage Area

REFERENCES AND RESOURCES

REFERENCES AND RESOURCES

California Department of Toxic Substances Control. 2001 (October). *Information Advisory—Clean Imported Fill Material*. Sacramento, CA.

DTSC. *See* California Department of Toxic Substances Control.

Kaiser Cement & Gypsum Corporation. 1972 (August 18). *Ridgeline Protection Easement Deed*. Provided to Santa Clara County, San Jose, CA.

Lehigh Southwest Cement Company. 2011 (December 13). *Reclamation Plan Amendment for Permanente Quarry*. State Mine ID #91-43-0004. Cupertino, CA.

SUPPLEMENTAL ENVIRONMENTAL INFORMATION

Permanente Quarry
Ridgeline Protection Easement Analysis

DATE: May 20, 2019

TECHNICAL MEMORANDUM

RIDGELINE PROTECTION EASEMENT ANALYSIS

PERMANENTE QUARRY

BACKGROUND AND PURPOSE

The North Quarry has been Permanente Cement's primary source of limestone for cement production for more than 100 years. Since 1939, the limestone, incorporated into cement, has been used in countless building projects throughout the Bay Area and northern California. Aggregate materials produced from lower grades of limestone and other rock types, including greenstone found at the quarry, has been used for road building and construction applications for decades.

The North Quarry contains limestone reserves that could potentially extend several decades. An obstacle to the development of these resources has been the Main Slide. The Main Slide is consists of approximately 14 million cubic yards of greenstone rock that failed on the upper slope in 1987, covering nearly 50 acres of the reserve. The *Reclamation Plan Amendment for Permanente Quarry* (2012 Reclamation Plan), which Lehigh Southwest Cement Company prepared in 2011 and Santa Clara County (County) approved in 2012, proposed to stabilize the toe of the Main Slide through a large buttress composed of West Material Storage Area (WMSA) material, but to leave the slide headscarp in place in its current form.

In addition, the upper slopes along the ridgeline, which were cut more than 40 years ago, are gradually eroding. While the reclaimed conditions specified in the 2012 Reclamation Plan comply with the state's regulatory requirements for stability, the upper slopes form a steep, unvegetated highwall that is visible from the valley floor and cannot be vegetated. The 2012 Reclamation Plan included leaving the slide and slope crest in place as-is at final reclamation. Those conditions can be seen in Figure 1, "North Highwall and Ridgeline Conditions."

Additional reserve drilling and geotechnical analysis, completed in 2018, has revealed options for extending North Quarry production and resolving the conditions at the upper highwall slopes. Rebenching the highwall could be completed to increase the final stability, allow the remaining limestone reserves to be recovered, and facilitate removal of the greenstone slide. Figure 2, "Existing North Quarry Conditions," and Figure 3, "Simulated North Quarry Conditions," depicts the changes in the North Quarry slopes planned under the 2019 reclamation plan amendment. Figure 4, "Simulated North Quarry Reclaimed Conditions," shows the North Highwall, ridgeline, and backfilled quarry following final reclamation and revegetation.

1972 RIDGELINE PROTECTION EASEMENT

On August 18, 1972, Kaiser Cement & Gypsum Corporation granted to 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 graphics referenced in the 1972 Easement are shown in Figure 5, "Exhibits from Ridgeline Protection Easement Deed," which shows the boundary as provided in the 1972 Easement.

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. The 2012 Reclamation Plan did not, however, propose to modify the 1972 Easement or provide a solution that would resolve the deviations from the 1972 Easement and improve the aesthetic appearance of the area.

TOPOGRAPHIC PROFILES AND PROPOSED MODIFICATIONS

The north highwall would be rebenched to increase long-term slope stability, allow for revegetation, and improve the visual quality. Known as a slope "lay-back," the work consists of cutting new benches at reduced overall angles to achieve an improved geometry that achieves increased stability. A profile of the plan is shown in Figure 6, "North Highwall Lay-Back Representative Cross Section."

An analysis of the 1972 topography, the current conditions, and proposed rebenching of the north highwall is shown in Figures 7 through 9. Figure 7, "North Highway Lay-Back Cross Section," re-creates the conditions from the 1972 Easement exhibits shown in Figure 5. Figure 8, "Current Topography and Ridgeline," shows the same area and ridgeline profile as they now exist. Figure 9, "Planned Topography and Ridgeline," depicts the engineered final grading, and Figure 10, "Summary of Ridgeline Changes," compiles the ridgeline profiles for comparison. The lay-back results in a northerly push of the easement boundary, and a varying reduction in elevation along the north highwall.

RIDGELINE AESTHETICS

The redesign is consistent with the goals of the 1972 Easement because it would maintain the visual and aesthetic quality of the ridgeline from viewpoints to the north. To examine the effect of the proposed changes on the aesthetics of Permanente Ridge, the engineered designs were used to create a three-dimensional (3D) digital terrain model, and then the topographic surface was rotated and scaled to correspond to a viewpoint location, as shown in Figure 11, "Digital Terrain Model Analysis—Oblique." The 3D surface model was then used as a tool to prepare visual simulations.

Simulations of the changes were be prepared by digitally modifying photographs taken from community viewpoints north of the Permanente Ridge. The existing-conditions photographs were modified to illustrate grading and revegetation. The simulations shown in Figure 12, "Existing and Simulated Permanente Ridge at Mora Trail," and Figure 13, "Existing and Simulated Permanente Ridge at La Rena Drive," represent actual to-scale size of grading and vegetation disturbance anticipated as a result of the project.

PROPOSED RIDGELINE MODIFICATION

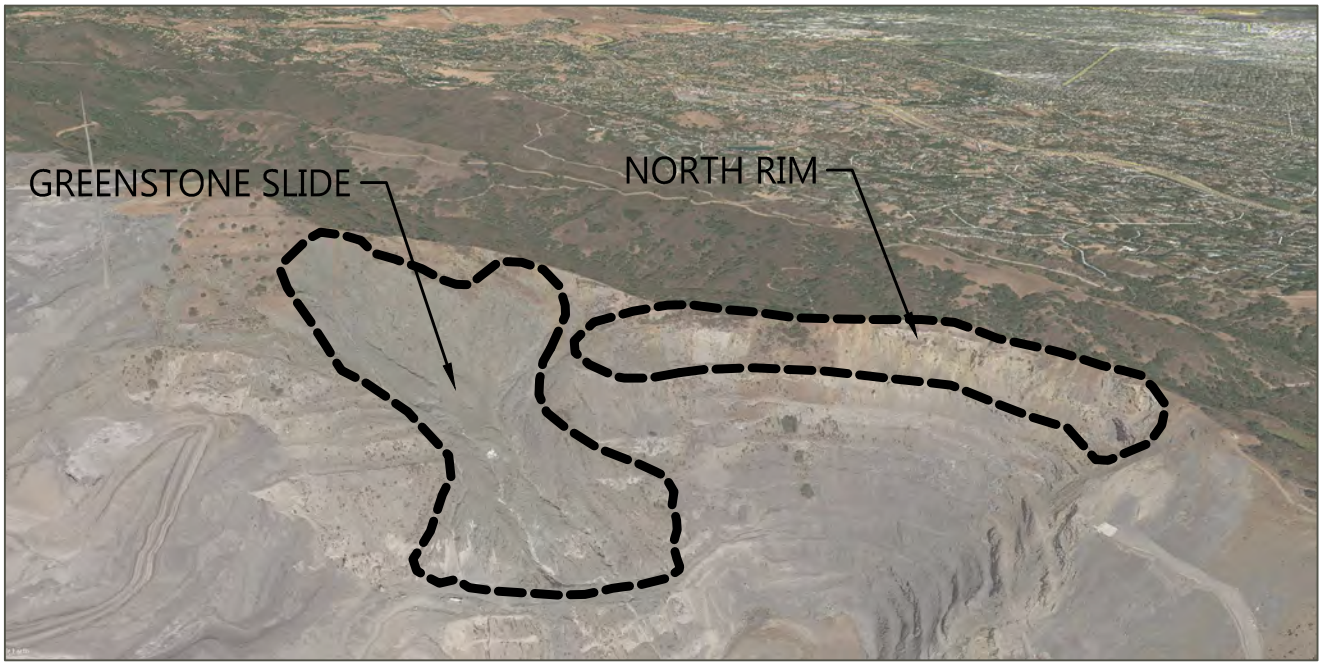
Figure 14, "North Highwall and Reclamation Grading," shows the existing conditions along the north rim and the 1972 Easement demarcation, which extends along 3,000 feet of the nearly 4 mile Permanente Ridge. The crest of the North Highwall Reserve along this area will need to be modified as a result of reconfiguring (or "laying back") the slopes internal to the quarry. This work will result in lowering the ridge crest along the highwall to a minimum of 1,400 feet msl. The slope crest will be contour graded to blend with ridgeline topography, resoiled, and planted with native trees as a first phase of the project (within approximately 18–24 months).

CONCLUSION

Lehigh seeks the approval of the County Board of Supervisors to modify the 1972 Easement, which amends the elevations set in 1972 for this portion of the ridgeline.

The 1972 Easement has been effective in maintaining the northeast slope such that views of mining operations are obscured. The proposed revisions provide for the same result. While equipment will be visible temporarily on the ridgeline, and the elevation along the north highwall will be reduced in a limited segment, the purpose of the original agreement would not be compromised, and the benefits include long-term protection of ridgeline aesthetics and enhanced North Quarry reclamation (e.g., improved slope stability and vegetation).

FIGURES



Oblique aerial view of north highwall conditions.



Photograph of north highwall conditions.

V:\DATA\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\396 - MISC\18-01-02_Easement TECH MEMO

SOURCES: AERIAL: Google Earth (8-9-2019); TOPOGRAPHY: Lehigh Southwest Cement Company, generated in 2018; compiled by Benchmark Resources in 2019

North Highwall and Ridgeline Conditions

PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 1

BENCHMARK RESOURCES

SOURCES: AERIAL: Google Earth (8-9-20109); TOPOGRAPHY: Lehigh Southwest Cement Company, generated in 2018; compiled by Benchmark Resources in 2019 Benchmark Resources in 2019



V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\396 - MISC\19-01-02_Easement TECH MEMO

Simulation of completed rebenching based on engineered design.

Simulated North Quarry Conditions
PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 2

BENCHMARK RESOURCES

SOURCES: AERIAL: Google Earth (8-9-20109); TOPOGRAPHY: Lehigh Southwest Cement Company, generated in 2018; compiled by Benchmark Resources in 2019 Benchmark Resources in 2019



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Simulation of completed rebenching based on engineered design.

Simulated North Quarry Mined Conditions

PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 3

BENCHMARK RESOURCES

SOURCES: AERIAL: Google Earth (8-9-20109); TOPOGRAPHY: Lehigh Southwest Cement Company, generated in 2018; compiled by Benchmark Resources in 2019 Benchmark Resources in 2019



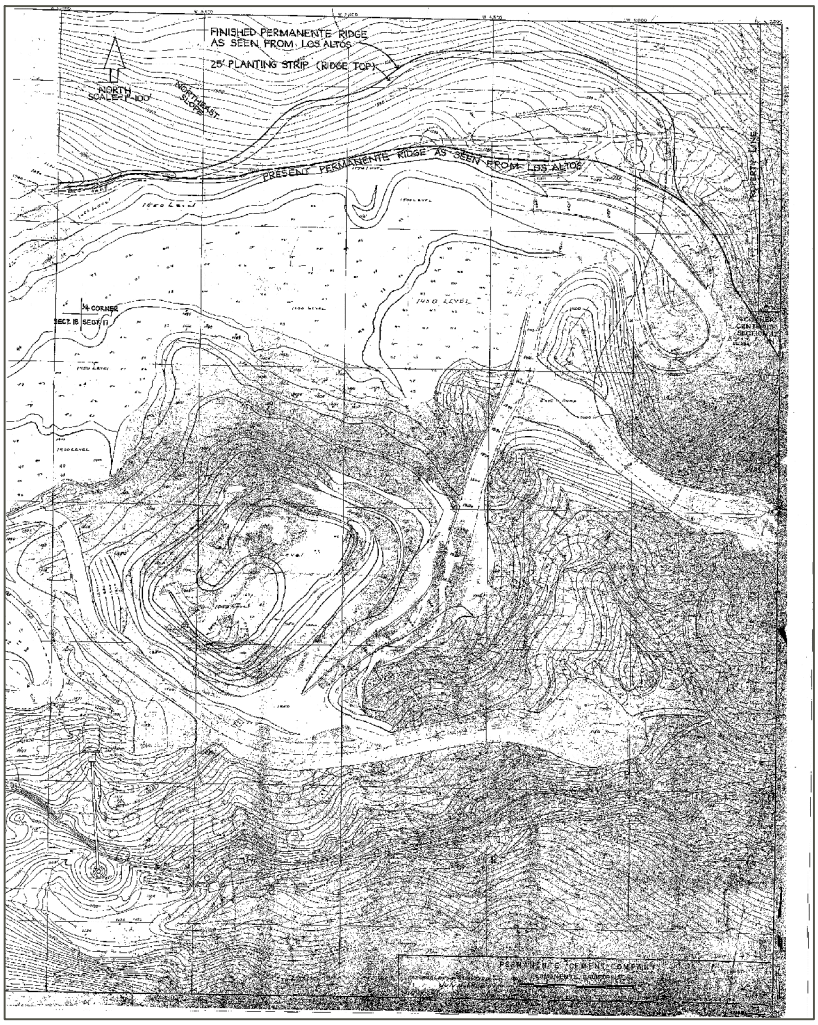
V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\396 - MISC\19-01-02_Easement TECH MEMO

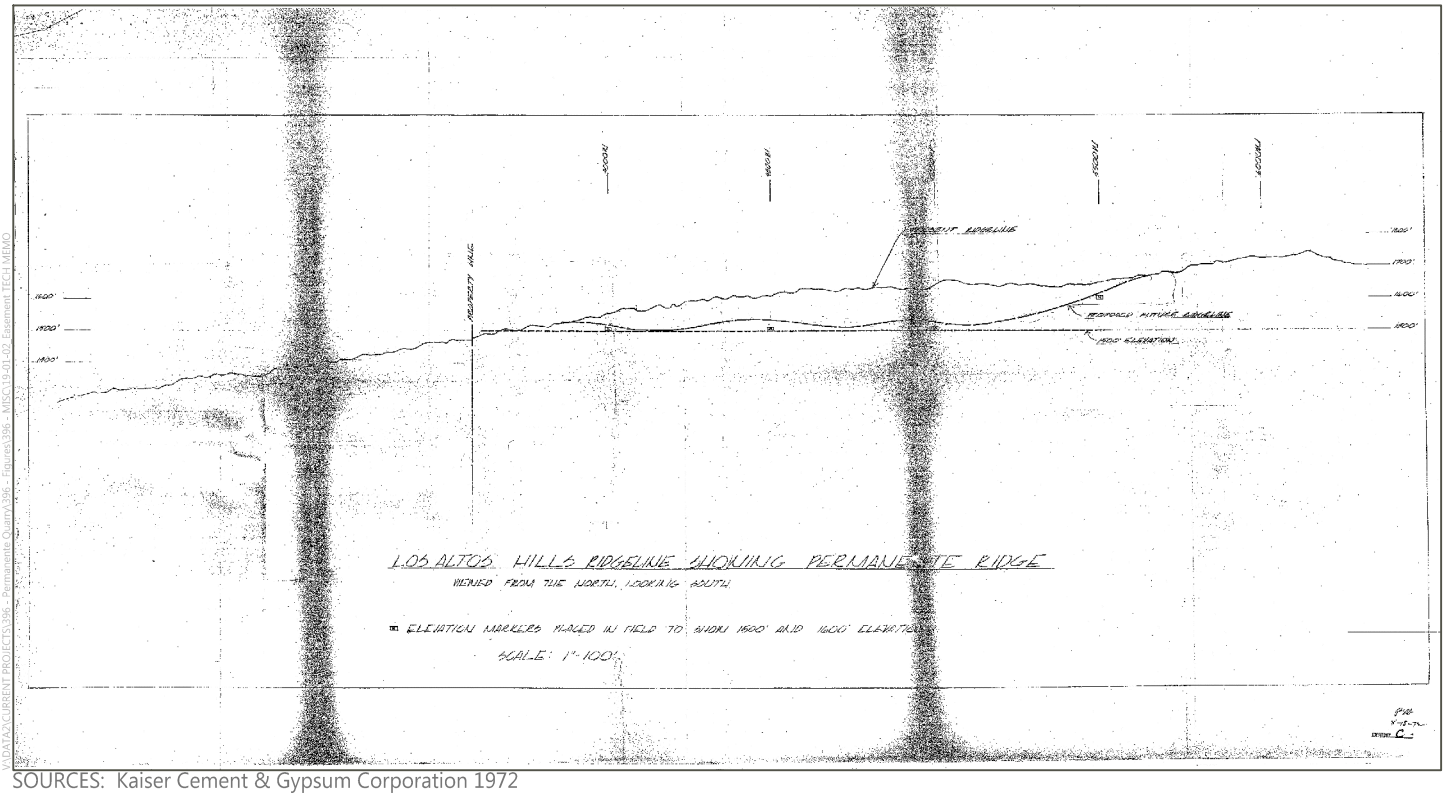
Simulation of completed rebenching and revegetation based on engineered design.

Simulated North Quarry Reclaimed Conditions

PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 4

BENCHMARK RESOURCES





SOURCES: Kaiser Cement & Gypsum Corporation 1972

Exhibits from Ridgeline Protection Easement Deed

PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 5

BENCHMARK RESOURCES

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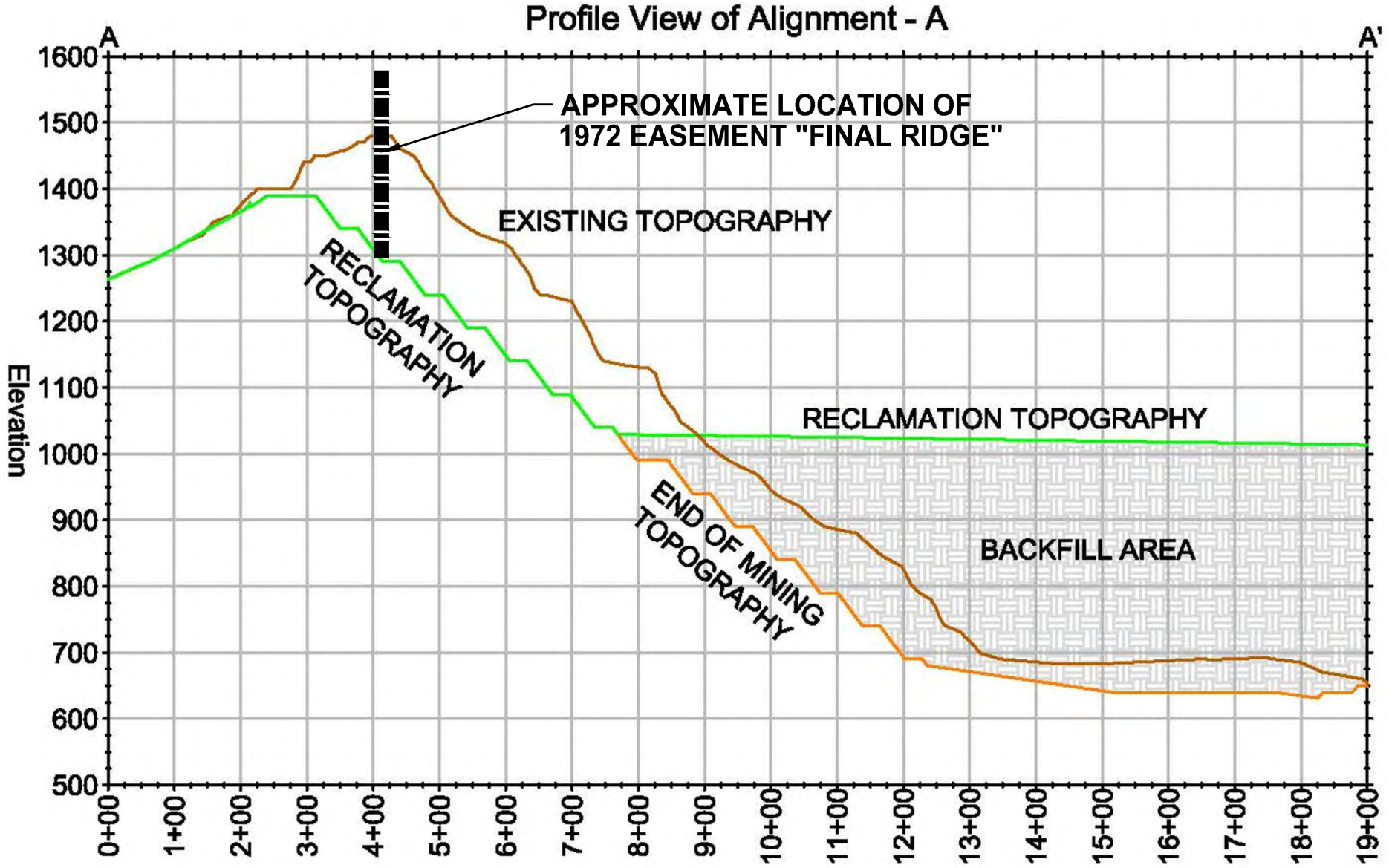

SCHEMATIC CROSS SECTION

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SOURCES: AERIAL: Google Earth Pro (2018-08-09); TOPOGRAPHY: Lehigh Southwest Cement Company, generated in 2018; compiled by Benchmark Resources in 2019

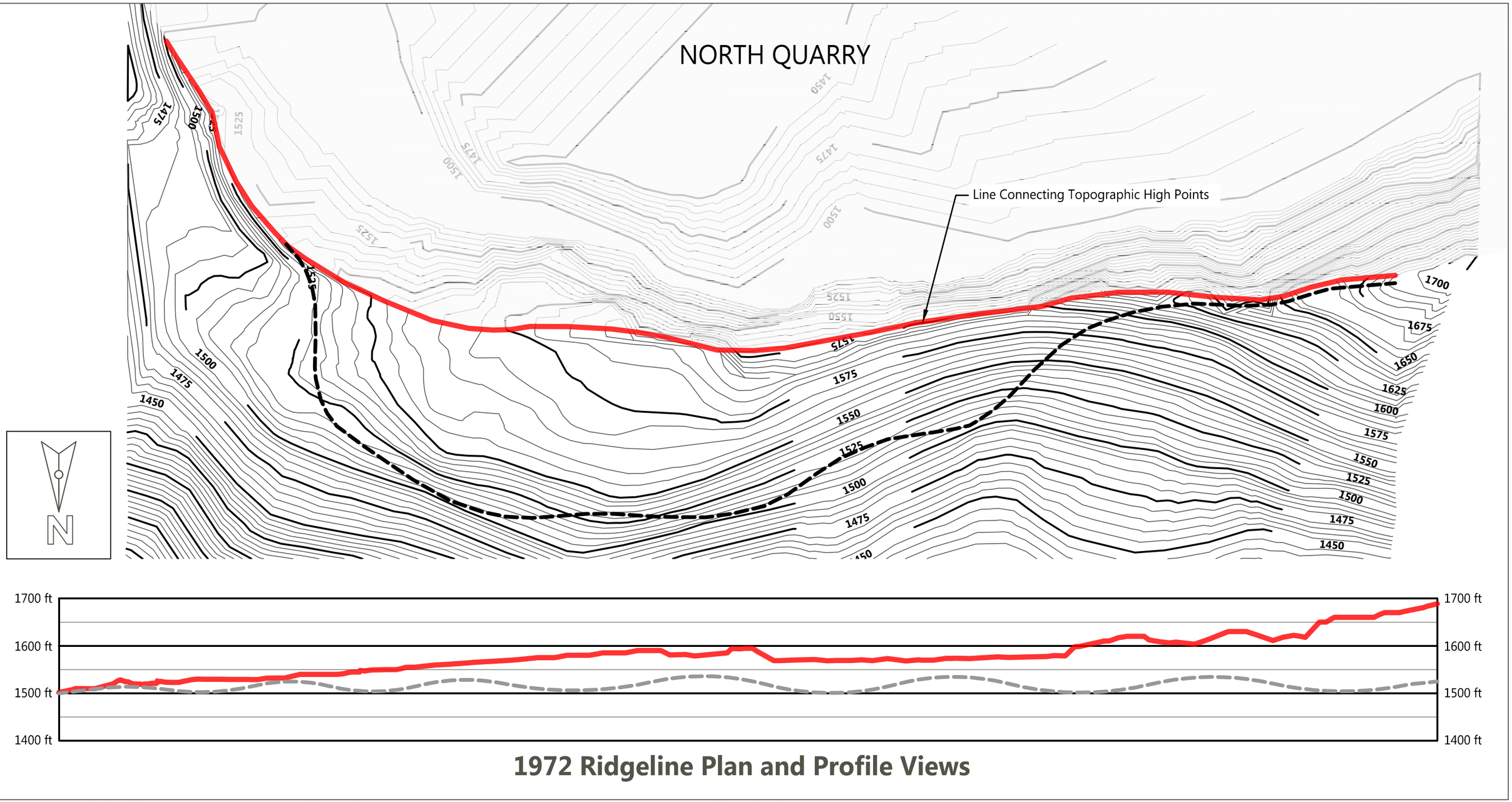
NOTES:

1. Schematic not to scale.

North Highwall Lay-back Representative Cross Section

PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 6

BENCHMARK RESOURCES



1972 Ridgeline Plan and Profile Views

CONTOUR SOURCE: Lehigh Southwest Cement Company Pit Survey, Exhibit B (July 1972); DIGITIZED TOPOGRAPHY AND RIDGELINE PROFILE SOURCE: prepared by Benchmark Resources in 2019

NOTES:

1. This drawing focuses on a segment of the north-facing ridgeline on Permanente Quarry property shown in "Exhibit B" of the 1972agreement. This ridgeline separates views of the North Quarry from northerly communities and travel routes. This ridgeline segment was the subject of a 1972 deed by the owner and a resolution by the Santa Clara County Board of Supervisors restricting the degree of change.
2. The 1972 topography was recreated digitally for this analysis. All elevation data is mean seal level.
3. The graphic is oriented south to reflect views of the ridgeline for northern communities consistent with the "Ridgeline Profile" shown in "Exhibit C" of the 1972 agreeement (See FIgure 5).
4. The "Proposed Future Ridgeline" shown in the plan view only indicates the line depicted on "Exhibit B" of the 1972 agreement (See Figure 4).

Ridgeline
"Finished Permanente Ridge" (1972)
"Proposed Future Ridgeline" (1972)
Index Contour (25 feet)
Intermediate Contour (5 feet)

BENCHMARK RESOURCES

N 0 100 200 400 Feet

North Highwall Lay-Back Cross Section

PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 7

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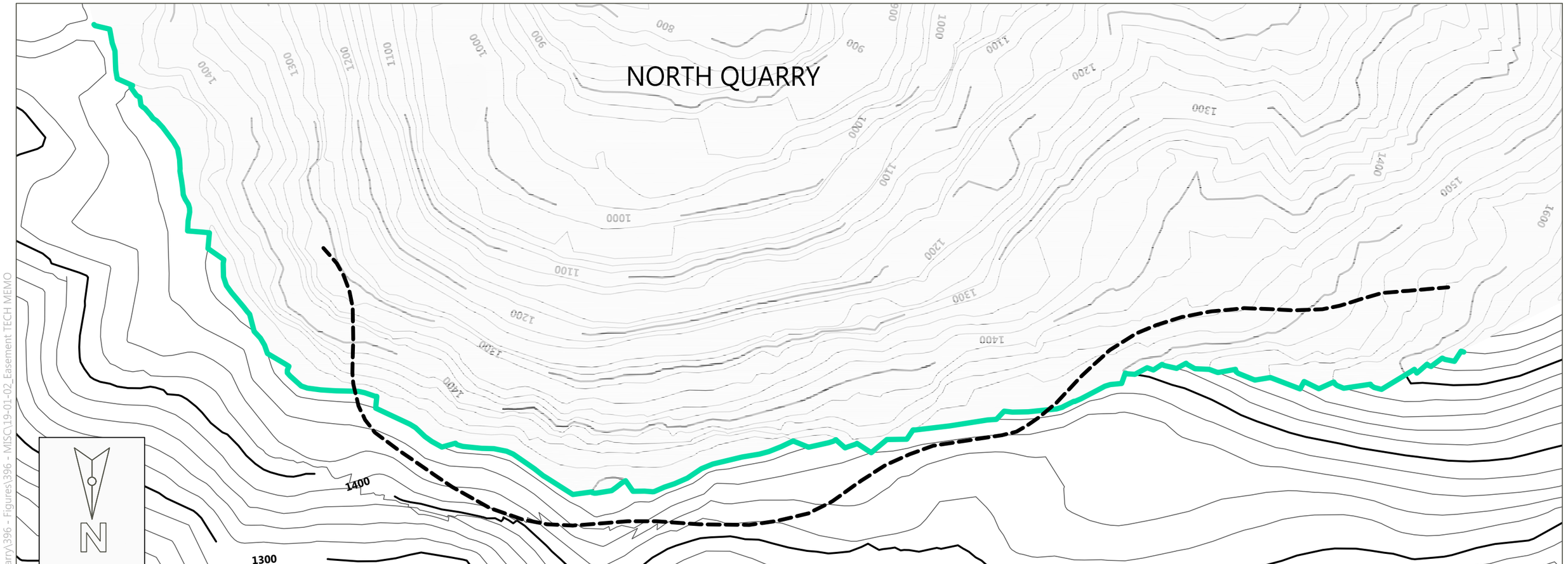

Current Ridgeline Plan and Profile Views

TOPOGRAPHY SOURCE: Lehigh Southwest Cement Company , provided in 2015; DIGITIZED TOPOGRAPHY AND RIDGELINE PROFILE SOURCE: prepared by Benchmark Resources in 2019

NOTES:

1. This drawing focuses on a segment of the north-facing ridgeline on Permanente Quarry property shown in "Exhibit B" of the 1972agreement. This ridgeline separates views of the North Quarry from northerly communities and travel routes. This ridgeline segment was the subject of a 1972 deed by the owner and a resolution by the Santa Clara County Board of Supervisors restricting the degree of change.
2. The 1972 topography was recreated digitally for this analysis. All elevation data is mean seal level.
3. The graphic is oriented south to reflect views of the ridgeline for northern communities consistent with the "Ridgeline Profile" shown in "Exhibit C" of the 1972 agreeement (See FIgure 4).
4. The "Proposed Future Ridgeline" shown in the plan view only indicates the line depicted on "Exhibit B" of the 1972 agreement (See Figure 4).
5. The 2015 data is provided by a Lehigh Southwest Cement Company topographic survey. Proposed (2018) grading is provided by Stantec Engineering (See Figures 7 and 8). All elevation data is mean sea level.
6. Segment of ridgeline shown is the same as Figure 4 and "Exhibit B" of the 1972 agreement.
7. Ridgeline elevation simplified for presentation purposes.

BENCHMARK RESOURCES

N 0 100 200 400 Feet

Ridgeline

"Finished Permanente Ridge" (1972)

Index Contour (100-feet)

Interval Contour (20-feet)

Current Topography and Ridgeline

PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 8

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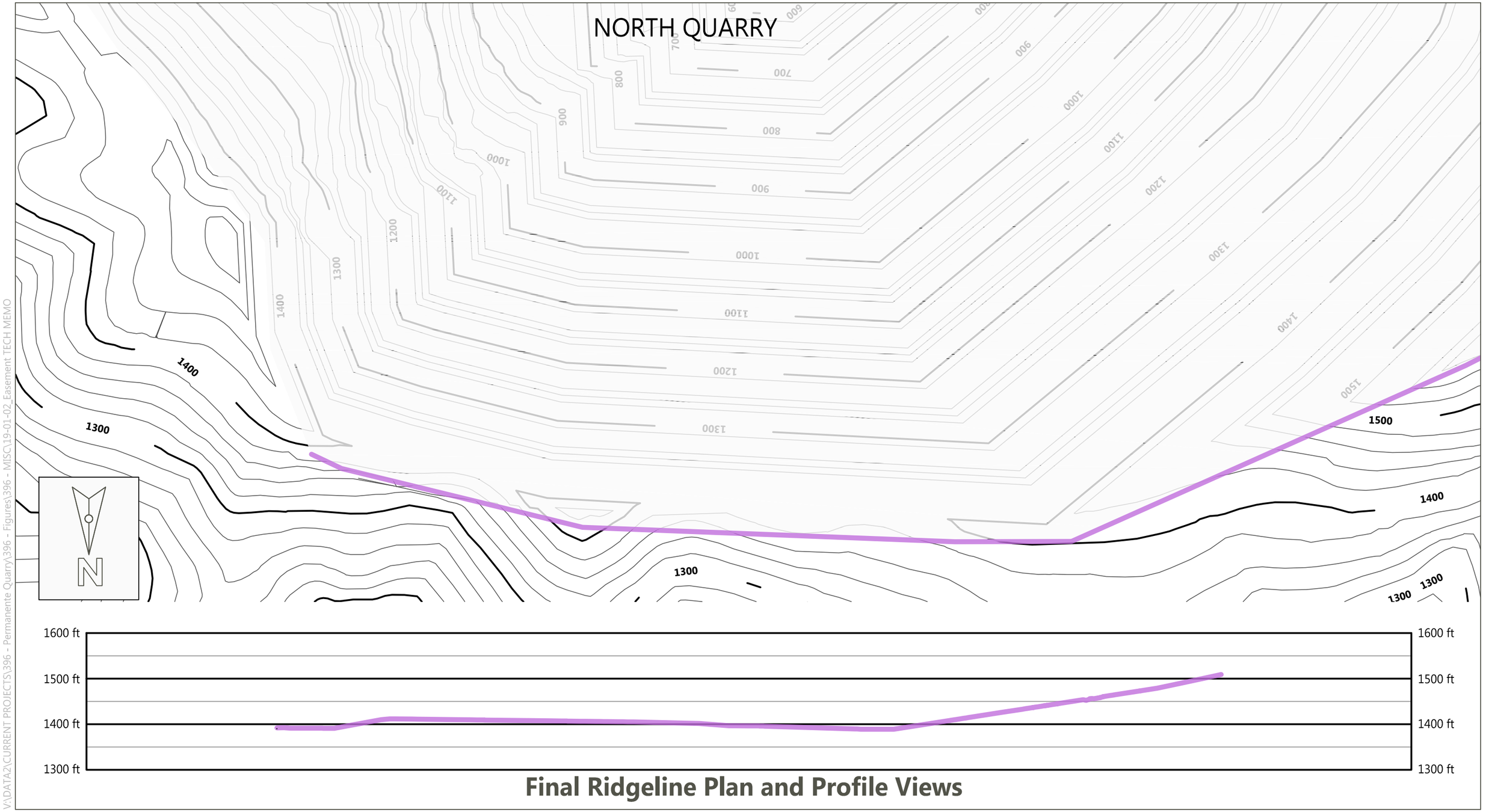

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Final Ridgeline Plan and Profile Views

CONTOUR SOURCE: Lehigh Southwest Cement Company, provided in 2018; DIGITIZED TOPOGRAPHY AND RIDGELINE PROFILE SOURCE: prepared by Benchmark Resources in 2019

NOTES:

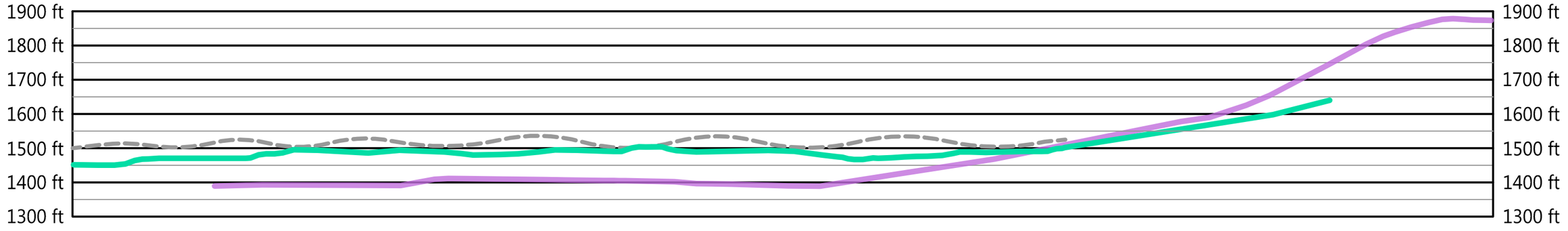
1. See Figure 7 notes.
2. Ridgeline elevation simplified for presentation purposes.

BENCHMARK RESOURCES

Planned Topography and Ridgline

PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 9





Summary of Historical and Planned Ridgeline

CONTOUR SOURCE: Lehigh Southwest Cement Company, provided in 2018; AERIAL SOURCE: Google Earth (8-1-2018);
DIGITIZED TOPOGRAPHY AND RIDGELINE PROFILE SOURCE: prepared by Benchmark Resources in 2019

NOTES:
1. See Figure 7 notes.
2. Ridgeline elevation simplified for presentation purposes.

Finished Permanente Ridge (1972)
Existing Ridgeline
Proposed Future Ridgeline (1972)
Planned Final Ridgeline

BENCHMARK RESOURCES

N 0 150 300 600 Feet

Summary of Ridgeline Changes
PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 10

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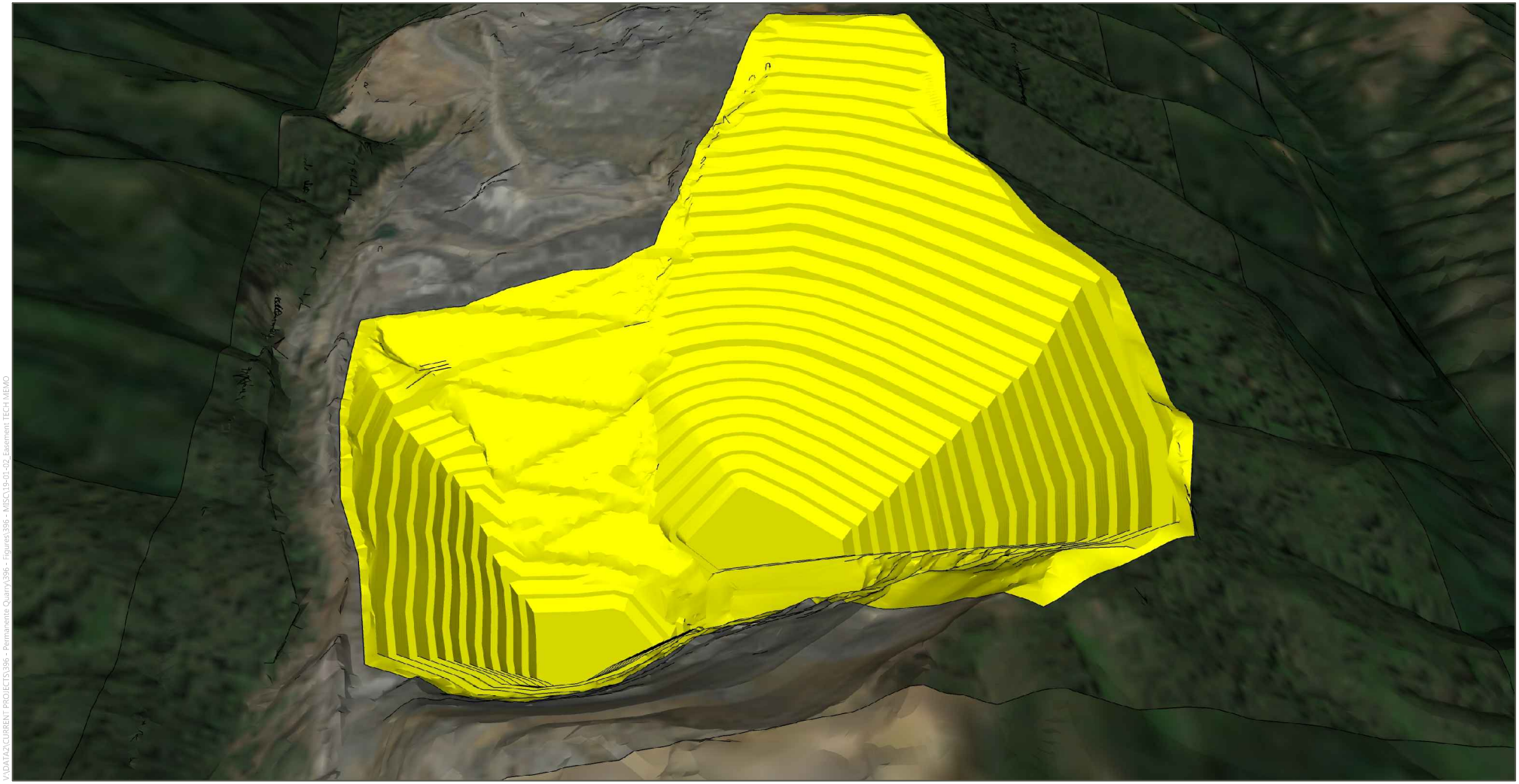
SOURCES: AERIAL: Google Earth (8-9-20109); TOPOGRAPHY: Lehigh Southwest Cement Company, generated in 2018; compiled by Benchmark Resources in 2019 Benchmark Resources in 2019



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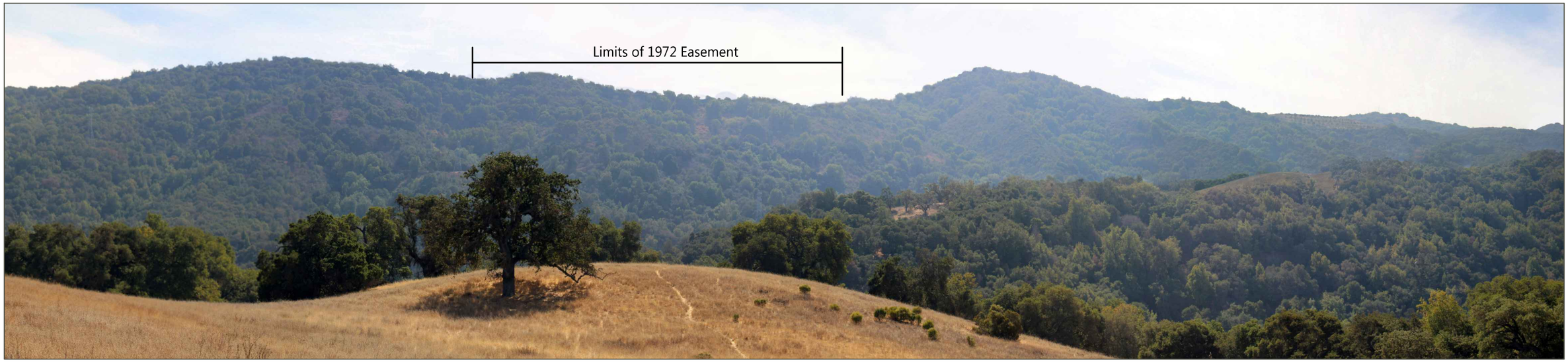
Digital terrain model of north highwall engineering.

Digital Terrain Model Analysis—Oblique
PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 11

BENCHMARK RESOURCES



View of Existing Ridgeline from Mora Drive and Mora Trail in Los Altos Hills (photograph taken September 2018).



Project simulation and modified ridgeline.

Existing and Simulated Permanente Ridge at Mora Trail
PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 12

BENCHMARK RESOURCES



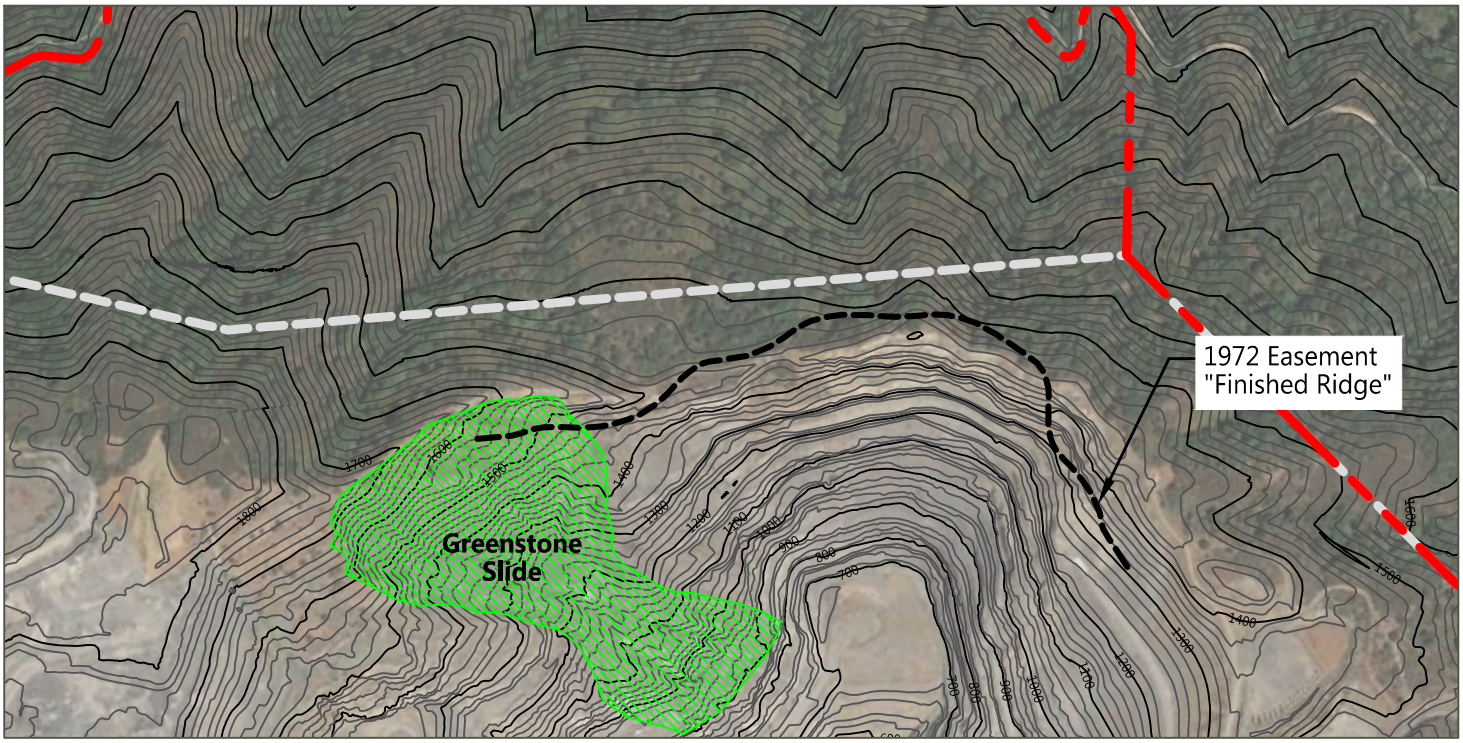
View of existing ridgeline from La Rena Lane (photograph taken September 2018).



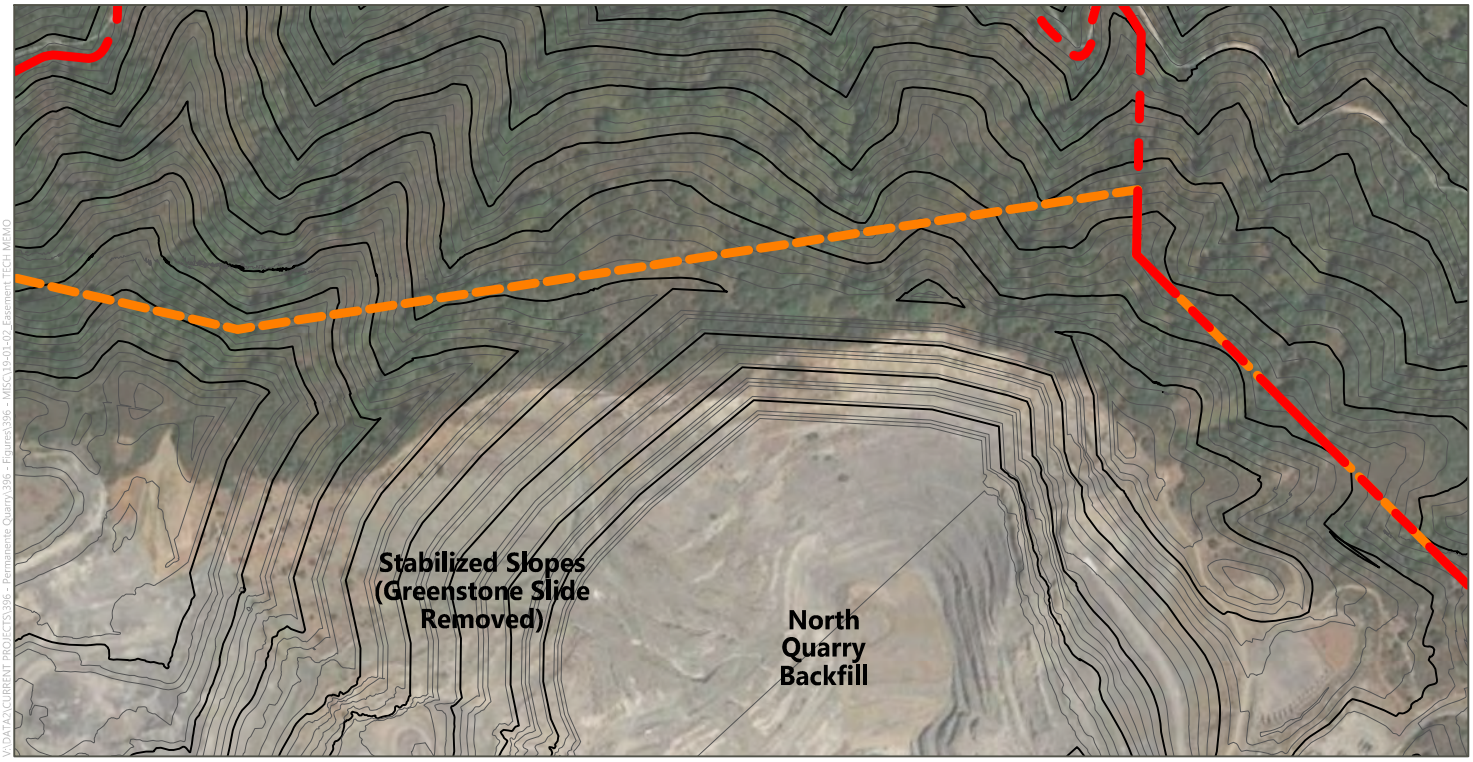
Project simulation and modified ridgeline.

Existing and Simulated Permanente Ridge at La Rena Lane
PERMANENTE QUARRY RIDGELINE PROECTION EASMENT
TECHNICAL MEMORANDUM
Figure 13

BENCHMARK RESOURCES



Existing conditions.



Amended Reclamation Plan Grading.

Property Boundary

Reclamation Boundary

Amended Reclamation Boundary

1972 Easement "Finshed Ridge"

Approximate Greenstone Slide Area

SOURCES: AERIAL: Google Earth (2018-08-01); SITE BOUNDARY/RECLAMATION BOUNDARIES/RESERVES/HAUL ROUTE AREAS/VESTED RIGHTS AREAS: Lehigh Southwest Cement Company, generated in 2018; PARCELS: County of Santa Clara Assessor's Parcel data download, accessed in 2018/ParcelQuest maps, accessed in January 2019/parcels compiled and modified to fit site boundary by Benchmark Resources in 2019; compiled by Benchmark Resources in 2019

BENCHMARK RESOURCES

N

0 1,000 2,000 4,000 Feet

North Highwall and Reclamation Grading

PERMANENTE QUARRY RIDGELINE PROTECTION EASEMENT
TECHNICAL MEMORANDUM
Figure 14

Suitable Surplus Soil Availability Study for Permanente Quarry

SUITABLE SURPLUS SOIL AVAILABILITY STUDY

FOR

PERMANENTE QUARRY

April 2019

Prepared by: Pinnacle Consulting

Prepared for: Lehigh Southwest Cement Company

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APPENDICES

Appendix 1 Pinnacle Consulting Qualifications Summary
Appendix 2 Summary of Sites that have Recently Received Surplus Construction Soil from the Focus Area

1 INTRODUCTION AND SUMMARY

Lehigh Southwest Cement Company ("Lehigh") operates the Permanente Quarry in Santa Clara County, California, as shown on Figure 1, "Permanente Quarry Regional Location." The existing approved reclamation plan for the quarry includes backfilling the quarry using onsite materials. Lehigh proposes to amend the existing reclamation plan to provide for backfill of the quarry using a combination of onsite material and surplus soil available from regional construction projects. Lehigh's reclamation plan and soil acceptance criteria as discussed in this report is based on input provided by Lehigh representatives during preparation of this assessment.

As discussed in more detail in Section 2 of this report, not all surplus construction soil ("SCS") would be suitable for use as Permanente Quarry backfill soil. Lehigh will establish strict acceptance criteria for imported soil to ensure that the imported soil is consistent with water quality and other site objectives, and only suitable surplus soil ("SSS") that meets the acceptance criteria will be used for Permanente Quarry reclamation. Site-specific acceptance criteria for Permanente Quarry will be employed in coordination with regulatory agencies, including the San Francisco Bay Regional Water Quality Control Board (RWQCB). This study was conducted to verify that sufficient quantities of SSS will be available to meet the objectives of the proposed reclamation plan amendment.

This report presents recent trends, industry input, and quantitative data from construction activities within the Permanente Quarry region – in particular, this study's focus area consisting of Santa Clara, San Mateo, San Francisco, and Alameda counties. Through various sources, actual and estimated quantities of recent and future SCS, and the portion of SCS composed of SSS, were assessed. Existing regional SSS reuse and disposal sites and the capacity of such sites to continue to receive SSS in the future was also evaluated.

This assessment concludes that approximately 4 million cubic yards per year of SCS has been generated from within the four focus area counties in recent years, and that 2 million cubic yards or more of that SCS has been SSS that would be suitable for use in Permanente Quarry reclamation. The assessment projects that recent annual SCS and SSS generation rates will continue as growth and development continues in the focus area counties. The assessment finds that there is limited and decreasing capacity to receive SSS at reuse sites in the focus area and that use of SSS for Permanente Quarry reclamation would provide a much needed SSS reuse option within the region. Given these factors, this study estimates that as much as 1 million or more cubic yards of SSS could be available and received at Permanente Quarry each year, and would reduce vehicle miles traveled (VMT) for hauling that material to about 33 percent of the VMT that would otherwise be required for transport of material to receiving sites outside of the focus area counties if Permanente Quarry is not available as a reuse site.

In summary, the information assembled in this report concludes that construction within the region will continue to generate substantial quantities of SCS and SSS in relative proximity to the Permanente Quarry and in sufficient quantities to provide for the proposed Permanente Quarry reclamation, and that the use of SSS for Permanente Quarry reclamation would help to meet a predicted deficit in the areas SSS reuse capacity. This report concludes that:

- development in the focus area will continue to generate about 2 million or more cubic yards of SSS requiring reuse or disposal each year;
- capacity at existing SSS reuse sites in the focus area is diminishing and there is a need for additional regional SSS reuse sites or an increased amount of surplus construction soil will need to be transported farther distances;
- construction within the focus area will generate sufficient annual amounts of SSS for the proposed Permanente Quarry reclamation;

- Permanente Quarry is centrally located within the south San Francisco Bay Area and use of SSS for reclamation will provide an important SSS reuse option for SSS generated within the focus area, especially in consideration of the diminishing capacity of existing reuse sites; and
- use of SSS for reclamation of the Permanente Quarry will substantially reduce vehicle miles traveled ("VMT"), and associated air pollutant and greenhouse gas emissions, associated with SSS transport as compared to conditions that would exist without the use of SSS for Permanente Quarry reclamation.

Section 2 of this report provides an overview of the proposed Permanente Quarry reclamation concept and discusses Lehigh's process for ensuring that SSS received at the site is suitable for the proposed use. Section 3 defines the focus area for this assessment. Section 4 discusses factors associated with the generation of SCS and SSS, and provides estimates of future SSS availability in the region. Section 5 discusses existing reuse sites in the focus area and discusses their existing and future SSS receiving capacity. Section 6 draws on information presented in Sections 4 and 5, and projects the availability of SSS for use in the proposed reclamation of the Permanente Quarry. Section 7 then provides estimates of SSS haul distances and vehicle miles traveled under future conditions both with and without the use of SSS for reclamation at Permanente Quarry. Section 8 provides a summary of the conclusions of this study.

This study was conducted by Mr. Greg Odenthal, of Pinnacle Consulting. Mr. Odenthal is an expert with over 35 years of experience in the construction materials industry. A summary of Pinnacle Consulting and Mr. Odenthal's qualifications is included as Appendix 1, "Pinnacle Consulting Qualifications Summary," of this report.

2 PROPOSED PERMANENTE QUARRY RECLAMATION AND USE OF SSS

The section summarizes the proposed amendment to the Permanente Quarry reclamation plan and discusses the process for developing acceptance criteria for the receipt of SSS at the site.

2.1 Proposed Use of SSS for Reclamation

Permanente Quarry is a limestone and aggregate mining operation located in Santa Clara County, west of the city of Cupertino, as shown on Figure 1. The site is subject to a reclamation plan prepared pursuant to the California Surface Mining and Reclamation Act ("SMARA") and Santa Clara County surface mining ordinance (County Code § 4.10.370). The existing reclamation plan provides for backfilling the quarry using overburden material from within the site.

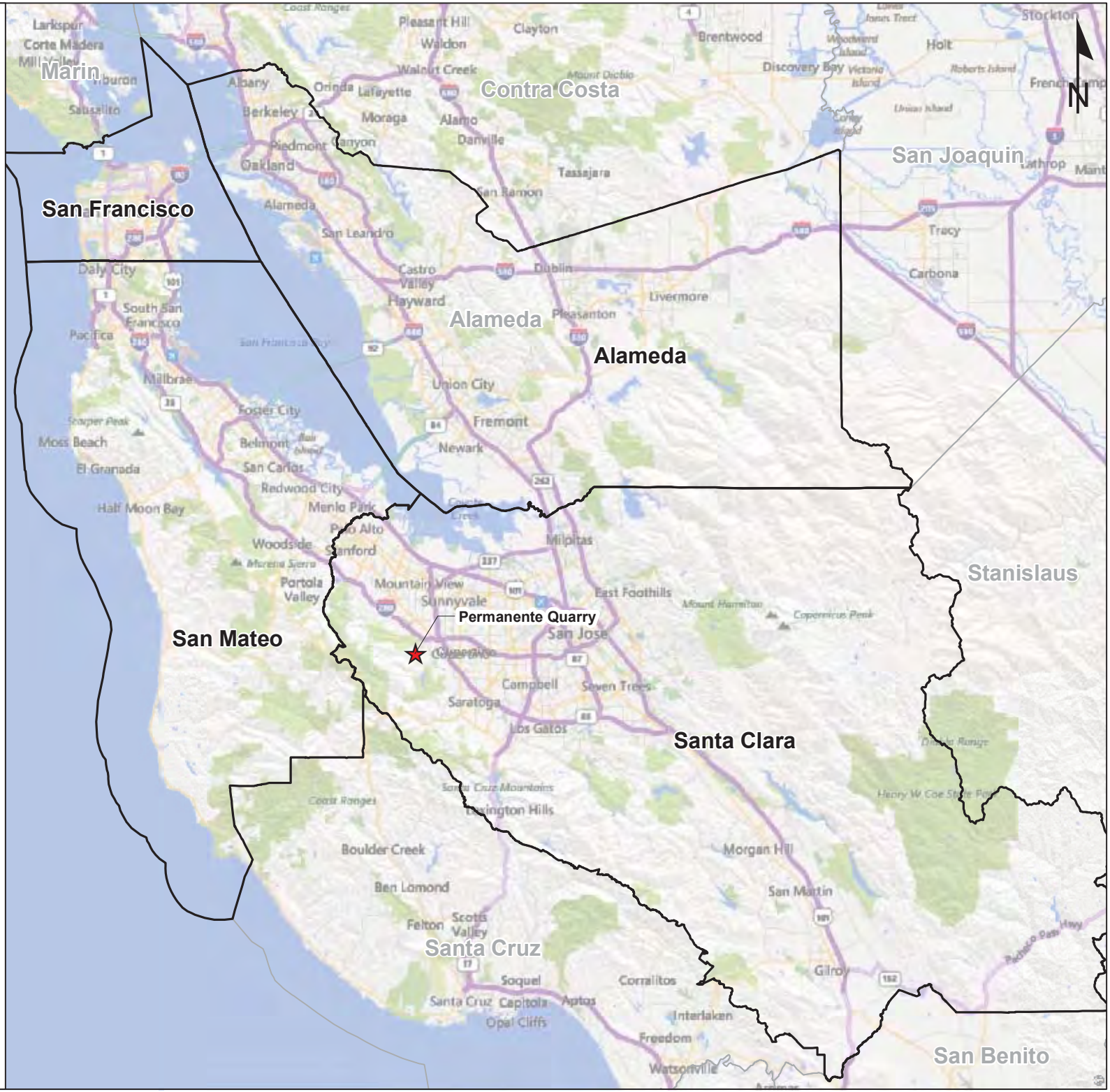
Lehigh proposes to amend the reclamation plan to provide for the use of imported SSS for backfilling the quarry, in combination with the use of onsite overburden material. Under the proposed reclamation plan amendment, Lehigh anticipates that approximately one million cubic yards or more of SSS would be imported to the site on an annual basis for a period of up to approximately 30 years.

2.2 Characteristics of SCS and SSS Acceptance Criteria

As used in this report "surplus construction soil" ("SCS") is that portion of soil generated at a construction site during demolition, excavation, or grading that is not retained and reused at that site. Depending on conditions at the construction site, SCS generated at a construction site can contain hazardous substances or other characteristics that require disposal at facilities permitted to receive such materials (i.e., landfills).

Figure 1

Permanente Quarry Regional Location



Legend

- Permenente Quarry
- Focus Area Counties
- Other Counties

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However, much of the SCS generated at construction sites does not require disposal in a landfill and may be suitable for reuse as fill material for development projects, public works projects, and land improvement projects, including reclamation.

Various regulations and site-specific criteria for accepting SCS ("acceptance criteria") at receiving sites influence the ability to reuse SCS. Permitted reuse sites typically have site-specific acceptance criteria that specify parameters that SCS must meet in order to be received at the site. (SCS that does not meet the acceptance criteria of available reuse sites, must be disposed of in a landfill permitted to receive such material.) As used in this report, suitable surplus soils ("SSS") is that portion of SCS that would generally be expected to meet acceptance criteria for a typical reuse site, including development projects and reclamation, such as that proposed at Permanente Quarry.

Site-specific acceptance criteria for Permanente Quarry must meet the requirements of regulatory agencies. Acceptance criteria will be based on the following guidelines:

1. California Environmental Protection Agency ("CalEPA") Department of Toxic Substances Control ("DTSC") *Information Advisory on Clean Imported Fill Material* guidance document (DTSC, 2001);
2. Constituents of Concern ("COCs") limits established via the San Francisco Bay RWQCB Environmental Screening Levels ("ESLs") and California Human Health Screening Levels ("CHHSLs") (this criteria will establish whether the material is considered a "designated waste" under the California Water Code, in which case it would not meet Permanente Quarry's acceptance criteria);
3. State and Federal hazardous and non-hazardous waste criteria;
4. Background concentration data using DTSC, EPA Commercial Regional Screening Levels ("RSLs"), and Federal Resource Conservation and Recovery Act ("RCRA") guidelines.

Lehigh proposes that acceptance of soil will be determined for each individual source location (e.g., construction project) and that all soil imported to Permanente Quarry will be subject to testing and quality controls to ensure that it meets Permanente Quarry's site-specific acceptance criteria. Lehigh will establish pre-approval procedures that may include soil sampling and testing at the source locations, pre-load inspections, sampling and testing methods, and other procedures to ensure that material is not delivered to Permanente Quarry without first determining that it meets Permanente Quarry's acceptance criteria.

3 STUDY AREA AND FOCUS AREA

Permanente Quarry is located in the southwestern portion of the San Francisco Bay Area. In the San Francisco Bay Area, SCS is typically moved by truck from construction sites to reuse/disposal sites. Transportation cost and efficiency are important factors in SCS reuse/disposal decisions. Construction and hauling companies typically seek to minimize transportation costs and optimize efficiencies by selecting reuse/disposal locations that minimize cost, travel time and travel distance.

As discussed in detail in Section 4, it is anticipated that sufficient supplies of SSS for Permanente Quarry reclamation will be available from construction activities within the San Francisco Bay Area. Given the cost of transportation and contractor efforts to minimize the distance that SCS is hauled, this study focuses on the availability of SCS from the four counties summarized in Table 1, "Focus Area Counties," and shown in Figure 1.

Table 1. Focus Area Counties

County	2018 Population[1]	*Land* Area (acres)	General Information
Alameda	1,670,149	472,960	14 incorporated cities including Oakland, Freemont, Hayward, and Berkeley. Majority of urban density is in the western portion of the county, ranging from 10 to 40 miles from Permanente.
San Francisco	882,565	29,952	County and city with substantial urban density throughout, ranging from 32 to 38 miles of Permanente Quarry.
San Mateo	779,900	286,720	20 incorporated cities including San Mateo, Daly City, Redwood City, South San Francisco, Menlo Park, and East Palo Alto. Majority of urban density is in the northeastern portion of the county, ranging from 8 to 30 miles from Permanente Quarry.
Santa Clara	1,965,597	825,600	County in which Permanente Quarry is located. 15 incorporated cities including San Jose, Cupertino, Sunnyvale, Santa Clara, Mountain View, and Palo Alto. Majority of urban density is in the northwestern portion of the county, ranging from 0.5 to 14 miles from Permanente Quarry.

Notes:
1. Based on California County Forecast 2017-2050 (Prepared for Caltrans by California Economic Forecast)

Notwithstanding this study's focus on the four-county "focus area", this study recognizes that some of the SCS generated within the four focus area counties is or could be exported for reuse or disposal in other nearby counties (e.g., Marin, Contra Costa, Napa, Solano, San Joaquin, and San Benito) and that imports of SCS to the four focus area counties from these other nearby counties can occur. Potential SCS movement to and from the focus area is discussed further in Section 4.

4 ESTIMATED SSS GENERATED IN THE FOCUS AREA

This section discusses the estimated quantities of SCS and SSS anticipated to be generated in the focus area on an annual basis. SCS is generated from ground excavation and grading for construction of various types of development projects, including the examples listed below:

- transitioning industrial, commercial or residential properties to mix-use residential and commercial including mid-rise to high-rise buildings with subterranean parking and foundation excavation (e.g., Sales Force Towers, San Francisco; Moffett Towers, San Jose; Apple Campus, Cupertino; and Almaden Terrace, San Jose);
- public works projects requiring excavation for roadway widening or tunneling (e.g., Wolfe Road & Interstate 280 off-ramp; planned Bay Area Regional Transit [BART] extension in San Jose);
- recreational venues including sports complexes and arenas (e.g., Chase Center, San Francisco);
- new development requiring grading and/or removal of soils (e.g., Pinewood School, Los Altos; Gomes Park, Fremont; and Canoas Creek, San Jose); and
- new commercial or residential construction generating surplus soil due to excavation for roads, infrastructure, building foundations and basements, subterranean parking, and structural foundations (e.g., Gilead Sciences, Foster City; Stewart Village Apartments, San Jose).

Developers evaluate soil conditions and design requirements to minimize the need to move soil from the construction site to other locations; however, achieving onsite reuse of excavated soil at a particular construction site is often not possible. (For example, the Apple Campus in Cupertino was designed to utilize excavated soil for onsite landscape enhancement. Though a significant amount of soil was reused on site, over 150,000 cubic yards of SCS needed to be removed from property.) Because SCS is generated during construction activities, the quantity of available SCS fluctuates over time as the level of development within a region fluctuates due to the rate of economic growth and other factors.

To predict future SSS availability, this study considers the amount of SCS generated in the focus area in recent years and the portion of that SCS that would meet a typical reuse site's acceptance criteria and therefore considered to be SSS. The study also considers information from an existing reuse site operation and input received from construction contractors and hauling companies regarding recent and estimated future SCS generation.

4.1 Methods and Data Sources

A centralize database for information and records of SCS and SSS generation, transport, and receipt within the focus area does not exist. Accordingly, in analyzing availability, Pinnacle Consulting obtained and used information from a variety of sources to develop a comprehensive understanding of soil movement within the focus area.

Information for this study was collected from a variety of sources including public records, discussions with industry personnel, and review of confidential data provided by industry contacts. Appendix 2, "Summary of Sites that have Recently Received Surplus Construction Soil from the Focus Area," provides a matrix summarizing the location, type of site, and the estimated receiving capacity at each of the receiving sites considered in this assessment. Appendix 2 also provides the source of the information for each receiving facility. In some instances it is necessary to retain confidentiality of information received during interviews and data collection, and the specific sources of data are therefore omitted. In general, information used for estimates of material quantities and receiving sites was obtained from the following:

- interviews (see additional discussion of interviews below);
- receiving site information obtained through construction company management;
- publically available receiving site acceptance reports and other information;
- review of construction projects and export soil reports and other data;
- personal observations of material handling and management at receiving sites; and
- review of historical and current aerial photography of receiving sites.

Information provided by key market participants was especially useful in defining recent and predicted trends in the Bay Area surplus soil market. Key market participants providing information for this study included, but were not limited to, representatives from Goodfellow Brothers, Pacific States Environmental Contractors, and JJ Albanese. Each provided input regarding their company's operations as well as insights of the overall Bay Area surplus soils market.

Between July 2018 and January 2019 Pinnacle Consulting conducted approximately 50 interviews to obtain information for this assessment. The purpose of these interviews was to explore and understand the generation and movement of SCS and SSS within the region and the relative need for future SSS receiving locations. Interviews were conducted with:

- waste management companies;
- construction demolition recycling contractors;
- state and local regulatory agencies;
- soil recycling and processing companies;
- regional quarry operators who have received or could receive SSS;
- general engineering contractors;
- fill site operators;
- large developers of corporate campuses, data centers, educational facilities, sports stadiums, high- and mid-rise buildings, hotels, and parking structures;
- dirt hauling companies;
- marine barge companies; and
- golf course management.

General issues discussed during interviews included:

- Quantity of soil surplus per year (from construction sites)
- Fluctuations in surplus soil generated/received from year to year and reasons for the fluctuations;
- Highest year volume of surplus soil generated/received;
- Economical capacity to accept surplus soil at receiving sites;
- Past, current, and future capacity to receive surplus soil at receiving sites;
- Options for future reuse (or disposal) of surplus soil;
- Quantity of surplus soil generated and moved each year; and
- Types of surplus soil generated and moved.

Pinnacle Consulting used information obtained from these various sources to estimate quantities of SCS received at various receiving site locations in recent years.

Literature review determined that few studies are available that quantify existing and predicted SCS generated from construction activities, and no such studies were identified that provide comprehensive estimates for the San Francisco Bay Area. While many of the recent SCS source locations (e.g., construction sites) and some receiving sites have undergone environmental review, a review of environmental impact reports ("EIRs") (a document that describes and evaluates the environmental effects of a project) concludes that the environmental review of those projects has typically not provided detail regarding the generation and use of SCS. It is also known that records are not required or produced for all of the SCS generated at construction sites and placed at receiving sites. Therefore, in some instances extrapolation and estimates are necessary to account for volumes.

Given the lack of comprehensive regional information, this study assembles data from various sources and estimates the annual volumes of SCS and SSS generated within the focus area based on the most recent trends. A primary component of the assessment of SSS availability is consideration of recently generated SCS and SSS within the focus area and use of that data as a predictor of future SCS and SSS generation and availability. Recently generated volumes of SCS and SSS were estimated based on actual and estimated amounts of SCS and SSS received at sites both within and outside of the focus area (as listed in Appendix 2 and discussed further in Section 4.2, below.) Quantities of SCS and SSS received, annual receiving capacities and remaining capacities discussed in this report are estimated using expert professional judgement in consideration of information obtained from the various data sources listed. This study

concludes that these recent volumes of SCS and SSS can be reasonably anticipated to continue through the foreseeable future due to ongoing development and industry behavior.

Validation of these estimates of recent SCS and SSS generation and the anticipated continuation of SCS and SSS generation was provided through discussions with construction and development company representatives, landfill representatives, and receiving site representatives; review of site-specific data from a large focus area receiving site (Dumbarton Quarry); and other available information as discussed in Section 4.3.

4.2 Focus Area-Generated SCS Estimates

This section discusses estimated quantities of SCS generated within the focus area in recent years. Section 4.2.1 presents information regarding recent SCS and SSS generated within the focus area as received at reuse and disposal sites located within and outside of the focus area. As discussed in Section 4.2.1, in both 2017 and 2018 over 4 million cubic yards of SCS was generated within the four focus area counties, and of that amount an estimated 2.3 million cubic yards was SSS. Section 4.2.2 then provides supplemental information regarding focus area SCS generation, discussing the quantity of fill material received at the Dumbarton Quarry (in Alameda County) in recent years; input from construction company representatives; and data regarding estimated SCS to be generated from near-term construction projects in the focus area.

4.2.1 Study Area SCS and SSS Received at Reuse and Disposal Sites

Information obtained for this study includes estimates of the amount of focus area-generated SCS received at various reuse and disposal locations located both within and outside of the focus area. The following sections discuss estimated quantities of SCS received from the focus area in 2017 and 2018 and the portion of that SCS considered to be SSS that would meet typical reuse site acceptance criteria.

Estimated Amount of SCS Received from Focus Area Sources

Table 2, "Estimated Volume of SCS Received from Focus Area Sources," provides a listing of receiving sites located both within and outside the focus area that are known to have accepted SCS generated within the focus area in 2017 and 2018, and lists the estimated amount of material received at each site. (Appendix 2 provides a matrix summarizing each of the receiving sites considered in this assessment, including the location, type of site, and the estimated total and annual receiving volumes.) Figure 2, "SCS Receiving Site Locations," shows the locations of each site. As shown in Table 2, an estimated 4 million cubic yards of SCS was generated within the focus area counties and received by reuse or disposal sites in both 2017 and 2018.

Table 2. Estimated Volumes of SCS Received from Focus Area Sources

Site Name	SCS or SSS Accepted	Estimated Quantity Received from Focus Area *(cubic yards)*	
		2017	*2018*
ALAMEDA COUNTY REUSE AND DISPOSAL SITES			
Altamont Landfill	SCS	360,000	360,000
Vasco Road Landfill	SCS	185,000	185,000
Corica Golf / TBI	SSS	150,000	150,000
Dumbarton Quarry	SSS	660,000	660,000

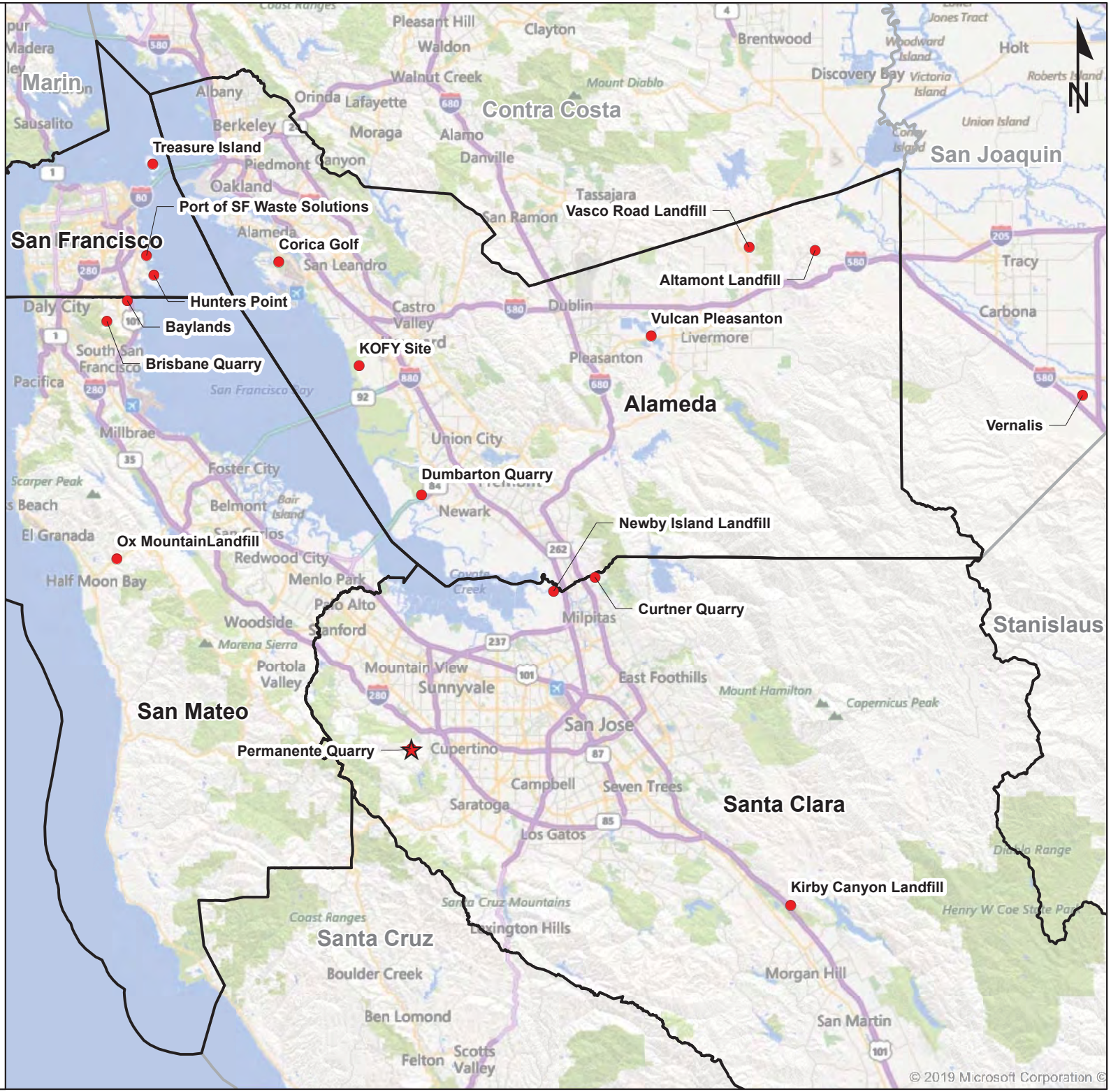
Site Name	SCS or SSS Accepted	Estimated Quantity Received from Focus Area *(cubic yards)*	
		2017	***2018***
Vulcan Pleasanton Quarry	SSS	50,000	50,000
KOFY Radio Site / All Cities	SSS	50,000	50,000
Alameda County Subtotal		1,455,000	1,455,000
SAN FRANCISCO COUNTY REUSE AND DISPOSAL SITES			
Port of San Francisco Waste Solutions	SCS	250,000	250,000
Treasure Island / Yerba Buena	SSS	50,000	75,000
Hunter's Point	SSS	50,000	100,000
San Francisco County Subtotal		350,000	425,000
SAN MATEO COUNTY REUSE AND DISPOSAL SITES			
Bayland's	SSS	200,000	20,000
EBI / Brisbane Quarry	SSS	150,000	100,000
Ox Mountain Landfill	SCS	220,000	220,000
San Mateo County Subtotal		570,000	340,000
SANTA CLARA COUNTY REUSE AND DISPOSAL SITES			
Kirby Canyon Landfill	SCS	85,000	90,000
Newby Island Landfill	SCS	340,000	350,000
Curtner Quarry	SSS	100,000	250,000
Santa Clara County Subtotal		525,000	690,000
OTHERS WITHIN FOCUS AREA			
Construction Reuse	SSS	300,000	300,000
Unregulated Soil Placement	SSS	300,000	300,000
Others within Focus Area Subtotal		600,000	600,000
OUTSIDE OF FOCUS AREA REUSE AND DISPOSAL SITES			
Kettleman Hills Landfill	SCS	150,000	150,000
Buttonwillow Landfill	SCS	50,000	50,000
Vernalis, Teichert Quarry	SSS	30,000	30,000
San Benito County (various locations)	50% SCS / 50% SSS	25,000	25,000
Marin County (various locations)	50% SCS / 50% SSS	25,000	25,000
Solano County (various locations)	50% SCS / 50% SSS	100,000	100,000
Contra Costa County (various locations)	50% SCS / 50% SSS	120,000	120,000
Exported Outside of Focus Area Subtotal		500,000	450,000
	Total	**4,000,000**	**4,000,000**

Source: See Appendix 2 for site information.

Table 2, above, lists whether SCS or only SSS was received at each site based on the type of receiving site. With the exception of "Construction Reuse," "Unregulated Soils Placement," and the various out-of-focus area counties listed in Table 2 (each explained in more detail in Appendix 2), sites for which SSS is listed as the material received are reuse sites that have site-specific acceptance criteria and are not permitted to accept SCS that contains hazardous or other restricted substances. Sites for which SCS is listed as the material received are disposal sites that are permitted to receive material that may contain hazardous or other substances and may not meet acceptance criteria of reuse sites. It is likely that some – possibly a substantial portion – of the SCS received at these sites would meet typical reuse site acceptance criteria. However, this study excludes all of the SCS received at those sites from predictions of future SSS availability, resulting in a conservative estimate (i.e., lower than likely actual) of the amount of SSS generated in the focus area during 2017 and 2018.

Figure 2

SCS Receiver Site Locations



- Permenente Quarry
- Receiver Sites
- Focus Area Counties
- Other Counties

Notes:

1. Buttonwillow Clean Harbors and Kettleman Hazardous Waste Class I Landfills are outside of map area, approximately 170 and 200 miles southeast of Permanente Quarry.
2. Unregulated Soil Placement and Construction Reuse receiving locations vary throughout the focus area counties.

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Estimated Amount of SSS Received from Focus Area Sources

Table 3, "Estimated Volumes of SSS Received from Focus Area Sources," lists the subset of receiver locations from Table 2 that are permitted reuse sites for which the receipt of SCS is subject to acceptance criteria. (As discussed in Appendix 1, "Unregulated Soil Placement" is an exception; whereas, by its unregulated status, the receiving location may not have specific acceptance criteria.) As shown in Table 3, over 2.2 million cubic yards, representing approximately 56 percent of the SCS generated within the focus area in both 2017 and 2018, is estimated to have met typical reuse site acceptance criteria and is considered SSS for the purposes of this study.

Table 3. Estimated Volumes of SSS Received from Focus Area Sources

Site Name	Estimated Quantity of SSS Received from Focus Area *(cubic yards)*	
	2017	***2018***
ALAMEDA COUNTY SITES		
Corica Golf / TBI	150,000	150,000
Dumbarton Quarry	660,000	660,000
Vulcan Pleasanton Quarry	50,000	50,000
KOFY Radio Site / All Cities	50,000	50,000
Alameda County Subtotal	910,000	910,000
SAN FRANCISCO COUNTY		
Treasure Island / Yerba Buena	50,000	75,000
Hunter's Point	50,000	100,000
San Francisco County Subtotal	100,000	175,000
SAN MATEO COUNTY SITES		
Bayland's	200,000	20,000
EBI / Brisbane Quarry	150,000	100,000
San Mateo County Subtotal	350,000	120,000
SANTA CLARA COUNTY SITES		
Curtner Quarry	100,000	250,000
Santa Clara County Subtotal	100,000	100,000
OTHERS WITHIN FOCUS AREA		
Construction Reuse	300,000	300,000
Unregulated Soils Placement	300,000	300,000
Others within Focus Area Subtotal	600,000	600,000
OUTSIDE OF FOCUS AREA		
Vernalis, Teichert Quarry	30,000	30,000
San Benito County (various locations)	12,500	12,500
Marin County (various locations)	12,500	12,500
Solano County (various locations)	50,000	50,000
Contra Costa County (various locations)	60,000	60,000
Exported Outside of Focus Area Subtotal	165,000	165,000
TOTAL		
Total SSS	**2,225,000**	**2,220,000**
Total SCS (from Table 2)	**4,000,000**	**4,000,000**
SSS Percent of Total SCS	**56%**	**56%**

Source: See Appendix 2 for individual data source references.

4.2.2 Examples of Recent and Projected Focus Area SCS and SSS

This section provides specific examples of projects and other information regarding SCS and SSS generation within the focus area that both validates the data in Section 4.2.1, above, and is informative in predicting the future availability of SSS. The information presented here includes:

- a focus area example that discusses the quantity of fill material received at the Dumbarton Quarry (Alameda County) in recent years;
- a summary of input from construction company representatives regarding past, present, and anticipated future surplus construction material generation within the focus area; and
- data regarding estimated SCS to be generated from near-term construction projects in the focus area.

In each case, the information presented supports the Section 4.2.1 conclusion that approximately 4 million cubic yards of SCS, including over 2 million cubic yards of SSS, has been generated annually within the focus area in recent years and a similar or greater amount can be reasonably anticipated to be generated in the future.

Focus Area Example: Quantity of SSS Received at Dumbarton Quarry

Dumbarton Quarry is located in the city of Fremont in Alameda County, as shown on Figure 2. Dumbarton Quarry ceased quarrying activities in 2007. In accordance with the Dumbarton Quarry reclamation plan, the site began accepting SSS in compliance with acceptance criteria established by the RWQCB, and is currently being reclaimed through the use of SSS import and placement that will provide for development of a regional park. The discussion of Dumbarton Quarry in this section describes fill material quantities received and counties of origin as an example of volumes and sources of fill material generated within the focus area. SCS received at Dumbarton Quarry and meeting Dumbarton Quarry's acceptance criteria would also be expected to meet the acceptance criteria for other typical reuse sites and is, therefore, considered SSS for the purposes of this study. (Section 5 of this report provides additional discussion of Dumbarton Quarry's reclamation plan and remaining capacity. Importantly, as discussed in Section 5, Dumbarton Quarry has a finite capacity to receive additional SSS. Once Dumbarton Quarry reaches capacity and stops accepting SSS, the annual amount of SSS currently received at Dumbarton Quarry will require alternative reuse sites, such as would be provided by the proposed Permanente Quarry reclamation plan.)

The Dumbarton Quarry operator reports incoming truck load counts along with generating site locations. Reports for the period from October 31, 2014 through June 30, 2018 were reviewed for this assessment and indicate that Dumbarton Quarry has received more than 660,000 cubic yards of SSS each year for the past several years from the focus area counties. (Receipt of 660,000 cubic yards per year at Dumbarton Quarry is conservatively assumed for this assessment. To the extent that actual receipt has been higher, the use of 660,000 cubic yards for this study is conservative in that it under-predicts the amount of SSS that has been historically generated within the focus area.) Table 4, "Percentages of SSS Received at Dumbarton Quarry from Focus Area Counties (2014-2018)," provides the percentages of the annual amount received at Dumbarton Quarry from each focus area county source location during this same period.

Table 4. Percentages of SSS Received at Dumbarton Quarry from Focus Area Counties (2014-2018)

Source County[1]	Portion from Each Focus Area County
Alameda County	11%
San Francisco County	3%
San Mateo County	28%
Santa Clara County	58%
Total from Focus Area	**100%**

Source: Calculated based on Pacific States Environmental Contractors, Inc., Dumbarton Quarry Quarterly Updates to the San Francisco Bay Regional Water Quality Control Board, 4th Quarter 2014 – 2nd Quarter 2018.

Notes:

1. Dumbarton Quarry received nominal additional fill from locations in other counties (i.e., El Dorado, Sonoma, Monterey, Contra Costa, San Joaquin, and Santa Cruz) during this period, representing approximately 1 percent of the total volume of material received, and are negligible amounts in terms of the focus of this study.

Dumbarton Quarry data is also useful in illustrating the locations and quantity of SSS generated within the focus area. Dumbarton Quarry has received SSS from hundreds of construction sites. Notable examples of recent (July 2017 through June 2018) construction projects in Santa Clara and San Mateo counties near the Permanente Quarry are listed in Table 5, "Representative Construction Projects and SSS to Dumbarton Quarry (July 2017–June 2018)," and shown on Figure 3, "Representative Construction Projects and SSS to Dumbarton Quarry (July 2017-June 2018)." As shown in the table and Figure, 281,310 cubic yards of SSS was generated from these eight projects during the 12-month period represented in the table. During that same period, Dumbarton Quarry also received another 411,420 cubic yards of SSS from other construction projects within the focus area.

Table 5. Representative Construction Projects and SSS to Dumbarton Quarry (July2017-June 2018)

Project Name	Quantity of SSS Received at Dumbarton Quarry[1] *(cubic yards)*
Moffet Towers	111,160
Facebook	87,040
Google	33,530
Stanford Garage	22,090
Windy Hills	16,330
Steward Village	4,520
Pathline Park Office	4,150
Almaden Terrace	2,490
Specific Projects Subtotal	281,310
Other Focus Area Construction Sites	411,420
Total Received During Period	692,730

Notes:

1. Quantities shown are only the amount of SSS received during the period between July 2017 through June 2018, and do not necessarily reflect the total amount of SSS generated by each of the construction projects.

Construction Contractors Input

In preparing this study, management personnel from ten San Francisco Bay Area SCS volume generators, including the top six generators by estimated volume, and three large developers were interviewed. Each contact was asked about their perspective of estimated SCS to be generated on an annual basis from projects within the focus area. Table 6, "Industry-Estimated Annual Volume of SCS to be Generated within the Focus Area," lists the estimated average annual amount of SCS generated by each contractor based on information obtained from the interviews.

As shown in the table, the industry estimates validate the estimated 4 million cubic yards per year of SCS from within the focus area discussed in Section 4.2.1. Interviewees also validated the overall estimates in this report of future SCS and SSS availability, and their responses consistently supported the fact that the South Bay (in particular, San Mateo and Santa Clara counties) are anticipated to continue to be the largest volume generators of SCS in the Bay Area. Their feedback also confirmed the estimate presented in this report that a minimum of two million cubic yards of SSS is anticipated to be generated annually within the focus area.

Table 6. Industry-Estimated Annual Volume of SCS to be Generated within Focus Area

Contractor	Estimated Annual SCS *(cubic yards)*
DeSilva Gates	1,500,000
Goodfellow Bros.	800,000
JJ Albanese	300,000
Graniterock	200,000
Evans Brothers	175,000
Kiewit Construction	150,000
Ghilotti Construction	150,000
Granite Construction	100,000
Silverado Contracting	100,000
Teichert Construction	90,000
McGuire Hester	75,000
Preston Pipelines	50,000
Other Generators[1]	400,000+
Total	**4,090,000+**

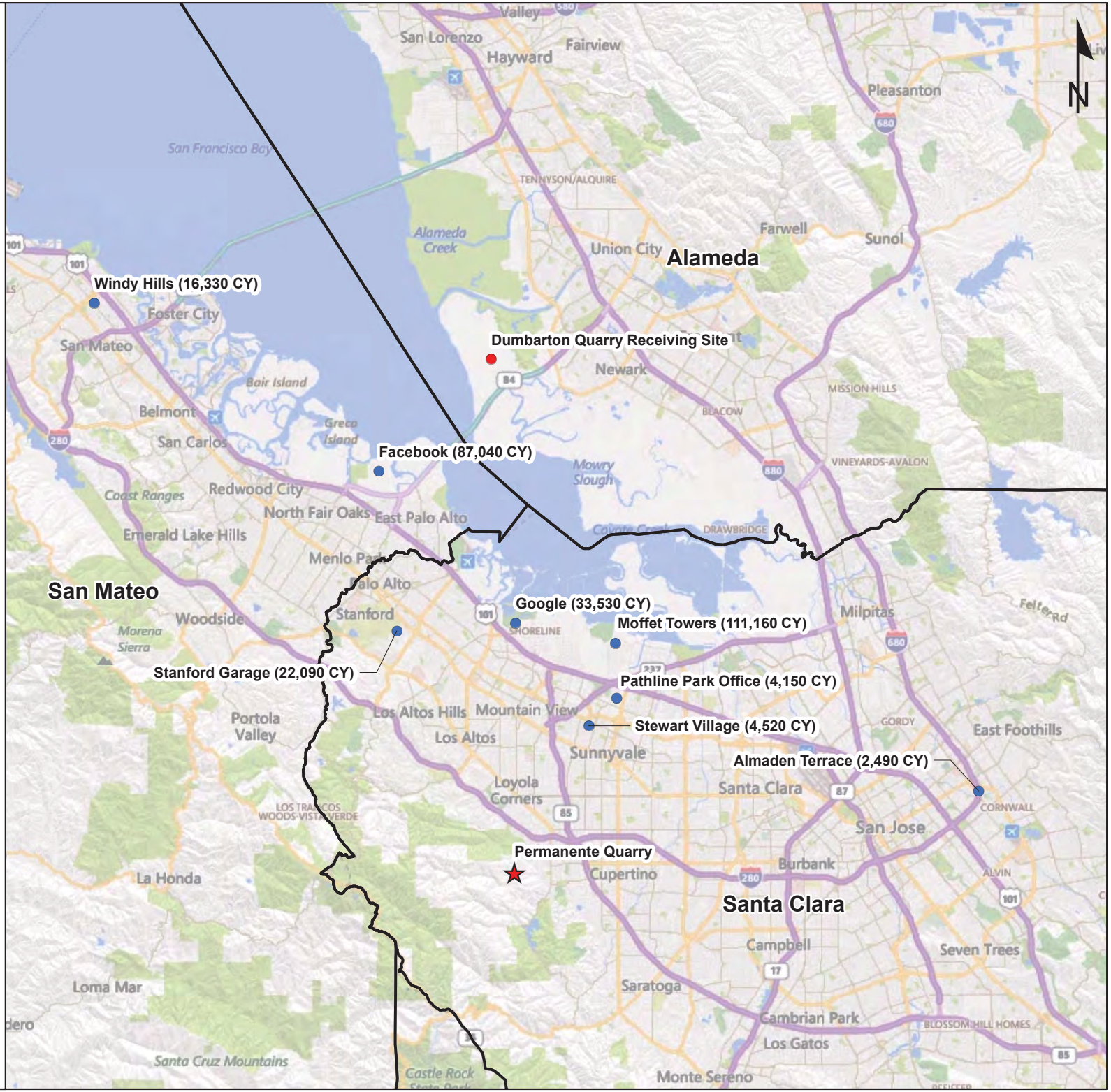
Source: Odenthal personal communications, 2018.
Notes:
1. There are hundreds of other contractors and agencies involved in Bay Area construction projects that generate SCS. The quantity of SCS generated in the focus area is conservatively shown here as approximately 10 percent of the total of the 12 contractors listed.

Estimates of Net SCS Surplus from Representative Future Construction Projects

The data above provides a comprehensive overview of recent SCS generated within the focus area and industry estimates of future SCS generation. Although the specific source locations for the SCS received at the sites listed in Tables 2 and 3 in Section 4.2.1, above, are not catalogued, the overall quantities received provide a clear indication of recent SCS generation and are useful in predicting future availability of SCS and SSS. This section provides additional information representative of the volumes of SCS anticipated to be generated by individual construction projects.

Figure 3

Representative Construction Projects and Surplus Fill to Dumbarton Quarry (July 2017 - June 2018)



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In preparing this study, input was provided from an established and experienced Bay Area construction contractor regarding future estimates and expectations related to excavation and reuse/disposal of SCS for identified (already planned) construction projects in Santa Clara and San Mateo counties. Figure 4, "Representative Future Construction Project Locations," illustrates the locations of these representative projects and identifies the estimated volumes of either "surplus" SCS generated onsite requiring offsite reuse/disposal or the amount of fill material "shortage" that would need to be brought to the site for construction reuse. Table 7, "Estimated SCS Surplus and Shortages for Representative Future Construction Projects in San Mateo and Santa Clara Counties," summarizes the estimated volumes of surplus and shortage of SCS from each of the projects.

As shown in Table 7, these representative projects are estimated to generate over 3.7 million cubic yards of SCS, and a conservative net *surplus* of over 1.5 million cubic yards of SCS. Note that this estimate provides a conservatively low estimate of net surplus for these representative projects by assuming that the shortages for projects 3 and 5 would be met by using surplus material generated by the other projects. Such concurrent reuse requires coincidental and coordinated timing. If such concurrent reuse does not occur, the net amount of surplus SCS will increase.

Table 7. Estimated SCS Surplus and Shortages for Representative Future Construction Projects in San Mateo and Santa Clara Counties

Project[1]	Estimated Project Volumes of SCS *(cubic yards)*	
	Surplus	***Shortage***
1	2,400,000	
2	70,000	
3		200,000
4	1,000,000	
5		2,000,000
6	200,000	
7	50,000	
Total	**3,720,000**	**2,200,000**
Net Surplus	1,520,000	

Source: Odenthal personal communication, 2018.
Notes:
1. Project locations are shown on Figure 4. Project names are omitted to maintain confidentiality.

4.3 Estimated Future SCS and SSS Generation within the Focus Area

As discussed in Section 4.2, SCS generated within the focus area in recent years has been about 4 million cubic yards per year and of that over 50 percent and over 2 million cubic yards was SSS. Predicting the specific amounts of SCS and SSS that will be generated in the future would require forecasting with full knowledge of future land use decisions and future development projects proposals, approvals, and construction details, which is not possible. Although short-term outlooks can be estimated based on known upcoming projects, longer-term estimates must rely on reasonable assumptions. The following sections consider the relationship between SCS generation and population (Section 4.3.1) and factors associated with future growth and development that will continue to result in SCS and SSS from future construction activities (Section 4.3.2). In summary, the information presented in the following sections support a conclusion that quantities of SCS and SSS generated in the focus area in recent years can be reasonably anticipated to continue in similar or potentially greater amounts in future years.

4.3.1 Per Capita SCS Generation and Population Growth

Research was conducted for this study to determine potential correlations between generation of SCS and economic, population, and other factors in order to forecast future SCS generation. Limited data on this topic exists and quantifiable methods are absent. However, one recent study, "*Sustainable Management of Excavated Soil and Rock in Urban Areas – A Literature Review*" (Magnusson S, Lundberg K, Svedberg B, Knutsson S, Sustainable management of excavated soil and rock in urban areas – A literature review, *Journal of Cleaner Production* (2015), doi: 10.1016/j.jclepro.2015.01.010.) provided a literature review and presented a conceptual model regarding material flow and management practices for excavated soil in urban areas. In observing that excavated soil and rock generated during urban construction projects is part of the *urban metabolism* and investigating a relationship between population and volume of excess construction material, the Magnusson et al. noted that "[a] few quantifications have been made, and they show that landfilling of excavated soil and rock is in the range of 0.4 to 5.5 tons per capita per year." Although this range is broad and reflects the findings of studies done in locations outside the U.S., a comparison to the focus area is illustrative.

Table 8, "Focus Area Population and Estimated Per Capita Annual SCS," provides a comparison of 2018 population forecasts for the four focus area counties. Since Magnusson et al. cited per capita estimates based on tonnage, a conversion of the tons per capita estimate to the cubic yard volumes used in this report is necessary. The volume to weight ratio of SCS will vary, but based on a conversion rate of 1.35 tons per cubic yard, the Magnusson et al. per capita range equates to 0.3 to 4.1 *cubic yards* per capita per year. As shown in Table 8, this comparison results in an estimated annual per capita SCS within focus area counties ranging from 0.54 cubic yards to 0.90 cubic yards per person, and an average of 0.75 cubic yards per person for the focus area. While a direct correlation between population and SCS generation rates is not established, the average focus area estimate of 0.75 cubic yards per capita shown in Table 8 is near the low end of the 0.3 to 4.1 range of per capita SCS generation indicated by Magnusson et al. This suggests that on a per capita basis, the estimated 4 million cubic yards of SCS generated within the focus area is credible and is not likely to overestimate the amount of SCS generated within the area.

Table 8. Focus Area Population and Estimated Per Capita Annual SCS

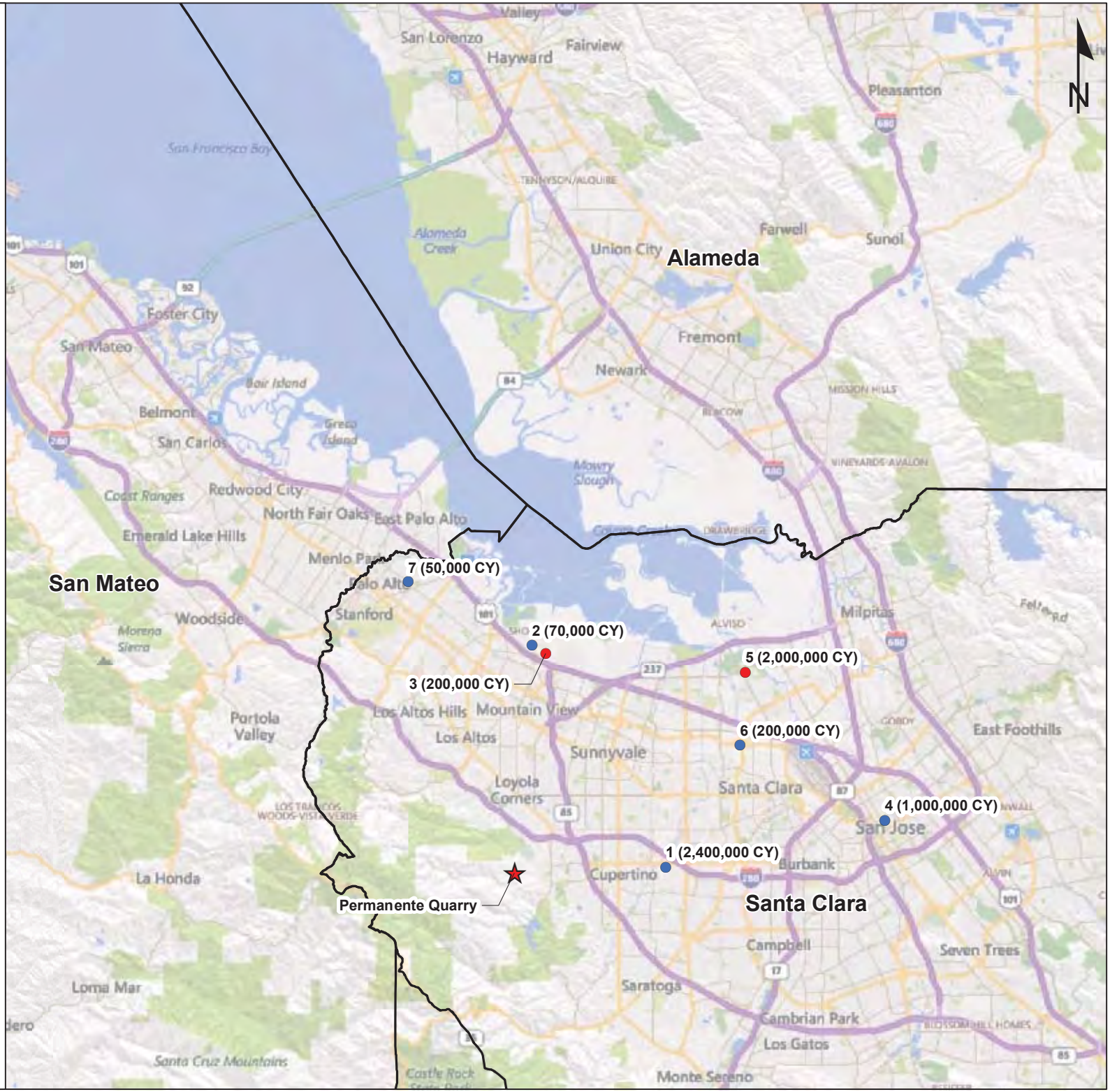
County	2018 Population[1]	Estimated 2018 SCS *(cubic yards)*	Annual SCS per Capita *(cubic yards)*
Alameda	1,670,149	900,000	0.54
San Francisco	882,565	800,000	0.91
San Mateo	779,900	700,000	0.90
Santa Clara	1,965,597	1,600,000	0.81
Focus Area	5,298,211	4,000,000	0.75

Notes:
1. Based on California County Forecast 2017-2050 (Prepared for Caltrans by California Economic Forecast)

Pinnacle Consulting also estimated the volumes of SCS generated in each focus area county for further correlation of the per capita data. The estimate considered volumes of SCS received at the various receiving sites (listed in Table 3, above), and assigned those volumes to individual source counties in consideration of transportation logistics, proximity, and the types of materials known to be accepted at the various receiving sites. The "Estimated 2018 SCS" column in Table 8 lists the volumes by county and the "Annual SCS per Capita" column lists the annual SCS per capita by county based on the estimated 2018 volumes.

Figure 4

Representative Future Construction Project Locations



- Permenente Quarry
- Future Construction Project with SCS Surplus
- Future Construction Project with SCS Shortage
- Focus Area Counties
- Other Counties

Notes:
1. Project names are omitted to maintain confidentiality.

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It is reasonable to expect per capita SCS generation to vary by county since factors that influence the amount of SCS generated also vary by county. For example, the relatively lower per capita generation rate for Alameda County is reasonable, given Alameda County's relatively larger amount of developable land area (as compared to San Francisco and San Mateo counties) and anticipated relatively lower density of development (resulting in less surplus soil generation) at a given construction site. Conversely, the higher per capita rates for the smaller counties (in terms of both population and land area), San Francisco and San Mateo counties, are also considered reasonable given the greater densities of development and likely greater amount of vertical construction generating larger volumes of SCS. Santa Clara County has the largest population and land area among the focus area counties, but also has an anticipated high level of relatively dense (and vertical) construction in more populated areas of the county. Therefore, a per capita SCS generation rate slightly higher than the focus area average is also reasonable for Santa Clara County. Although this data is not intended to represent the specific future volumes of SCS generated or the specific per capita SCS generation rates for these counties with certainty, the data are useful and validate the estimates of total SCS generated within the focus area counties.

Table 9, "Focus Area Population Growth Projections," provide population projections for the focus area counties through the year 2050. Although these growth projections are not relied on in this study to estimate future increases in the availability of SCS, it is informative to note that population growth, which may also suggest economic expansion and increased development and construction, is anticipated to continue within the focus area. To the extent that the amount of construction activity and associated generation of SCS is influenced by increases in population, increases in the amount of SCS generated within the focus area above the estimated 4 million cubic yards per year can be reasonably anticipated.

Table 9. Focus Area Population Growth Projections

County	Population				
	2018	***2020***	***2030***	***2040***	***2050***
Alameda	1,670,149	1,697,903	1,827,823	1,949,566	2,069,317
San Francisco	882,565	891,887	937,307	966,226	993,440
San Mateo	779,900	788,878	837,790	892,484	956,130
Santa Clara	1,965,597	1,996,607	2,115,661	2,213,088	2,307,538
Study Focus Total	5,298,211	5,375,275	5,718,581	6,021,364	6,326,425

Source: California County Forecast 2017-2050 (Prepared for Caltrans by California Economic Forecast)

4.3.2 Growth Outlook and Conclusions Regarding Future SCS Generation

Interviews and other data collection for this study identified consensus amongst market participants that 4 million cubic yards of SCS are anticipated to be generated annually within the San Francisco Bay Area. The area with greatest anticipated volumes of soil generation is in the south San Francisco Bay Area, including much of the focus area, largely due to the need for both residential and office buildings to accommodate the growth of technology and support industries. Limited land availability in these areas requires developers to maximize the use of available area, commonly resulting in vertical construction that requires significant amounts of soil excavation for the construction of foundations and infrastructure and typically offers limited opportunities for onsite reuse of the excavated material.

It can be anticipated that the volume of SCS generated from future construction projects in the focus area will be similar to, if not larger than, recently generated amounts. Economic forecasts and indexes indicate that construction trends will continue within the focus area and construction activities will continue to generate SCS well into the future. For instance, the "Plan

Bay Area 2040" is a report prepared by the Metropolitan Transportation Commission ("MTC") and the Association of Bay Area Governments ("ABAG") that provides the long-range transportation plan and a sustainable communities strategy for the nine-county San Francisco Bay Area. For example, plan data supports growth of employment from 2010 to 2040 and projects increased employment rates over that period of 41 percent in Santa Clara County; 37 percent in San Mateo County; 51 percent in San Francisco County, and 35 percent in Alameda County.

This study, therefore, reasonably concludes that construction activity will be sustained based on demand driven by both growth in employment, population, and property value potential. This, combined with the fact that the historical nature of SCS generation has largely been driven by building designs that maximize land use density, combining subterranean excavation with vertical construction, result in large amounts of SCS. It is therefore reasonable to conclude that an average of at least 4 million cubic yards of SCS, of which 2 million cubic yards or more will be SSS, will be generated within the focus area each year.

5 EXISTING AND POTENTIAL SSS RECEIVING LOCATIONS AND CAPACITIES

As discussed in the preceding sections, it is estimated that approximately 2 million or more cubic yards of SSS will be generated within the focus area each year. This section discusses the capacity for reuse of this material at existing reuse sites within the focus area. (For the purposes of this study, receiving site capacity denotes the volumes of SCS/SSS anticipated to be accepted at a given site.) With the exception of the proposed Permanente Quarry reuse of SSS for reclamation and potential reuse at construction sites (including private and public development and public works projects) within the focus area, no new substantial future capacity to receive SSS at reuse sites within the focus area has been identified. Thus, the data suggest that capacity to reuse SSS within the focus area is diminishing. If additional capacity does not become available, SSS generated within the focus area will need to be transported out of the focus area for reuse or disposal at increasing rates.

Table 10, "Summary of Remaining Capacity of Focus Area SSS Reuse Sites," tabulates the estimated remaining capacities at existing reuse sites in the focus area. The table also lists the estimated annual receiving capacity and years of remaining capacity, assuming recent annual receiving rates at these sites will continue. As used in this report, the term "annual receiving capacity" reflects the maximum amount of material that is expected to be received annually at a given site based on observations of recent site behavior. (Note that existing landfill sites within the focus area also receive SCS, some of which may be SSS that could otherwise be used at a reuse site if available. Although focus area landfills have some additional capacity to receive SSS, that capacity is limited and receipt of SSS at landfill sites can reduce the daily, annual, and/or total capacity of the landfill to receive solid waste.)

As shown in the table, several of the reuse sites within the focus area will reach capacity and will no longer be able to receive SSS within the next few years. Two sites (Bayland's and EBI/Brisbane Quarry) are expected to have recently reached capacity and effectively have no remaining capacity to receive additional SSS. Three sites (Hunter's Point, Corica Golf, and KOFY) are each estimated to have less than 2 years of remaining capacity. Dumbarton Quarry, which receives SSS as fill material for surface mine reclamation purposes, is estimated to have approximately 7 years of remaining capacity based on estimated annual receipt of approximately 660,000 cubic yards of SSS. (An amendment to the Dumbarton Quarry Reclamation Plan was approved by the City of Freemont on December 13, 2018; and estimated remaining capacity presented herein reflects the approved amendment.) Two other focus area reuse sites (Vulcan Pleasanton Quarry and Treasure Island) have larger total capacities and several years of remaining capacity, but each has relatively low annual receiving capacity. Note that remaining capacity is not

applicable to Construction Reuse and Unregulated Soil Placement since these two receiver categories are not site-specific and are anticipated to continue to be available at various locations. For the purposes of this study, construction reuse and unregulated soil placement are each predicted to provide for approximately 300,000 cubic yards of SSS receipt each year.

Table 10. Summary of Remaining Capacity of Focus Area SSS Reuse Sites

Facility	Estimated Annual SSS Receiving Capacity *(cubic yards)*	Estimated Remaining Capacity *(cubic yards)*[1]	Years of Remaining Capacity[1]
EBI / Brisbane Quarry	100,000	0	0
Bayland's	20,000	0	0
Curtner Quarry	250,000	250,000	1
KOFY Radio Site/All Cities	50,000	100,000	1
Corica Golf / TBI	150,000	300,000	2
Hunter's Point	100,000	250,000	3
Dumbarton Quarry	660,000	4,000,000	7
Treasure Island/Yerba Buena	75,000	1,100,000	14
Vulcan Pleasanton Quarry	50,000	4,000,000	80
Unregulated Soil Placement[2]	300,000	NA	NA
Construction Reuse[2]	300,000	NA	NA
Total	**2,055,000**	**10,000,000**	**NA**

Source: See Appendix 2 for individual data source references.
Notes:
1. Data presented is as of 2018.
2. These numbers represent volume not capacity.

Annual volumes of SSS acceptance capacity at reuse sites is an important factor in assessing whether SSS will need to be transported outside of the focus area for reuse or disposal in any given year. Figure 5, "Projected Annual Focus Area SSS Reuse Receiving Capacity without Permanente Quarry Reclamation Reuse," shows projections of the annual receiving capacity of focus area reuse sites through the year 2029. Estimated annual SSS reuse receiving capacity at focus area sites for the year 2019 is approximately 1,935,000 cubic yards. This is 65,000 cubic yards less than the projected focus area SSS generation of approximately 2 million cubic yards, and the net deficit in receiving capacity will likely require disposal of SSS in a focus area landfill and/or SSS to be transported to reuse or disposal sites outside of the focus area.

As discussed above and shown in Figure 5, several focus area SSS reuse sites are predicted to fully deplete remaining capacity within the next few years. An important example of these is Dumbarton Quarry. Dumbarton Quarry receives about 660,000 cubic yards of fill material each year. An amendment to the site's reclamation plan that was approved in December 2018 provides for import of approximately 4 million cubic yards of additional SSS. At an annual receipt of rate of 660,000 cubic yards, Dumbarton Quarry receipt of SSS will be complete in 2025 and will no longer receive imported SSS. (Figure 5 data assume some reduction in the amount received during the final two years for operational purposes.) Thus, even with the recent approval of its reclamation plan amendment, the Dumbarton Quarry site is projected to reach full capacity and will stop receiving SSS in about 7 years. The loss of Dumbarton Quarry as an available SSS reuse site will result in a substantial reduction in the focus area's SSS reuse capacity.

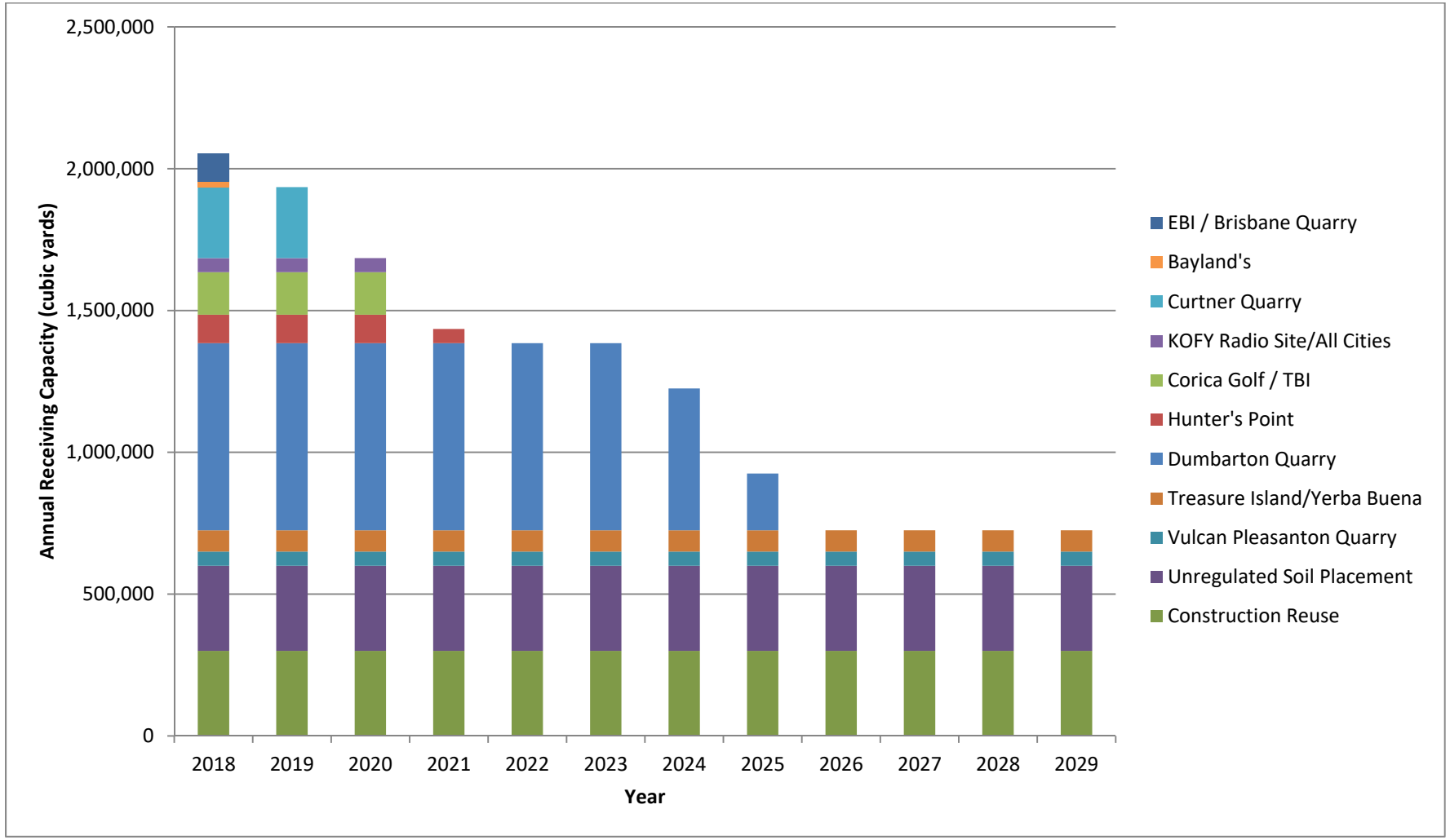
Once the several SSS reuse sites that currently have limited capacity reach capacity and no longer accept SSS, remaining annual SSS reuse capacity within the focus area will be limited to Vulcan's Pleasanton Quarry and Treasure Island (50,000 and 75,000 cubic yards, respectively),

an estimated approximately 300,000 cubic yards of "Unregulated Soil Placement," and an estimated average of approximately 300,000 cubic yards of "Construction Reuse."

"Construction Reuse" soil is defined for this study as SCS moved from one construction site to another construction or other reuse site requiring fill for public or private development or land restoration purposes. Examples of public Construction Reuse sites are Bair Island wetlands restoration and the South Bay Salt Pond Restoration Project (Salt Ponds Project), and are discussed briefly here. Beginning in 2006, the Bair Island wetlands restoration project in Redwood City accepted hundreds of thousands of cubic yards of surplus soil excavated from under the San Francisco Bay associated with Hetch Hetchy water distribution system improvements. The Salt Ponds Project is a multi-agency/organization collaboration to restore wetlands habitat, provide wildlife-oriented public access and recreation, and provide for flood management in the South Bay on 15,100 acres of former industrial salt pond areas. In 2008, a restoration plan was adopted for the Salt Ponds Project, and the first phase of salt ponds restoration was undertaken and construction was completed in 2013. Phase 2 of the Salt Ponds Project is evaluated in a Final Environmental Impact Statement/Report (FEIS/R) ("South Bay Salt Pond Restoration Project Final Environmental Impact Statement/Report, Phase 2" U.S. Fish and Wildlife Service / California State Coastal Conservancy, April 2016) and a Record of Decision (ROD) was executed by the U.S. Fish and Wildlife Service (USFWS) in September 2018 ("South Bay Salt Pond Restoration Project Phase 2 Final Environmental Impact Statement - Don Edwards San Francisco Bay National Wildlife Refuge." U.S. Fish and Wildlife Service, September 27, 2018). Phase 2 anticipates Salt Ponds Project work that would predominantly involve the use of dredge material or onsite reuse of soils in levees and other areas that are within the restoration areas. Based on the ROD description of selected Phase 2 alternatives and modifications (ROD, pp. 3-5) and net import volumes estimated in the FEIS/R, it is anticipated that Phase 2 Salt Ponds Project work could involve the use of up to approximately 500,000 cubic yards of imported fill for the entirety of Phase 2 work. However, the ROD also discusses modifications to the selected alternatives to reduce the amount of imported fill needed (ROD, pg. 5). The actual timing and duration of construction activities and the amount and timing of fill placement for Phase 2 activities and for future phases of the Salt Ponds Project is undetermined. Projects such as these have accepted and will continue periodically to accept surplus soil in varying quantity and from various sources. Although the predominant source of fill for wetlands restoration and other bay perimeter projects is dredge material, a portion of the fill used may be upland surplus construction soil. Although the specific quantities of potential annual use of SSS at such projects cannot be determined with certainty, the potential demand is accounted for in the "Construction Reuse" estimates in this study that SSS at various permitted and regulated development/land restoration sites will continue to be about 300,000 cubic yards per year.

Based on currently available information as presented in the data above, the net annual deficit in focus area SSS reuse capacity is estimated to be approximately 1,275,000 cubic yards by the year 2026.

Figure 5. Projected Annual Focus Area SSS Reuse Receiving Capacity without Permanente Quarry Reclamation Reuse



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6 ESTIMATED IMPORT OF AVAILABLE SSS FOR PERMANENTE QUARRY RECLAMATION

This section discusses the potential for SSS to be available and efficiently transported to Permanente Quarry for use in reclamation. As concluded in Section 5, a net deficit in annual SSS reuse site receiving capacity within the focus area is projected to increase to a deficit of about 1,275,000 cubic yards per year by the year 2026. Since transportation costs are a primary factor in contractor decisions regarding SSS reuse and disposal, the travel distance between the construction site at which SSS is generated and reuse/disposal site options is a primary consideration when selecting a reuse/disposal site.

To estimate the annual amount of SSS generated within each county, Pinnacle Consulting considered the volumes of SSS received at the various receiving sites (listed in Table 3, above), proximity of those sites to the focus area counties, transportation logistics between the sites and the focus area counties, and the availability of other reuse sites within the focus area. Using the individual county SSS volume estimates, we then considered the proximity of the counties from which the SSS would be transported to Permanente Quarry or to other potential receiving sites.

Permanente Quarry's relative proximity to locations where SSS will be generated as compared to the locations of other potential reuse/disposal options is an important consideration in assessing the anticipated availability of SSS for Permanente Quarry reclamation. Permanente Quarry's location in Santa Clara County provides relatively shorter transport distances for SSS hauling as compared to other SSS reuse and disposal sites available for SSS generated within three of four focus area counties – namely, Santa Clara, San Francisco, and San Mateo counties. Therefore, it can be reasonably anticipated that much of the SSS generated within these three counties would be available for reuse at Permanente Quarry. Conversely, SSS generated in Alameda County is less likely to be transported to Permanente Quarry due to the availability of other SSS reuse and disposal options in Alameda County and at Vernalis which is outside of Alameda County but nearer to many areas in the county as compared to Permanente Quarry. (Although some SSS generated in Alameda County would likely be received at Permanente Quarry, this study assumes the amount will be negligible due to the availability of other SSS reuse and disposal options in Alameda County and in western San Joaquin County.)

Table 11, "Estimated Permanente Quarry Receipt of Focus Area SSS," provides the estimated quantities of SSS to be generated from within each of the focus area counties and the percent and quantity of SSS projected to be received by Permanente Quarry for reclamation. As shown in the table, it is anticipated that Permanente Quarry will be positioned to receive approximately 1 million cubic yards of the approximately 2 million cubic yards of SSS anticipated to be generated within the focus area each year.

Table 11. Estimated Permanente Quarry Receipt of Focus Area SSS

County	Annual SSS Generated in Each Focus Area County *(cubic yards)*	Estimated Permanente Annual Receipt of SSS *(cubic yards)*
Alameda	620,000	0[1]
San Francisco	425,000	140,000
San Mateo	355,000	320,000
Santa Clara	600,000	540,000
Total	**2,000,000**	**1,000,000**

Notes:

1. Although some SSS generated in Alameda County would likely be received at Permanente Quarry, this study assumes the amount will be negligible due to the availability of other SSS reuse and disposal options in Alameda County and in western San Joaquin County.

The addition of Permanente Quarry to the focus area's annual SSS reuse site receiving capacity will increase the focus area's annual SSS reuse receiving capacity by 1 million cubic yards or more. As shown in Figure 6, "Future Focus Area Annual SSS Reuse Receiving Capacities and Deficits with and without Permanente Quarry," it is estimated that by 2026 the use of SSS for reclamation of the Permanente Quarry will substantially reduce the deficit in SSS reuse site receiving capacity within the focus area and that there will be sufficient SSS for Permanente Quarry reclamation.

7 SSS HAUL TRIPS AND VEHICLE MILES TRAVELED

As discussed above, it is anticipated that Permanente Quarry will receive as much as 1 million cubic yards or more of SSS generated from within the focus area each year. This section discusses the estimated vehicle miles traveled ("VMT") for transport of 1 million cubic yards of SSS to Permanente Quarry as compared to estimated VMT for transport of 1 million cubic yards of SSS each year to other locations if the Permanente Quarry is not available as an SSS reuse site.

Although 2 million or more cubic yards of SSS is anticipated to be generated in the focus area each year, this section focuses on transport of the annual 1 million cubic yards of SSS estimated to be received at Permanente Quarry if the proposed reclamation plan amendment is approved. The balance of SSS generated within the focus area will be reused or disposed at other sites within or outside of the focus area depending on market factors and reuse/disposal capacity.

7.1 SSS Haul Truck Capacities and Number of Haul Trips

Trucks that transport SSS vary in type and capacity. A commonly used truck type is a "super dump" with three axles and a fourth drop axle that is lowered and used when the truck is loaded and lifted for travel when the truck is not loaded. Other truck types would also be used, including end-dump or bottom-dump semi-trailers, with load capacities ranging from about 8 to 15 cubic yards depending on the type of truck and legal limits (e.g., vehicle weight, load covering and freeboard requirements). For efficiency, construction and hauling companies typically seek to maximize load size to minimize the number of trips required to move a given amount of soil.

For the purposes of the VMT analysis herein, an average load size of 10 cubic yards is assumed for SSS transport. Since this average load size is assumed for SSS transport to any receiving site (Permanente Quarry or another receiving site) it provides a comparable measure of VMT.

Table 12, "Annual SSS Haul Trips for Transport of 1 Million Cubic Yards of SSS," lists the estimated number of haul loads and total trips associated with the transport of 1 million cubic yards of SSS. As shown in the table, with an average load capacity of 10 cubic yards, 100,000 loads are required to move 1 million cubic yards of SSS. Each load transporting SSS to the receiving site is a one-way trip and the corresponding return of the unloaded truck results in a second one-way trip. Therefore, transporting 100,000 loads of SSS results in 200,000 one-way haul truck *trips* accounting for transport of SSS to the facility and for the truck's return to the construction site.

Figure 6. Future Focus Area Annual SSS Reuse Receiving Capacities and Deficits with and without Permanente Quarry

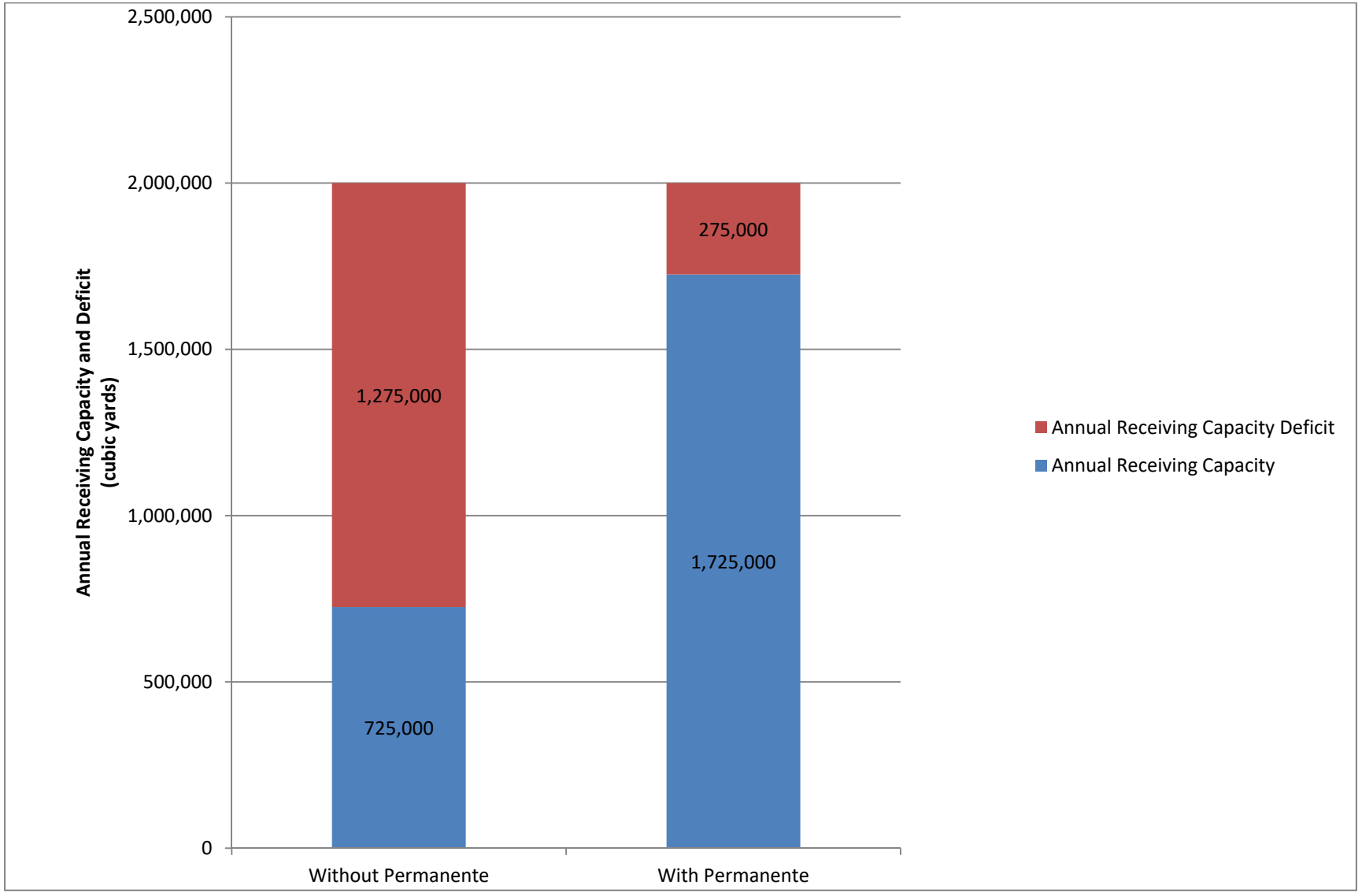

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Table 12. Annual SSS Haul Trips for Transport of 1 Million Cubic Yards of SSS

Factor	Quantity
Volume of SSS Transported	1 million cubic yards
Average Load Size	10 cubic yards
SSS Haul Loads	100,000 loads
Total Round Trips	100,000 round trips
Total One-Way Trips[1]	200,000 one-way trips

Notes:
1. Total one-way trips includes trips transporting SSS to destination and trips returning to construction site.

7.2 SSS Haul Routes and Logistics

For travel between the SSS source location (i.e., the construction site at which the SSS is generated) and the receiving site, haulers generally select routes anticipated to be most efficient in terms of minimizing travel distance, cost, and travel time. Traffic conditions and other factors can influence route selection, and under certain conditions haulers may decide to use a route with a longer distance in an effort to avoid congestion and decrease travel time. Although travel time does have some influence on route selection, estimated average trip distances are used in this study to provide a comparable measure of VMT between the with- and without-Permanente Quarry scenarios.

For typical construction projects, SSS hauling is accomplished with haul trucks making multiple round-trips (two one-way trips) between the construction site and delivery site on a daily basis during the period of SSS transport. Therefore, the total VMT per load is estimated at twice the distance from the origin to destination.

Transport of SCS from a typical construction project will use a fleet of haul trucks that that will pick up SCS from the construction site, transport the SCS to the receiving site, and then return to the construction site to pick up subsequent loads.

Each haul truck will typically make several round trips each day, with the total number of trips depending on the volume of material to be moved and the distance between the two locations. Unless individual haul trucks are stored at the construction site or receiving site, each truck will also need to travel from the its overnight storage location to the construction site each morning and from the receiving site to the truck's overnight storage location at the end of each day. To minimize costs, hauling companies also seek to minimize this daily travel distance, and will utilize trucks nearest the construction or receiving site.

7.3 Focus Area Construction Site Location Assumptions

The estimated 1 million cubic yards of SSS that could be received by Permanente Quarry annually would be generated at construction sites in various locations within the focus area counties. Although the specific locations of these future construction sites cannot be determined, it is reasonable to anticipate that SSS would be predominantly generated by construction projects associated with infill development and from construction projects involving substantial excavation which is common for projects involving the construction of relatively taller buildings common to more urbanized areas. In consideration of these factors, this study identified a location in each of the four focus area counties for use in estimating average haul trip travel distances for SSS generated at construction sites within each county.

7.4 SSS Haul Trips and VMT with Permanente Quarry

This section provides estimated VMT for the annual transport of 1 million cubic yards of SSS from construction sites within the focus area to Permanente Quarry. As discussed in Section 6, above, it is estimated that Permanente Quarry could receive an average of approximately 140,000, 320,000, and 540,000 cubic yards of SSS from San Francisco, San Mateo, and Santa Clara counties, respectively, each year. (As discussed in Section 6, SSS generated within Alameda County is less likely to be transported to Permanente Quarry due to the availability of other SSS reuse and disposal options in Alameda County and at Vernalis or other receiving sites in the Tracy/Vernalis area. Therefore, for the purposes of estimating average annual VMT, this study does not assign Alameda County SSS transport to Permanente Quarry.) Table 13, "Estimated VMT for Transport of 1 Million Cubic Yards of SSS to Permanente Quarry," lists the estimated volume of material to be transported from each focus area county, the number of loads and number of trips, the trip distance, and the VMT for transport of SSS from each county to Permanente Quarry.

Table 13. Estimated VMT for Transport of 1 Million Cubic Yards of SSS to Permanente Quarry

County of Origin[1]	Annual Volume of SSS to Permanente Quarry *(cubic yards)*[2]	Number of Loads[2]	Number of Trips[3]	Trip Distance[4] *(miles)*	VMT
San Francisco	140,000	14,000	28,000	43	1,204,000
San Mateo	320,000	32,000	64,000	23	1,472,000
Santa Clara	540,000	54,000	108,000	8	864,000
Total	**1,000,000**	**100,000**	**200,000**	**NA**	**3,540,000**

Notes:
1. Although some SSS generated in Alameda County would likely be received at Permanente Quarry, this study assumes the amount will be negligible due to the availability of other SSS reuse and disposal options in Alameda County and in western San Joaquin County.
2. See Section 6 for discussion of this annual volume estimate.
3. Assumes average of 10 cubic yards per load.
4. Total one-way trips - includes trips transporting SSS to destination and trips returning to construction site.
5. Haul truck travel distance between construction site and Permanente Quarry.

7.5 SSS Haul Trips and Vehicle Miles Traveled without Permanente Quarry Reuse

As discussed in Section 6 and illustrated in Figure 6, above, by the year 2026, the focus area is projected to have less than 1 million cubic yards of annual reuse/disposal capacity for the more than 2 million cubic yards of SSS anticipated to be generated within the focus area counties each year. Even with the addition of Permanente Quarry's capacity to receive 1 million or more cubic yards of SSS each year, the balance of the SSS generated within the focus area would fully consume the remaining focus area capacity and a portion of the balance would likely need to be transported to areas outside the focus area for reuse or disposal. Therefore, if Permanente Quarry is not available as an SSS reuse site and given the absence of other known or planned reuse sites in the focus area, it can be reasonably anticipated that the approximately 1 million cubic yards per year that would otherwise be received by Permanente Quarry will, instead, be transported to locations outside of the focus area as discussed in detail below.

7.5.1 Methods for Assessing VMT under Future Conditions without Permanente Quarry SSS Reuse

In an effort to identify reasonably anticipated SSS reuse/disposal sites with sufficient capacity to receive the 1 million cubic yards that would otherwise be received at Permanente Quarry, locations that could potentially receive SSS in the future were considered in five counties

adjacent to the focus area – San Joaquin, Marin, Solano, Contra Costa, and San Benito counties.

Potential locations in these five adjacent counties include some existing receiving sites as well as other potential sites that could become available in the future. Potential future reuse sites include: existing surface mines that could receive SSS as backfill material for reclamation, anticipated areas of future development requiring fill for grading, and anticipated areas of future fill for public works projects including flood control.

Because there is substantial uncertainty with regard to potential future receiving sites, this assessment focuses on identifying the general areas of potential future receiving locations in the five adjacent counties. These general areas are then used to estimate the potential average travel distances for transport of SSS from each focus area county. The identification of these areas in the five adjacent counties was done using a conservative approach that assumes sufficient receiving capacity will be available in areas of the five counties that are relatively close to the focus area. This conservative approach tends to result in shorter estimated travel distances than might actually be required in the future and therefore results in a lower estimated VMT under the without-Permanente scenario than might actually occur. These estimates allow us to estimate travel distances and VMT for transport of SSS from the focus area counties to these other locations.

7.5.2 SSS Transport to Locations Outside the Focus Area without Permanente Quarry Reuse

As discussed above, it is estimated that with Permanente Quarry reuse of SSS for reclamation, SSS would be received from locations in San Francisco, San Mateo, and Santa Clara counties in the volumes listed above in Table 13. To estimate VMT *without* Permanente Quarry reuse of SSS for reclamation, estimates were made for this study that allocates those same volumes of material from each county to the adjacent counties discussed above – San Joaquin, Marin, Solano, Contra Costa, and San Benito counties. Existing reuse sites (e.g., Vernalis in San Joaquin County), potential other reuse sites (e.g., surface mines potentially suitable for SSS reuse), and other potential SSS reuse opportunities associated with potential future development and public works projects were considered. The amount of material from each focus area county, the known and potential for future reuse sites, and the distance between focus area and adjacent counties were considered, and estimates of potential volumes transported from each focus area county to each adjacent county were made using professional judgement and are intentionally conservative to avoid over estimating trip distances under future conditions without Permanente Quarry's receipt of SSS. The rationale for the estimates of SSS movement from the focus area counties to adjacent counties is discussed below.

San Joaquin County is located east of Alameda County. The Vernalis Teichert Quarry is an existing surface mine located in San Joaquin County about 8 miles south of the city of Tracy. Vernalis Quarry currently receives SSS for reclamation reuse. Other surface mining operations exist in the western portion of San Joaquin County that could also be reasonably anticipated to receive SSS for reclamation purposes; however, the extent to which this capacity may be available is unknown. For the purposes of this assessment, it is anticipated that the majority of any future SSS deliveries to San Joaquin County from the focus area would be to the western portion of the county. It is possible that SSS would be transported farther into San Joaquin County, but this study conservatively estimates that average trip distances would not be more than the distance to the city of Tracy. It is estimated that approximately 224,000 cubic yards of SSS from San Mateo County and approximately 324,000 cubic yards of SSS from San Clara County would be transported an average of 57 and 59 miles, respectively, from these two focus area counties to San Joaquin County receiving sites if

Permanente Quarry reuse is not available. Given the distance and proximity to other adjacent counties, it is assumed that no SSS would be transported from San Francisco County to San Joaquin County if Permanente Quarry reuse is not available.

Marin County is located north of San Francisco County. Some areas in Marin County could be reasonably anticipated to receive SSS for reclamation purposes; however, the extent to which this capacity may be available is unknown. The most likely anticipated future receiving locations in Marin County could include flood protection projects in San Rafael, Tiburon, Sausalito areas. It is possible that SSS would be transported farther north in Marin County, but this study conservatively estimates that average trip distances into Marin County for transport of SSS from the focus area would not be more than the approximate distance into the southern half of the county. It is estimated that approximately 28,000 cubic yards of SSS from San Francisco County would be transported an average of 25 miles to potential future Marin County receiving sites if Permanente Quarry reuse is not available. Given the distance, intervening traffic conditions in the San Francisco area, and proximity to other adjacent counties, it is assumed that no SSS would be transported from San Mateo or Santa Clara counties to Marin County if Permanente Quarry reuse is not available.

Solano County is located northeast of the San Francisco Bay Area. Some areas within Solano County could also be reasonably anticipated to receive SSS for reclamation purposes; however, the extent to which this capacity may be available is unknown. This study conservatively estimates that average trip distances into Solano County for transport of SSS from the focus area would not be more than the approximate distance into the southern portion of the county, nearest the focus area. It is estimated that approximately 70,000 cubic yards of SSS from San Francisco County would be transported an average of 39 miles to potential future Solano County receiving sites if Permanente Quarry reuse is not available. Given the distance and proximity to other adjacent counties, it is assumed that no SSS would be transported from San Mateo or Santa Clara counties to Solano County if Permanente Quarry reuse is not available.

Contra Costa County is located north of Alameda County. Some areas within Contra Costa County could also be reasonably anticipated to receive SSS for reclamation purposes; however, the extent to which this capacity may be available is unknown. It is possible that limited land improvements within the western portion of the county near the San Pablo Bay could require SSS fill imports and also possible that development projects along the I-680 corridor could require SSS fill imports. It is possible that SSS would be transported farther into Contra Costa County, including to the eastern area of the county; however, this study conservatively estimates that average trip distances into Contra Costa County would not be more than the approximate distance to the Walnut Creek area. It is estimated that approximately 42,000 cubic yards of SSS from San Francisco County would be transported an average of 29 miles to potential future Contra Costa County receiving sites if Permanente Quarry reuse is not available. Given the distance and proximity to other adjacent counties, it is assumed that no SSS would be transported from San Mateo or Santa Clara counties to Contra Costa County if Permanente Quarry reuse is not available.

San Benito County is located south of Santa Clara County and the focus area. Some areas within San Benito County could also be reasonably anticipated to receive SSS for reclamation purposes; however, the extent to which this capacity may be available is unknown. The most likely potential San Benito County reuse locations for SSS generated in the focus area could include potential future development requiring fill in the northern portion of the county. Although other potential future reuse sites, including potential surface mine reclamation, could become available in more central areas of the San Benito County, this study conservatively estimates that average trip distances into San Benito County would

not be more than the approximate distance to the northern portion of the county. It is estimated that approximately 96,000 cubic yards of SSS from San Mateo County and approximately 216,000 cubic yards of SSS from San Clara County would be transported an average of 64 and 49 miles, respectively, from these two focus area counties to San Benito County receiving sites if Permanente Quarry reuse is not available. Given the distance and proximity to other adjacent counties, it is assumed that no SSS would be transported from San Francisco County to San Benito County if Permanente Quarry reuse is not available.

7.5.3 Estimated VMT for Transport of SSS to Adjacent Counties without Permanente Quarry Reuse

The estimated SSS movement and trip distances discussed above were used to determine estimated VMT that would result from the transport of SSS to adjacent counties if Permanente Quarry is not available as an SSS reuse site. Table 14, "Estimated VMT for Transport of SSS to Adjacent Counties without Permanente Quarry Reuse," tabulates this data and provides the estimated VMT associated with SSS movement between the various counties.

Table 14. Estimated VMT for Transport of SSS to Adjacent Counties without Permanente Quarry Reuse

County of Origin	Annual Volume of SSS to Destination County *(cubic yards)*[1]	Number of Loads[2]	Number of One-Way Trips[3]	Trip Distance[4] *(miles)*	Vehicle Miles Traveled
DESTINATION COUNTY: SAN JOAQUIN					
San Mateo	224,000	22,400	44,800	57	2,553,600
Santa Clara	324,000	32,400	64,800	59	3,823,200
San Joaquin County Total	548,000	54,800	109,600	NA	6,376,800
DESTINATION COUNTY: MARIN					
San Francisco	28,000	2,800	5,600	25	140,000
Marin County Total	28,000	2,800	5,600	NA	140,000
DESTINATION COUNTY: SOLANO					
San Francisco	70,000	7,000	14,000	39	546,000
Solano County Total	70,000	7,000	14,000	NA	546,000
DESTINATION COUNTY: CONTRA COSTA					
San Francisco	42,000	4,200	8,400	29	243,600
Contra Costa County Total	42,000	4,200	8,400	NA	243,600
DESTINATION COUNTY: SAN BENITO					
San Mateo	96,000	9,600	19,200	64	1,228,800
Santa Clara	216,000	21,600	43,200.00	49	2,116,800
San Benito County Total	312,000	31,200	62,400	NA	3,345,600
DESTINATION COUNTIES TOTAL					
Total	**1,000,000**	**100,000**	**200,000**	**NA**	**10,652,000**

Notes:

1. See Section 7.5.2 for discussion of estimated allocations of SSS from focus area counties to destination counties.
Assumes average of 10 cubic yards per load.
2. Total one-way trips - includes trips transporting SSS to destination and trips returning to construction site.
3. Haul truck travel distance between construction site and destination county.

7.6 Comparison of Vehicle Miles Traveled for Transport of SSS with and without SSS Reuse at Permanente Quarry

Table 15, "Comparison of Estimated SSS Haul Truck VMT with and without Permanent Quarry Reuse," provides a comparison of estimated VMT for transport of 1 million cubic yards of SSS for use in Permanente Quarry reclamation. As shown in the table, reuse of SSS at Permanente Quarry would result in only 33 percent of the VMT that would otherwise occur without reuse of SSS at Permanente Quarry resulting in a reduction of over 7,000,000 miles of haul truck travel each year.

Table 15. Comparison of Estimated SSS Haul Truck VMT with and without Permanente Quarry Reuse

County of Origin	Annual Volume of SSS Transported *(cubic yards)*	Number of Loads[1]	Number of One-Way Trips[2]	Vehicle Miles Traveled
With Reuse of SSS at Permanente Quarry	1 million	100,000	200,000	3,540,000
Without Reuse of SSS at Permanente Quarry	1 million	100,000	200,000	10,652,000

Notes
1. Assumes average of 10 cubic yards per load.
2. Total one-way trips - includes trips transporting SSS to destination and trips returning to construction site.

8 CONCLUSION

The information assembled in this report concludes that construction within the region will continue to generate substantial quantities of SCS and SSS in relative proximity to the Permanente Quarry with 1 million cubic yards per year available for the proposed Permanente Quarry reclamation, and that the use of SSS for Permanente Quarry reclamation would help to meet a predicted deficit in the areas SSS reuse capacity.

This assessment concludes that approximately 4 million cubic yards per year of SCS has been generated from within the four focus area counties in recent years, and that 2 million cubic yards or more of that SCS has been SSS that would be suitable for use in Permanente Quarry reclamation. The assessment projects that recent annual SCS and SSS generation rates will continue as growth and development continues in the focus area counties. The assessment finds that there is limited and decreasing capacity to receive SSS at reuse sites in the focus area and that use of SSS for Permanente Quarry reclamation would provide a much needed SSS reuse option within the region. Given these factors, this study estimates that as much as 1 million or more cubic yards per year of SSS could be available and received at Permanente Quarry each year, and would reduce vehicle miles traveled (VMT) for hauling that material to about 33 percent of the VMT that would otherwise be required for transport of material to receiving sites outside of the focus area counties if Permanente Quarry is not available as a reuse site.

APPENDICES

APPENDIX 1

Pinnacle Consulting Qualifications Summary



Pinnacle Consulting

www.gregodenthal.com

Overview

Pinnacle Consulting provides a variety of services to the construction and construction materials industries. The firm has provided consultations and services involving market research, acquisition due diligence, strategic development and project support for dozens of firms involved in the aggregate, construction, ready-mixed concrete, asphalt and cement industries since 2009. We have also performed as an independent expert witness. Pinnacle Consulting offers an array of services while leveraging industry knowledge and technical training.

Proven Capabilities

- ❒ **Market Research**
- ❒ **Strategic Analysis**
- ❒ **Due Diligence Support**
- ❒ **Product Development**
- ❒ **Operational Benchmarking**
- ❒ **Business Development**
- ❒ **Acquisition Support**
- ❒ **Recruiting**
- ❒ **Organizational Development**

Experience

Greg Odenthal has worked for Fortune 500 companies including more than 20 years with Granite Construction Company in a variety of management roles. His experience includes design and construction of new facilities, sales/marketing management, operations, organizational development of Materials Group, web design, and IT system development along with mergers and acquisitions. Moving from the position of Growth and Development Manager for Granite Construction's Branch Division, Greg joined Knife River (a subsidiary of MDU Resources) as Business Development Manager for the Pacific Region with primary focus on identification and execution of acquisition opportunities along with development of logistics strategies for the importation of aggregates from Canada and Mexico into the LA Basin, Hawaii and San Francisco markets. Since leaving Knife River in 2008, Greg has applied his industry knowledge in conjunction with professional relationships for the benefit of both large and small, public and private clients on projects throughout California and Nevada.

Laura Odenthal provides extensive technical and professional support as a Registered Professional Geologist in California and Idaho as well as a Certified Project Management Professional. Her background includes oil and gas exploration, telecommunications, IT infrastructure, construction management, nuclear nonproliferation, environmental and financial management.

Industry Involvement

- **CalCIMA** Government Affairs Committee
- **CalCIMA** 2016 Associate of the Year
- **Chico State CIM** Executive Board of Directors
- **Rock Products Committee / CalTrans**

Education

Greg Odenthal

- B.S. Marketing, University of Nevada
- M.B.A. University of Oregon

Laura Odenthal

- B.A. Geology, University of Colorado
- M.B.A. Golden Gate University

APPENDIX 2

Summary of Sites that have Recently Received Surplus Construction Soil from the Focus Area

Appendix 2. Summary of Sites that have Recently Received Surplus Construction Soil from the Focus Area

Facility and Operator	Estimated SCS/SSS Received and SCS/SSS Receiving Capacities[1,2]	Facility Information and Use in Study
ALAMEDA COUNTY		
Altamont Landfill *Waste Management Solutions*	SCS Received 2017: 360,000 cy SCS Received 2018: 360,000 cy Annual Receiving Capacity: 360,000 cy Remaining Capacity: Indefinite	Altamont Landfill is located in Alameda County and provides for disposal of wastes, including asbestos, auto shredder residue, biosolids, construction and demolition debris, sludge, drum management, industrial and special waste, municipal solid waste, and yard waste for composting. (Waste Management, 2018. http://altamontlandfill.wm.com/landfill/index.jsp) It is estimated that approximately 360,000 cubic yards of SCS generated from within the focus area was received at the facility each year in 2017 and 2018. This estimate is based on tonnages of "clean fill" and "contaminated soil" reported in semi-annual reports submitted to RWQCB, with volumes estimated using a conversion factor of 1.35 tons per cubic yard). Data was obtained from reports including "Second Semiannual-Annual 2017 Groundwater Monitoring Report Altamont Landfill and Resource Recovery Facility" (SCS Engineers, February 2018) and "First Semiannual 2018 Groundwater Monitoring Report Altamont Landfill and Resource Recovery Facility" (SCS Engineers, August 2018). Interviews with industry representatives support these estimates. Although a portion of the SCS received at Altamont Landfill is likely to have been SSS, this study conservatively excludes the full 360,000 cubic yards from estimates of recent and future generation of focus area SSS. This study assumes that the recent volumes of SCS received represent a reasonable estimate of the annual SCS receiving capacity at Altamont Landfill. Although Altamont Landfill has a finite total permitted capacity, this study conservatively assumes that the facility could continue to receive SCS indefinitely.
Vasco Road Landfill *Republic Services*	SCS Received 2017: 185,000 cy SCS Received 2018: 185,000 cy Annual Receiving Capacity: 185,000 cy Remaining Capacity: Indefinite	Vasco Road Landfill is located in Alameda County and provides for disposal of residential, commercial, municipal garbage, and also receives recyclables and green waste. (City of Livermore, 2018. http://www.cityoflivermore.net/citygov/ pw/ public_works_divisions/swr/landfill.htm) It is estimated that approximately 185,000 cubic yards of SCS generated from within the focus area was received at the facility each year in 2017 and 2018. This estimate is based on tonnages of "clean dirt" reported in semi-annual reports submitted to RWQCB, with volumes estimated using a conversion factor of 1.35 tons per cubic yard). Data was obtained from reports including "January Through March 2017 Quarterly Self Monitoring Report (SMR) Vasco Road Landfill" (Geo-Logic Associates, April 2017), "April Through June 2017 Quarterly Self Monitoring Report (SMR) Vasco Road Landfill" (Geo-Logic Associates, July 2017), "July Through September 2017 Quarterly Self Monitoring Report (SMR) Vasco Road Landfill" (Geo-Logic Associates, October 2017), and "October Through December 2017 Quarterly Self Monitoring Report (SMR) Vasco Road Landfill" (Geo-Logic Associates, January 2018). Interviews with industry representatives support these estimates. Although a portion of the SCS received at Vasco Road Landfill is likely to have been SSS, this study conservatively excludes the full 185,000 cubic yards from estimates of recent and future generation of focus area SSS. This study assumes that the recent volumes of SCS received represent a reasonable estimate of the annual SCS receiving capacity at Vasco Road Landfill. Although Vasco Road Landfill has a finite total permitted capacity, this study conservatively assumes that the facility could continue to receive SCS indefinitely.

Facility and Operator	Estimated SCS/SSS Received and SCS/SSS Receiving Capacities[1,2]	Facility Information and Use in Study
Corica Golf / TBI *Greenway Golf (Alameda)*	SSS Received 2017: 150,000 cy SSS Received 2018: 150,000 cy Annual Receiving Capacity: 150,000 cy Remaining Capacity: 300,000 cy (2-3 yrs)	The Corica Golf site is a municipal golf course undergoing regrading. The redevelopment drainage improvement plan for the site calls for the import of SCS from construction projects in the East Bay and San Francisco region. As originally approved, the project involved import of 800,000 cubic yards (City Manager Report, 2012). Recent reports from 2018 indicated reconstruction is completed on one course and nearly completed on the second course (City Staff Reports, 2016 and 2018). Based on site visits, review of current and historical aerial photography, and interviews with the site operator, Pinnacle Consulting's assessment assumes that approximately 150,000 cubic yards per year has been recently received and additional material could continue to be received for the next 2 to 3 years (through approximately 2020). The SCS received at the site is subject to acceptance criteria and is therefore considered to be SSS for the purposes of this study.
Dumbarton Quarry *DeSilva/Pacific States*	SSS Received 2017: 660,000 cy SSS Received 2018: 660,000 cy Annual Receiving Capacity: 660,000 cy Remaining Capacity: 4 million (7 yrs)	Dumbarton Quarry is located in the city of Fremont in Alameda County. The site ceased quarrying activities in 2007. In accordance with the approved reclamation plan, the site began accepting SSS in compliance with acceptance criteria established by the SFBRWQCB, and is currently being reclaimed through the use of SSS import and placement that will provide for development of a regional park. Dumbarton Quarry receives about 660,000 cubic yards of fill material each year (Pacific States Environmental Contractors, Inc., Dumbarton Quarry Quarterly Updates to the San Francisco Bay Regional Water Quality Control Board, quarterly reports for 4th quarter 2014 through 2nd quarter 2018). An amendment to the site's reclamation plan was approved in December 2018 and provides for import of approximately 4 million cubic yards of additional SSS (City of Freemont, Planning Commission Staff Report, Dumbarton Quarry Reclamation Plan Amendment PLN2018-00065; December 13, 2018). At an annual receiving rate of 660,000 cubic yards, Dumbarton Quarry reclamation will be complete within about seven years and will no longer receive imported SSS. The SCS received at the site is subject to acceptance criteria and is therefore considered to be SSS for the purposes of this study.
Vulcan Pleasanton Quarry *Vulcan Materials Company*	SSS Received 2017: 50,000 cy SSS Received 2018: 50,000 cy Annual Receiving Capacity: 50,000 cy Remaining Capacity: Indefinite	The Vulcan Pleasanton Quarry is a surface mine near Pleasanton. Discussions with the operator indicate receipt of approximately 50,000 cubic yards of SSS in 2017 and 2018. The site's total remaining capacity is undetermined, but for the purposes of this study, the site is conservatively assumed to have the capacity to continue to receive approximately 50,000 cubic yards per year indefinitely. The SCS received at the site is considered to be SSS for the purposes of this study.
KOFY Radio Site/All Cities *Landfill Management*	SSS Received 2017: 50,000 cy SSS Received 2018: 50,000 cy Annual Receiving Capacity: 50,000 cy Remaining Capacity: 50,000 (1 yr)	Site accepts SSS for the purpose of capping previous landfill located on the site. Prequalification tests are required to verify soil is consistent with the facility's material requirements acceptance criteria. Based on an interview with the site operator, the site has limited remaining capacity and in mid-2018 anticipated about 2 years of remaining SSS imports at up to approximately 50,000 CY per year. The study therefore anticipates that the site will receive up to approximately 50,000 cubic yards in 2019 and will then stop receiving SSS. The SCS received at the site is subject to acceptance criteria and is therefore considered to be SSS for the purposes of this study.

Facility and Operator	Estimated SCS/SSS Received and SCS/SSS Receiving Capacities[1,2]	Facility Information and Use in Study
San Francisco County		
Port of San Francisco Waste Transfer Terminal *Waste Solutions Group*	SCS Received 2017: 250,000 cy SCS Received 2018: 250,000 cy Annual Receiving Capacity: 250,000 cy Remaining Capacity: Indefinite	The Port of San Francisco site is a transfer station that receives hazardous and other waste materials for rail transport to the state of Utah. Discussions with market participants indicated that approximately 250,000 cubic yards of SCS generated within the focus area has been received and transferred through the facility in recent years. For the purposes of this study, it is assumed that the capacity of this facility will continue to meet the demand for transfer of soils containing hazardous substances. It is anticipated that limited, if any, SSS is received at this facility.
Treasure Island/Yerba Buena *Lennar/DeSilva Gates*	SSS Received 2017: 50,000 cy SSS Received 2018: 75,000 cy Annual Receiving Capacity: 75,000 cy Remaining Capacity: 1,100,000 cy (14 yrs)	Treasure Island site is a redevelopment site that projected to require a total of approximately 1.1 million cubic yards of clean soil over the 10 to 15 years of development (Treasure Island/Yerba Buena Island Redevelopment Project Final Environmental Impact Report; April 21, 2011). Based on discussions with the site operator, the site is estimated to have received approximately 50,000 and 75,000 cubic yards of SSS generated within the focus area in 2017 and 2018, respectively. This assessment conservatively assumes the site may still have capacity to receive 1.1 million cubic yards of imported SSS, and that approximately 75,000 cubic yards of SSS will be received each year over the 10- to 15-year period of development.
Hunter's Point *Lennar*	SSS Received 2017: 50,000 cy SSS Received 2018: 100,000 cy Annual Receiving Capacity: 100,000 cy Remaining Capacity: 250,000 cy (2 yrs)	Hunter's Point is a redevelopment site in San Francisco that receives SSS for use as fill material. The site is estimated to have received approximately 50,000 and 100,000 cubic yards of SSS generated within the focus area in 2017 and 2018, respectively. Discussions with the site operator indicate that the site has limited if any remaining capacity. This assessment conservatively assumes that up to 250,000 cubic yards of additional material could be received and that the site will no longer receive SSS within two years.
San Mateo County		
Bayland's *Universal Paragon*	SSS Received 2017: 200,000 cy SSS Received 2018: 20,000 cy Annual Receiving Capacity: 0 cy Remaining Capacity: 0 cy (0 yrs)	Bayland's is a planned commercial and residential development site in San Mateo County that has received SSS for use as fill material. Based on discussions with soil hauling companies and the site operator, the site has not accepted SSS in past months and it is understood that commercial / residential development will likely commence in the near future with all or a majority of SSS imports having been completed. For the purposes of this analysis, it is assumed that the site will be unavailable for future receipt. Discussions with the site operator and review of historical aerial photographs, suggest that the site had received approximately 200,000 cubic yards or more per year in recent years. The estimated lower volume of receipt in 2018 is consistent with operator input and that the site has received all or the majority of the fill needed for development.
EBI / Brisbane Quarry *Evans Brothers Inc.*	SSS Received 2017: 150,000 cy SSS Received 2018: 100,000 cy Annual Receiving Capacity: 0 cy Remaining Capacity: 0 cy (0 yrs)	The Brisbane Quarry site has accepted SSS for reclamation in conjunction with construction material production. Conversations with dirt hauling companies and review of aerial photography indicate that the site has received 100,000 to 150,000 cubic yards per. The reclamation plan calls for private development in near future and the site has limited to no remaining capacity to receive imported fill material. Therefore, it is assumed that the site will be unavailable for future receipt of SSS.

Facility and Operator	Estimated SCS/SSS Received and SCS/SSS Receiving Capacities[1,2]	Facility Information and Use in Study
Ox Mountain Landfill *Republic Services*	SCS Received 2017: 220,000 cy SCS Received 2018: 220,000 cy Annual Receiving Capacity: 220,000 cy Remaining Capacity: 2,000,000 cy (9 yrs)	Ox Mountain Landfill is located near Half Moon Bay and accepts construction/demolition, mixed municipal, sludge (biosolids), asbestos, other designated wastes, and tires. (CalRecycle, 2018). The facility accepts SSS for landfill closure purposes and additional SCS for disposal or other landfill management purposes. It is estimated the facility received approximately 220,000 cubic yards of SCS from the focus area in each of the past two years. Data is based on information obtained from "Water Quality Monitoring Report January – June 2017 Semiannual Corinda Los Trancos (Ox Mountain) Sanitary Landfill" (Geo-Logic Associates, July 2017) and "Water Quality Monitoring Report July – December 2017 Semiannual Corinda Los Trancos (Ox Mountain) Sanitary Landfill" (Geo-Logic Associates, January 2018). Interviews with industry representatives support these estimates. Although a portion of the SCS received at Ox Mountain Landfill will have been SSS, this study conservatively excludes the full 220,000 cubic yards of SCS received annually from estimates of recent and future generation of focus area SSS.
Santa Clara County		
Kirby Canyon Landfill *Waste Management Solutions*	SCS Received 2017: 85,000 cy SCS Received 2018: 90,000 cy Annual Receiving Capacity: 90,000 cy Remaining Capacity: Indefinite	Kirby Canyon Landfill is located near Morgan Hill and accepts non-hazardous construction and demolition debris, industrial and special waste, and municipal solid waste. (Waste Management Solutions, 2018. https://www.wmsolutions.com/locations/details/id/184). The facility accepts SSS for landfill closure purposes and additional SCS for disposal or other landfill management purposes. It is estimated the facility received approximately 90,000 cubic yards of SCS from the focus area in each of the past two years. This estimate is based on the facility's reported tonnages for "revenue generating cover (RGC) cover soil" and "RGC inert tons" using a conversion factor of 1.35 tons per cubic yard. Data was obtained from "First Semi-Annual 2017 Self-Monitoring Program Report Kirby Canyon Recycling & Disposal Facility" (Crawford Consulting, Inc., undated) and "Second Semi-Annual 2017 Self-Monitoring Program Report Kirby Canyon Recycling & Disposal Facility" (Crawford Consulting, Inc., February 13, 2018). Interviews with industry representatives support these estimates. Although a portion of the SCS received at Kirby Canyon Landfill will have been SSS, this study conservatively excludes the full amount of SCS received annually from estimates of recent and future generation of focus area SSS. Although Kirby Canyon Landfill has a finite total permitted capacity, this study conservatively assumes that the facility could continue to receive SCS indefinitely.
Newby Island Landfill *Republic Services*	SCS Received 2017: 340,000 cy SCS Received 2018: 350,000 cy Annual Receiving Capacity: _350,000 cy Remaining Capacity: 7,000,000 cy (20 yrs)	The Newby Island Resource Recovery Park (NIRRP) is located in San Jose. The site accepts industrial wastes, grit, screenings, wastewater treatment sludge, contaminated soils, clean soils and municipal solid waste. (Republic Services, 2018. http://local.republicservices.com/site/newby-island) Data is based on information obtained from "Water Quality Monitoring Report January – June 2017 Semi-Annual Newby Island Sanitary Landfill" (Geo-Logic Associates, July 2017) and "Water Quality Monitoring Report July – December 2017 Semi-Annual Newby Island Sanitary Landfill" (Geo-Logic Associates, January 2018). Interviews with industry representatives support these estimates. Although a portion of the SCS received at Newby Island Landfill will have been SSS, this study conservatively excludes the full amount of SCS received annually from estimates of recent and future generation of focus area SSS.

Facility and Operator	Estimated SCS/SSS Received and SCS/SSS Receiving Capacities[1,2]	Facility Information and Use in Study
Curtner Quarry *DeSilva/Pacific States*	SSS Received 2017: 100,000 cy SSS Received 2018: 250,000 cy Annual Receiving Capacity: 250,000 cy Remaining Capacity: 250,000 cy (1 yrs)	Curtner Quarry is a surface mine reclamation site with potential for subsequent development reuse and has accepted SSS as part of the site's reclamation plan. Based on discussions and review of site records with the operator, and review of historical aerial photography, the facility is estimated to have received 100,000 and 250,000 cubic yards of SSS from the focus area in 2017 and 2018, respectively. Final grade (i.e., reuse volume) is being determined based on cooperative plan with local agencies to transition to a residential community, and it is anticipated that the site has reached its SSS receiving capacity and will not be available for future receipt of SSS. For the purposes of this assessment, it is assumed that up to 250,000 cubic yards of additional material could be required for final grading.
Multiple/Various Locations in Focus Area		
Construction Reuse	SSS Received 2017: 300,000 cy SSS Received 2018: 300,000 cy Annual Volume: 300,000 cy Remaining Capacity: Ongoing	"Construction Reuse" soil is defined for this study as SCS moved from one construction site to another construction or other reuse site requiring fill for public or private development or land restoration purposes. An example of a public Construction Reuse site is Bair Island in Redwood City. Beginning in 2006, the Bair Island wetlands restoration project accepted hundreds of thousands of cubic yards of surplus soil excavated from under the San Francisco Bay associated with Hetch Hetchy water distribution system improvements. Similar public projects, including the South Bay Salt Pond Restoration Project, have accepted and will continue periodically to accept surplus soil in varying quantity and from various sources. These projects typically use dredged material from the San Francisco Bay (which is not considered SSS for the purposes of this study). However, these projects also may use imported surplus soil trucked in from regional construction sites, which is considered Construction Reuse SSS for the purposes of this study. Construction reuse requires the timing of construction activities at separate sites to be such that the generation of surplus soil at one site occurs at a time when that material can be received at another construction site, or requires one or both sites to have the capacity to stockpile and store the surplus soil until its placement for reuse. In preparing this study, input was provided from established and experienced Bay Area construction contractors regarding future estimates of construction projects in the Bay Area. Based on this input and on Pinnacle Consulting's understanding and experience in the soils market, it is recognized that the amount of construction reuse in any given year can fluctuate widely, and we conservatively (i.e., so as not to overestimate the amount of surplus soil available) estimate that approximately 300,000 cubic yards per year on average of SSS generated in the focus area counties has and will continue to be reused at various development or land restoration sites in the focus area counties.

Facility and Operator	Estimated SCS/SSS Received and SCS/SSS Receiving Capacities[1,2]	Facility Information and Use in Study
Unregulated Soil Placement	SSS Received 2017: 300,000 cy SSS Received 2018: 300,000 cy Annual Volume: 300,000 cy Remaining Capacity: Ongoing	"Unregulated Soil Placement" soil is defined for this study as SCS that is moved from construction sites to other properties for reuse or disposal without reporting or other regulatory oversight. Unregulated Soil Placement is also known to occur within the focus area counties, although the characteristics and the movement of this material cannot be precisely quantified given the absence of regulation and/or non-compliance with existing regulations. In preparing this study, input was provided from dirt hauling companies, construction contractors, other market participants, and local agencies regarding unregulated soil placement. Based on this input and on Pinnacle Consulting's understanding and experience in the soils market, it is recognized that the amount of unregulated soil placement in any given year can fluctuate widely, and we conservatively (i.e., so as not to overestimate the amount of surplus soil available) estimate that of the undetermined amount of Unregulated Soil Placement in the focus area, approximately 300,000 cubic yards per year is SSS. "Dirt Importing" is a term used by the Alameda Community Development Agency in a September 9, 2018 memorandum sent to the County Board of Supervisor's Transportation and Planning Committee, subject "*Fill Importing Ordinance – Development of regulations for the importing of fill onto properties in the Agriculture ("A") and Combining Agriculture ("L") zoning districts in the unincorporated areas of Alameda County*". As discussed in the memorandum, "Some properties have imported dirt, soil, construction debris, plant material, or road material, or a combination of these with many land owners claiming the material will be used for agricultural purposes and therefore exempt from any County ordinance. Although these claims are difficult to substantiate, the importing of material has reached such amounts (up to a million yards proposed on one 560 acre property) that dirt importing has become a separate activity on its own ("Dirt Importing"), and Staff believes some regulation of this activity is needed." For the purposes of this study, such "dirt importing" is included in our estimates of Unregulated Soils Placement.
Outside of Study Area		
Kettleman Hills Landfill *Waste Management Solutions*	SCS Received 2017: 150,000 cy SCS Received 2018: 150,000 cy Annual Receiving Capacity: Unknown Remaining Capacity: Ongoing	The Kettleman Hills facility is a permitted, 1,600 acre hazardous waste treatment, storage and disposal facility located 3.5 miles southwest of Kettleman City, in Kings County, California. Discussions with market participants indicated that approximately 150,000 cubic yards of SCS generated within the focus area in each of the past two years has been transported to and disposed at Kettleman Hills Landfill. For the purposes of this study, it is assumed that the capacity of this facility will continue to meet the demand for transfer of soils containing hazardous substances. It is anticipated that limited, if any, SSS from the focus area is received at this facility. This study excludes the full 150,000 cubic yards received annually from estimates of recent and future generation of focus area SSS.
Buttonwillow Landfill Facility *Clean Harbors*	SCS Received 2017: 50,000 cy SCS Received 2018: 50,000 cy Annual Receiving Capacity: Unknown Remaining Capacity: Ongoing	The Buttonwillow Landfill facility is a permitted hazardous waste facility in Kern County, California, that receives, stores, treats and landfills a variety of hazardous and non-hazardous waste streams. Discussions with market participants indicated that approximately 50,000 cubic yards of SCS generated within the focus area in each of the past two years has been transported to and disposed at the Buttonwillow Landfill. For the purposes of this study, it is assumed that the capacity of this facility will continue to meet the demand for transfer of soils containing hazardous substances. It is anticipated that limited, if any, SSS from the focus area is received at this facility. This study excludes the full 50,000 cubic yards received annually from estimates of recent and future generation of focus area SSS.

Facility and Operator	Estimated SCS/SSS Received and SCS/SSS Receiving Capacities[1,2]	Facility Information and Use in Study
Teichert Vernalis Quarry *Teichert Materials*	SSS Received 2017: 30,000 cy SSS Received 2018: 30,000 cy Annual Receiving Capacity: Undetermined Remaining Capacity: Undetermined	Vernalis is surface mine in San Joaquin County that accepts surplus soil for backfill at previously mined operations. Quantities and testing are required before acceptance. Other sites managed by other companies are also located in in the same vicinity. Discussions with the site owner and operator indicated that the site has received approximately 30,000 cubic yards of SSS from the focus area (primarily Alameda County) in the past two years associated with reclamation. The annual receiving capacity and remaining total capacity of the site are undetermined; however, based on conversations with the site operator this assessment conservatively assumes that the site will have the capacity to receive SSS for the foreseeable future.
San Benito County (various locations)	SCS Received 2017: 25,000 cy SCS Received 2018: 25,000 cy Annual Receiving Capacity: Unknown Remaining Capacity: Ongoing	Various construction projects within the focus area export material to various receiving locations in other counties – including San Benito, Marin, Solano, and Contra Costa counties. 2017 and 2018 export of SCS from the study area to those counties is estimated to have been a total of approximately 270,000 cubic yards, of which approximately 50 percent is conservatively assumed to have been SSS. Estimates for each county are based on Pinnacle Consulting's discussions with receiving site operators, construction contractors, and other market participants that do business within the focus area and locations in these other counties. The specific receiving locations in these counties vary. Various sites in these counties could continue to become available in the future, although the specific locations and capacity to receive SCS at such potential future sites are unknown. With readily available receiver locations within the focus area, it is less likely that material would be exported from the study area; while with fewer available receiver locations within the study area it is more likely that SCS would be exported from the focus area to these counties.
Marin County (various locations)	SCS Received 2017: 25,000 cy SCS Received 2018: 25,000 cy Annual Receiving Capacity: Unknown Remaining Capacity: Ongoing	
Solano County (various locations)	SCS Received 2017: 100,000 cy SCS Received 2018: 100,000 cy Annual Receiving Capacity: Unknown Remaining Capacity: Ongoing	
Contra Costa County (various locations)	SCS Received 2017: 120,000 cy SCS Received 2018: 120,000 cy Annual Receiving Capacity: Unknown Remaining Capacity: Ongoing	

Notes:

1. Quantities of SCS and SSS received, annual receiving capacities and remaining capacities listed are estimated using expert professional judgement in consideration of information obtained from the various data sources listed.
2. As used in this report, the term "annual receiving capacity" reflects the maximum amount of material that is expected to be received annually at a given site based on observations of recent site behavior. "Construction reuse" and "unregulated soil placement" categories do not have capacity limits.

Permanente Quarry
Reclamation Plan Amendment
Aesthetics Technical Study

PERMANENTE QUARRY
RECLAMATION PLAN AMENDMENT

AESTHETICS TECHNICAL STUDY

MAY | 2019

Prepared for
Lehigh Southwest Cement Company

Preparer
Benchmark Resources

BENCHMARK RESOURCES

PERMANENTE QUARRY
RECLAMATION PLAN AMENDMENT

AESTHETICS TECHNICAL STUDY

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PERMANENTE QUARRY

AESTHETICS TECHNICAL STUDY

1. INTRODUCTION

Permanente Quarry (Quarry) is a limestone and aggregate mining operation located in the Santa Clara County foothills west of the city of Cupertino, as shown on Figure 1, "Regional Location." Lehigh Southwest Cement Company (Lehigh) operates the Quarry, which is subject to a reclamation plan most recently amended and approved by Santa Clara County (County) in 2012 (2012 Reclamation Plan). Lehigh proposes to amend the 2012 Reclamation Plan and obtain entitlements for related activities (collectively referred to herein as the "project"). This report presents an evaluation of potential aesthetic impacts associated with the project to support the County's environmental review of the proposed project under the California Environmental Quality Act (CEQA). Section 8 of this report provides a summary of the anticipated visual and aesthetic impacts based on the detailed evaluations presented in Sections 6 and 7.

The 2012 Reclamation Plan was approved by the County after conducting environmental review, which involved the preparation of an environmental impact report (EIR) (*Lehigh Permanente Quarry Reclamation Plan Amendment Environmental Impact Report* [2012 EIR]). The 2012 EIR included an evaluation of aesthetic (visual and lighting) impacts of the reclamation plan amendment proposed and ultimately approved at that time. This current study uses similar methods of analysis used for the 2012 EIR.

2. PROJECT SUMMARY

The proposed project involves four primary components that modify the 2012 Reclamation Plan. The primary components are summarized below, and the referenced areas are illustrated on Figure 2, "Existing Conditions Aerial Photograph." The sections below also discuss the approach for evaluating the potential aesthetic effects of each component (additional information regarding assessment methods is provided in Section 3, "Methodology").

Lehigh operates the Permanente Quarry in accordance with the 2012 Reclamation Plan and other entitlements, including a vested right to mine within certain parcels. Lehigh proposes to amend the 2012 Reclamation Plan and obtain related entitlements to accomplish the following primary project components:

1. Incorporate development and reclamation of the Rock Plant Reserve.
2. Regrade and mine the upper slopes of the north highwall to recover limestone, eliminate the need for a large fill buttress, and achieve long-term slope stability.
3. Reclaim the majority of the West Materials Storage Area (WMSA) in place.
4. Backfill the North Quarry using a combination of imported surplus construction soil that meets site-specific acceptance criteria and greenstone overburden to protect water quality.

These components are discussed in the following subsections. See Section 2.5, "Revegetation and Phasing," for details on vegetation of the site and timing of each component.

No changes in quarry operational hours or the type of lighting used for operations would occur as compared to existing operations. No night lighting would be used for reclamation activities.

Figure 3, "Key Project Components," shows key components of the proposed project. Figure 4, "Final Conditions Plan," provides a map of the topography and vegetation planned for the site at completion of reclamation and the phase in which activities will be completed. Figure 5, "Surrounding Land Uses," identifies the uses surrounding the Permanente Quarry.

2.1 Rock Plant Reserve Reclamation

Lehigh will conduct mining of the Rock Plant Reserve area pursuant to Lehigh's vested right to mine within the Rock Plant Reserve. Lehigh has a vested right to conduct surface mining operations in certain portions of the Permanente Quarry site, as determined in February 2011 by the County Board of Supervisors. These vested areas include the entirety of the 31-acre Rock Plant Reserve. Therefore, aesthetic and visual effects that may be associated with disturbance resulting from surface mining operations and related activities within the Rock Plant Reserve are not attributed to the proposed reclamation plan amendment and are not an impact of the proposed project. Nevertheless, this evaluation recognizes that vegetation removal and ground disturbance would occur associated with mining in the Rock Plant Reserve area; thus, this evaluation includes discussion of the potential effects of those activities.

Mining in the Rock Plant Reserve will result in development of a northwest-facing slope made up of benches (each approximately 50-feet-high), with slopes ranging from approximately 1:1 (horizontal:vertical) (1H:1V) to 2H:1V. The floor elevation of the excavation will be approximately 915 feet mean sea level (msl). Site preparation and mining is planned to occur following completion of mineral extraction in the North Highwall Reserve. (As discussed below, mineral extraction in the North Highwall Reserve is estimated to be completed 15–20 years following approval of the proposed project). One initiated, mining the Rock Plant Reserve will require up to approximately 10–15 years to complete.

Reclamation of the Rock Plant Reserve following mining is a component of the proposed project and the proposed reclamation plan amendment requires County approval. Reclamation of the Rock Plant Reserve would include a site-specific design for surface water runoff and for placement of fill and topsoil. Final reclamation under the proposed project would be initiated following the completion of mining and require up to approximately 5 years to complete. The benches would be revegetated with oak trees and other vegetation.

2.2 North Highwall Reserve

Under the proposed project, the North Highwall Reserve would be mined and reclaimed to create a flatter slope and long-term slope stability, which would result in a generally 100-foot lower ridgeline (to an approximate elevation of 1,400 msl). The slope would be angled back from the existing generally 1:1 horizontal to vertical (1H:1V) (45 degrees) to 1H:1.25V (38 degrees) and would include 50-foot-tall benches. The slope crest would be contour graded to blend with ridgeline topography, resoiled, and planted with native trees as a first phase of the project. This lowered ridgeline would occur within approximately 18–24 months of approval of the proposed reclamation plan amendment, and revegetation activities will begin as soon as mining of this area is complete. The current slope does not allow for revegetation, but the proposed slope would allow for revegetation and would be planted with native shrubs and grasses. The timing for the mining the entire North Highwall Reserve would depend on market conditions but is estimated to take approximately 15–20 years to complete. Revegetation would continue concurrent with mining, as mining on sections of benches is completed. Plantings will be monitored for a minimum of 5 years to ensure revegetation performance standards are met.

The North Quarry is within the area for which Lehigh has a vested right to mine. However, an approximately 20-acre portion of surface disturbance associated with accessing the North Highwall Reserve is within a *Ridgeline Protection Easement Deed* (1972 Easement) (Kaiser Cement & Gypsum Corporation 1972) and Lehigh is requesting entitlements to modify the easement allowing for mining and reclamation activities within that portion of the site. Therefore, this evaluation considers visual impacts associated with both mining-related and reclamation activities associated with the North Highwall Reserve component of the project.

2.3 West Materials Storage Area

The 2012 Reclamation Plan anticipates the movement of material from the existing WMSA to the North Quarry for backfill of the quarry. Under the proposed project, the majority of the WMSA would instead remain in place (see below for discussion of the proposed North Quarry backfill) allowing for final grading and revegetation of the WMSA. Overburden from mining the North Quarry could continue to be placed on the WMSA, and the WMSA would increase from the current maximum elevation of approximately 1,980 feet msl to approximately 2,060 feet msl (by approximately 80 feet msl). Placement of the additional overburden from mining the North Quarry and completion of revegetation would take approximately 10–20 years to complete. Potential visual effects of proposed additional materials placement and final reclamation of the WMSA under the proposed project are considered in this evaluation.

2.4 North Quarry Backfill

Reclamation of the North Quarry would involve placing fill materials into the North Quarry to a final floor elevation of 990 feet msl, which is the same elevation as planned in the 2012 Reclamation Plan. Backfill materials would include nonmarketable greenstone material produced from ongoing mining and would include imported surplus construction soil from regional construction projects. Under the proposed reclamation plan amendment, Lehigh would accept up to approximately 1 million cubic yards per year of imported surplus construction soil for a period of up to approximately 30 years.

2.5 Revegetation and Phasing

Revegetation of disturbed areas is a component of the project. Figure 4 illustrates the types of vegetation that will be planted on-site as component of reclamation. The proposed reclamation plan amendment includes a revegetation plan (WRA 2019) designed to reclaim disturbed lands to self-sustaining revegetated cover that support a postmining open space land use. The vegetation communities established will mature over time to be similar to surrounding natural areas. South- and west-facing slopes, which are warmer and drier, are designed to be scrub and chaparral habitats, while north- and east-facing slopes, which are cooler and moister, are designed to support woodlands. The different planting areas were determined using a solar radiation analysis of reclaimed slope contours.

Sloped areas and south-facing benches will be seeded or planted with native shrub and herb seeds and will grow into scrub and chaparral habitat. Flat areas with less intense solar radiation will be planted with container shrubs and trees and will grow into woodlands. North-facing benches will be planted with oak-woodland species. East-facing benches will be planted with a mixture of oak woodland species and native grey pine, which can tolerate the harsher solar exposures for such areas and create microhabitats that will allow more successful establishment of oak woodland over time. South-facing benches will be vegetated with chaparral and scrub species tolerant of the drier conditions. Eventually

these areas will develop into mixed oak woodland habitat that will blend in with the surrounding environment.

The revegetation plan (WRA 2019) also includes enhanced vegetation (additional trees) in areas of the site that would be visible from off-site locations, such as the visible benches of the North Highwall Reserve, the north-facing side of the WMSA, and the Rock Plant Reserve benches (tree placement locations are shown in Figure 4).

Table 1, "Reclamation Phasing," provides the various components of site reclamation and their estimated timing for completion. Figure 4 shows the phasing areas. Final revegetation would occur as soon as each area receives final grading. Thus, the upper areas of both the North Highwall Reserve and the Rock Plant Reserve would be revegetated before mining is completed at the lower areas.

TABLE 1
RECLAMATION PHASING[1]

Phase	Reclamation Component	Time Frame[2]	Description
I	North Highwall Reserve	10–20	• Ridgeline mining, grading, and stabilization (within approximately 18–24 months) followed immediately by ridgeline revegetation and monitoring. • Placement of greenstone slide material on quarry floor. • North Highwall Reserve concurrently mined and reclaimed with slopes meeting geotechnical specifications.
	North Quarry		• Placement of on-site and imported fill where no conflict with access to reserves will occur.
	West Materials Storage Area		• Placement of final fill and regrading of surfaces to geotechnical specifications. • Revegetation and monitoring.
II	North Quarry	15–30	• Mining completed. • Continued backfill with on-site and imported fill.
	East Materials Storage Area		• Final surface preparation, revegetation, and monitoring.
	Rock Plant Reserve		• Mining and reclamation of highwalls concurrently. • Installation of drainage controls. • Grading and revegetation of floor. • Overburden placed in North Quarry. • Vegetation monitoring.
III	North Quarry	30–40	• Final fill elevation reached (+/-990 mean sea level). • Completion of removal of construction aggregate stockpiles. • Installation of final drainage controls. • Revegetation and monitoring.
	Operations Areas		• Reclamation of the conveyor tunnel after the conveyor is dismantled and removed. • Completion of removal of construction aggregate stockpiles. • Revegetation of all remaining areas. • Monitoring all areas for erosion and vegetation until success criteria is met.

Notes:

1 Phasing, tasks, and timing subject to specifications and future updates to waste discharge requirements by the San Francisco Bay Regional Water Quality Control Board.

2 Years after approval of the reclamation plan amendment.

3. METHODOLOGY

This section describes the methodology used to assess how implementation of the proposed project would visually affect the existing site and its surroundings. Consistent with the County Environmental Checklist and Appendix G of the CEQA Guidelines, the project would have a significant impact if it would:

a) have a substantial adverse effect on a scenic vista;
b) substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
c) in nonurbanized areas, substantially degrade the existing visual character or quality of public views (i.e., views experienced from publicly accessible vantage points) of the site and its surroundings (reflects applicable revisions pursuant to CEQA Guideline amendments of December 2018);
d) create a new source of substantial light or glare which would adversely affect day or nighttime views in the area;
e) if subject to Architecture and Site Approval (ASA), be generally in noncompliance with the guidelines for ASA; or
f) if within a Design Review Zoning District for purposes of viewshed protection (d, -d1, -d2), conflict with applicable General Plan policies or County Zoning Ordinance provisions.

This report addresses potential impacts associated with criteria a through d, above. Criteria e and f apply to the construction or major modification of buildings and structures requiring ASA and design review. The proposed project does not include the construction of buildings or structures that require such review, therefore, no potential for impacts associated with criteria e and f would occur and these issues are eliminated from further consideration.

To address potential impacts associated with criteria a through c, the analysis herein uses representative viewpoints and photographic simulations to document anticipated changes in the aesthetic and visual character of the site as viewed from off-site locations. The sections below discuss the selection and locations of representative viewpoints, the simulation scenarios, the existing visual setting, viewer sensitivity, the changes to existing views, and the effect of those changes on viewers. Potential impacts associated with criteria d, regarding light and glare, are evaluated as described in Section 6, "Project Impacts and Mitigation Measures."

3.1 Representative Viewpoints

Representative viewpoints are used to assess a project's potential for aesthetic impacts to the surrounding area. To determine representative viewpoints of the project site, Benchmark Resources (Benchmark) reviewed aerial photographs, topography, site plans, previous visual analysis conducted for the 2012 EIR, and County requirements and guidance (e.g., general plan, codes, and ordinances).

Seventeen representative viewpoints were selected at publicly accessible locations that were considered representative of the area or of locations from which a viewer would have the most potential to experience a change in visual character as a result of the project. Appendix A, "Viewpoint Simulation Selection," provides a map (Figure A-1, "Viewpoint Locations") showing the seventeen viewpoint locations and direction of view and photographs (Figure A-2, "Viewpoint Photographs") showing the view toward the Quarry from each viewpoint. Appendix A also provides a discussion of the process and

rationale for selecting certain viewpoint photographs for simulations, as discussed in Section 3.2, "Photographic Simulations."

Many of the viewpoints discussed in Appendix A are the same as those used in the 2012 EIR analysis, but photographs were retaken in the fall of 2018 (on the dates specified in Appendix A) to reflect existing conditions. Additional viewpoints were added to represent views from the Los Altos, Los Altos Hills, and Cupertino areas to ensure that this analysis provides full disclosure of all potential project effects.

Photographs from each viewpoint were taken from approximately 5½ feet above ground level to the approximate eye level of a standing human. The camera lens was adjusted to duplicate the perspective of the human eye (approximately 55 millimeters).

3.2 Photographic Simulations

As discussed in Appendix A, Benchmark created photographic simulations for eight of the viewpoint locations. These simulations illustrate the visibility of project components. Figure 6, "Simulated Viewpoint Locations and Scenic Roadways," shows the locations of the eight simulated viewpoints and the direction of view toward the Quarry from each viewpoint. Table 2, "Simulated Viewpoints and Attributes," lists the viewpoints selected for photographic simulation and their attributes as representative viewpoints for this evaluation.

TABLE 2
SIMULATED VIEWPOINTS AND ATTRIBUTES [1]

No.	Description	Attributes
1	Anza Knoll	A special interest location with a view from east of the project site with high site visibility.
2	Canyon View Circle	View from southeast of the project site with high site visibility. Similar view angle to views from Masie's Peak and Coyote Ridge Trail in the Fremont Older Open Space Preserve, but closer to the project site and provides more direct views of the project components.
3	Northbound I-280 from Mary Avenue Bicycle Footbridge	Representative view from east of the project site with high site visibility. Representative of views from Steven's Creek Boulevard near SR 85, but with increased site visibility.
4	Northbound SR 85 near Quito Road	Representative view from southeast of site and SR 85. Representative of views from northbound De Anza Boulevard on the SR 85 overpass and from Bascom Avenue near SR 85, but with increased site visibility.
5	La Rena Lane	Representative view from north of the site with views of the ridgeline where North Quarry highwall lay-back activities would occur.
6	Stonebrook Drive	Representative view from north of the site with views of the ridgeline where North Quarry highwall lay-back activities would occur.
7	Mora Drive and Mora Trail	Representative view from north of the site with views of the ridgeline where North Quarry highwall lay-back activities would occur.
8	Entrance to Rancho San Antonio County Park	A special interest location northeast of the site, with potential views of the North Quarry.

Notes: I-280 = Interstate 280; SR 85 = State Route 85.

Photographic simulations were prepared for this evaluation as a tool to show the degree to which the project components could affect a viewshed. In general, viewpoints from which project components would be visible were selected for simulation. Viewpoints that were not selected for simulation were

those from which project components would not be visible or were sufficiently represented by another viewpoint selected for simulation (Appendix A provides additional discussion of the selection process).

Photographic simulations were prepared to illustrate (1) conditions at the maximum extent of mining visible from each viewpoint to show the maximum extent of disturbed areas visible and (2) 5–10 years after final reclamation begins to show initial revegetation plant growth and cover. Simulations were prepared by first creating a 3D model of the topography for the project site and surrounding area, including the topography of the completed project. Then an image of the model was created from each viewpoint's Global Positioning System (GPS) location within the model. Figure 7, "Digital Terrain Model," shows a 3D topographic model as an example of the tools used for preparing the simulations. Each resulting image was aligned with the relevant existing conditions photograph. The photographs were then altered using the computer software program, Photoshop, to reflect the topography in the 3D model, the exposed surfaces under mined conditions, and exposed surfaces and vegetation under reclaimed conditions. Vegetation representations are based on the revegetation plan component of the proposed reclamation plan amendment. Plant growth shown at 5–10 years reflects the average growth and coverage expected based on plant species and site conditions. For simulations representing 5–10 years following the completion of mining of the North Highwall Reserve and the Rock Plant Reserve, upper benches of mined surfaces would be expected to have additional vegetation coverage because these areas would be revegetated before mining concludes in the lower areas. The simulations, therefore, provide a conservative illustration of reclaimed conditions (i.e., showing less vegetation cover than can reasonably be expected within the representative time period.)

3.3 Visual Assessment

The analysis of aesthetics presented herein is a qualitative, yet methodical analysis that compares the existing visual setting to the future visual setting with implementation of the project. To illustrate site changes over time, the assessment considers the visual character and impacts of the site for maximum disturbance before reclamation and reclamation and revegetation approximately 5–10 years after initial revegetation).

Aesthetics and visual quality are subjective and reasonable people might disagree as to whether changes to the existing visual character of an area are adverse or beneficial and whether such changes are substantial. However, modifications that result in visual disturbance to more natural areas through removal of vegetation and creation or exposure of barren surfaces earth or the presence of heavy equipment are typically considered adverse, whereas the retention or restoration of vegetation cover and absence of equipment or other indications of mining and reclamation activities are considered favorable and beneficial.

The existing visual quality and character of the project site and surrounding area were assessed, including existing visual elements, features, and land uses. For consistency with the 2012 EIR, this assessment uses the terminology to assess the visual sensitivity of the existing environment, as defined in the 2012 EIR:

> **Visual Quality** is defined as the overall visual impression or attractiveness of an area as determined by the particular landscape characteristics, including landforms, rock forms, water features, and vegetation patterns. The attributes of line, form, and color combine in various ways to create landscape characteristics whose variety, vividness, coherence, uniqueness, harmony, and pattern contribute to the overall visual quality of an area. For the purposes of this EIR, visual quality is defined according to three levels:

- *Indistinctive, or industrial:* generally lacking in natural or cultural visual resource amenities typical of the region
- *Representative:* typical or characteristic of the region's natural and/or cultural visual amenities
- *Distinctive:* unique or exemplary of the region's natural or cultural scenic amenities.

Viewer Exposure addresses the variables that affect viewing conditions from potentially sensitive areas. Viewer exposure considers the following factors:

- Landscape visibility (i.e., the ability to see the landscape)
- Viewing distance (i.e., the proximity of viewers to the project)
- Viewing angle—whether the project would be viewed from above (superior), below (inferior) or from a level (normal) line of sight
- Extent of visibility—whether the line of sight is open and panoramic to the project site or restricted by terrain, vegetation and/or structures
- Duration of view

Viewer Types and Volumes of use pertain to the types of use (i.e., public viewers including recreationalist and motorist) and amounts of use (i.e., number of recreational users or motorists) that various land uses receive.

Visual Sensitivity is the overall measure of an existing landscape's susceptibility to adverse visual changes. People in different visual settings, typically characterized by different land uses surrounding a project, have varying degrees of sensitivity to changes in visual conditions depending on the overall visual characteristics of the place. In areas of more distinctive visual quality, such as designated scenic highways, designated scenic roads, parks, and recreation and natural areas, visual sensitivity is characteristically more pronounced. In areas of more indistinctive or representative visual quality, sensitivity to change tends to be less pronounced, depending on the level of visual exposure. This analysis of visual sensitivity is based on the combined factors of visual quality, viewer types and volumes, and visual exposure to the project. Visual sensitivity is reflected according to high, moderate, and low visual sensitivity ranges.

4. VISUAL SETTING

The existing visual setting includes the project site and surrounding areas that contribute to the visual character of the project site as they presently exist. This section describes the visual characteristics of the project site and surrounding areas.

4.1 Project Site and Surrounding Area

The project site is within the eastern foothills of the Santa Cruz Mountains, which are part of California's Coast Range and separate the San Francisco Bay from the Pacific Ocean along most of the San Francisco Peninsula. Much of the Coast Range remains undeveloped. Within the Permanente Quarry site and surrounding areas are large open space areas that are generally undeveloped, with the exception of limited roads and trails are both. The site is bordered by large open space areas to the north, south, and west. To the north and northeast are Rancho San Antonio County Park (which is connected to several open space preserves, including Montebello Regional Open Space and Los Trancos Regional Open Space) and Midpeninsula Regional Open Space District (MROSD) land. These open space areas are distinct from more intensive land uses and developments, including mining and processing areas within the

Permanente site and the adjacent Permanente Cement Plant (east of Permanente Quarry), Steven's Creek Quarry (south of Permanente Quarry), and developed urban and suburban areas, including Los Altos, Cupertino, Saratoga, Los Altos Hills, and other cities and developed area within the greater south San Francisco Bay area north, east, and southeast of Permanente Quarry.

The Lehigh property is a total of 3,510 acres, 2,656 of which are in unincorporated Santa Clara County and 854 of which are located within the cities of Palo Alto and Cupertino. Approximately 629 acres of the property are highly disturbed from mining and mineral processing activities, including the main excavation area (North Quarry), west and east materials storage areas (WMSA and East Materials Storage Area [EMSA]), and processing plant facilities. The majority of the remaining 2,899 acres of the site are relatively undisturbed, steep, heavily vegetated, and have limited access. Access to the site is from the east via Stevens Creek Boulevard. No public roads exist within the property.

Permanente Quarry includes existing surface mining disturbances related to mineral extraction, overburden storage, roads, exploration areas, and ancillary facilities. The quarry primarily produces limestone suitable for cement or aggregate production subject to market demands and greenstone suitable for road base or other aggregate products. These materials are extracted from a single pit (the North Quarry). "Surface mining" includes the process of obtaining minerals such as rock or aggregate materials by removing topsoils and overburden (i.e., materials that are not suitable for use as limestone or aggregate) and excavating the mineral commodities. Materials are excavated by drilling, blasting, and loaders or excavators. Materials are then hauled to a processing area using trucks and conveyors. Materials are processed using crushers located southeast of the North Quarry. Material may be further processed into aggregate products at the Rock Plant, located in the far southeast portion of the quarry. Material is also conveyed to the adjacent Permanente Cement Plant, which lies adjacent to the quarry on the east. The Permanente Cement Plant is separately permitted and not part of the Permanente Quarry site.

Final slopes are graded and benched to specifications for slope stability. Overburden is moved to various locations on-site. The WMSA is the overburden stockpile area located west of the North Quarry. The EMSA is another overburden stockpile area located to the east of the North Quarry. Permanente Creek flows west to east through the site within a defined stream channel lined by riparian vegetation. The area south of Permanente Creek includes roads and disturbed areas related to past exploration for materials. Figure 2 identifies the location of key features on-site.

The predominant visual character of the project site where mining, overburden placement, and operations occur is heavy industrial. However, surrounding portions of the site provide large areas of relatively undisturbed, densely vegetated, visually distinctive open space. Maintenance of previously disturbed areas that already have been revegetated includes monitoring of native grass species, shrubs and trees, irrigation as necessary to encourage the establishment of planted trees and shrubs and installation, and monitoring of the protective cages that have been installed around most container plantings to reduce damage caused by browsing deer. Nonquarrying uses and activities occurring in the project site include plowing for fire breaks and construction and maintenance of dirt roads.

4.2 Existing Light Sources

The quarry operates up to 24 hours per day, 365 days per year. Night lighting is used when necessary for safety and nighttime operations at various locations within the site. On-site vehicle lighting and mobile light towers are used for mining and overburden movement and placement, including within the North Quarry and WMSA. Lights are repositioned as needed in various areas of the site as needed for safe and

efficient operations. Mobile lights are positioned to direct light toward work areas, minimize glare onto neighboring areas, and comply with the County Zoning Code, which requires the use of certain types of light fixtures on nonresidential properties to minimize the amount of light cast on adjoining properties and to the night sky. Generally, pole-mounted sodium, metal halide, or fluorescent lighting are employed to minimize energy use and, in combination with cut-offs, to reduce light pollution. The surrounding area includes sources of light from street lights, residences, businesses, vehicles in the surrounding communities and the city of Cupertino, and periodic lighting from nighttime operations at Steven's Creek Quarry. Other light exists from vehicles on major freeways nearby, such as SR 85 and I-280.

4.3 View Types and Exposures

Public viewer groups and vantage points from the surrounding area were considered to assess how the public would perceive changes in site conditions associated with the proposed project. The vantage points include those consider to be the most visually sensitive locations. Public viewer groups and view locations assessed include:

- **Motorists along major and scenic roadways:** I-280 (State Eligible Scenic Highway and County-designated State Scenic Route); SR 85 and Foothill Boulevard/Expressway (County Scenic Freeways, Expressways, Arterial, and Rural Routes); Montebello Road (County Local Road Needing Scenic Protection); and Stevens Creek Boulevard and De Anza Boulevard (major roadways in the study area);
- **Motorists along minor travel routes (e.g., residential neighborhoods):** Canyon View Circle near Lindy Lane in Cupertino; La Rena Lane in Los Altos Hills, Stonebrook Drive in Los Altos Hills, and Columbus Avenue and Linda Vista Drive in Cupertino;
- **Visitors to recreational areas:** Rancho San Antonio Open Space Preserve, Rancho San Antonio County Park, and Fremont Older Open Space Preserve; and
- **Designated scenic vistas:** Anza Knoll (Rancho San Antonio County Park) and Maisie's Peak (Fremont Older Open Space Preserve).

For each of the viewer groups identified in the study area, viewer exposure conditions were assessed. Study area reconnaissance was conducted September 26 and 27 and November 3, 2018. The viewing distance, angle of view, the extent to which views are screened or open, and duration of view were assessed. Viewing distances are described according to whether the project activities would be viewed within the foreground, middleground, or background. Viewing angle and extent of visibility relate to the location of the viewed feature to the viewer and whether visibility conditions are open or panoramic or limited by intervening vegetation, structures, or terrain.

Duration of view pertains to the amount of time the project site or facilities typically would be seen from a sensitive viewpoint. In general, duration of view would be less in instances where the project would be seen for short or intermittent periods (such as from major travel routes and recreation destination roads) and greater in instances where the project would be seen regularly and repeatedly (such as from public use areas).

Table 3, "Visual Sensitivity of Assessed View Locations," summarizes the visual quality, viewer exposure, and visual sensitivity for the various viewer categories and view locations assessed in this evaluation. Sections 4.3.1 through 4.3.4 provide additional discussion for each of the viewer categories and view locations.

TABLE 3
VISUAL SENSITIVITY OF ASSESSED VIEW LOCATIONS

Viewer Type/Location	Visual Quality	Viewer Exposure and Volumes	Visual Sensitivity
MOTORISTS ON MAJOR TRAVEL ROUTES			
Foothill Boulevard/ Expressway	Distinct/ representative	**Exposure:** Partially to fully obstructed views in middleground and background Volume of viewers: Low to moderate View duration: Short	Low to Moderate
Interstate 280	Distinct	**Exposure:** Partially to fully obstructed in middleground and background Volume of viewers: High **View duration:** Short to medium	Moderate
Stevens Creek Boulevard	Representative	**Exposure:** Open to fully obstructed views in middleground and Background Volume of viewers: Moderate to high View duration: Medium	Moderate
De Anza Boulevard	Representative	**Exposure:** Partially to Fully Obstructed Views in Background Volume of viewers: High View duration: Short	Low to Moderate
State Route 85	Distinct/ representative	**Exposure:** Open and panoramic to fully obstructed views in middleground and background Volume of viewers: High **View duration:** Short to Medium	Moderate to high
Montebello Road	Distinct	**Exposure:** Fully obstructed background views Volume of viewers: Low View duration: None	None
MOTORISTS ON MINOR TRAVEL ROUTES			
La Rena Lane	Distinct/ representative	**Exposure:** Partially to fully obstructed background views Volume of viewers: Low View duration: Short	Low
Stonebrook Drive	Distinct/ representative	**Exposure:** Open to fully obstructed views in foreground, middleground, and background Volume of viewers: Low **View duration:** Short to medium	Low to Moderate
Columbus Avenue/Linda Vista Drive	Representative	**Exposure:** Nearly fully obstructed views in background Volume of viewers: Low View duration: Short	Low
Canyon View Circle	Distinct	**Exposure:** Partially to fully obstructed background views Volume of viewers: Low View duration: Short	Low
RECREATIONAL AREAS			
Rancho San Antonio County Open Space	Distinct	**Exposure:** Open and panoramic views in foreground, middleground, and background	High

Viewer Type/Location	Visual Quality	Viewer Exposure and Volumes	Visual Sensitivity
Preserve (Mora Trail)		Volume of viewers: High View duration: Medium	
Rancho San Antonio County Park (Hammond-Snyder Loop Trail, Cristo Rey Drive)	Distinct/ representative/ industrial	**Exposure:** Partially to fully obstructed views in middleground Volume of viewers: High View duration: Medium	High
Fremont Older Open Space Preserve (Coyote Ridge Trail)	District	**Exposure:** Open and panoramic to fully obstructed views in background Volume of viewers: High View duration: Medium	High
SCENIC VISTAS			
Rancho San Antonio County Park (Anza Knoll)	Distinct/ industrial	**Exposure:** Open and panoramic views in middleground Volume of viewers: High View duration: Short	Moderate to high
Fremont Older Open Space Preserve (Maisie's Peak)	Distinct	**Exposure:** Open and panoramic views in background Volume of viewers: High View duration: Short	High

Source: Benchmark Resources in 2019

4.3.1 Motorists on Major or Scenic Travel Routes

As discussed above, scenic and major highways and routes in the study area include I-280, SR 85, Foothill Boulevard/Expressway, Montebello Road, Stevens Creek Boulevard and De Anza Boulevard. Traffic volumes are classified as low (approximately less than 10,000 vehicle trips per day), moderate (approximately 10,000 to 20,000) and high (approximately more than 20,000 vehicle trips per day).

Interstate 280

I-280 is an important regional travel corridor within the study area, with eight-lanes running north-south to connect the cities of San Francisco and San Jose. As indicated in Figure 6, I-280 is an Eligible State Scenic Highway from SR 17 to the northwest border of the County, and a designated State Scenic Route in the *Santa Clara County General Plan* (General Plan). The character of I-280 near the project is visually distinct; motorists are surrounded by scenic views of the Santa Cruz Mountains to the west, and views of cities to the east of I-280 are screened by intervening hills. The landscape is distinct and dominated by trees, vegetation and hillsides, though views become more representative as the highway travels through urban centers including the city of Cupertino.

The project site is located approximately 1 mile southwest of the closest segment of I-280, and would be viewed in middle to background distance. In the study area, traffic volumes are high. Given the hilly topography and prevalence of tall trees along I-280, views of the project site are generally fully screened from motorists' views. However, the project site is visible from segments of the highway, particularly for northbound travelers east of the I-280/SR 85 interchange. For northbound motorists traveling on I-280, views of the project site are moderated by the distance to the project site and by other intervening visual features including highway overpasses, signage, landscaping, roads, and buildings. Views toward the site are dominated by natural features associated with vegetated hillsides and open space uses that surround

the site. Industrial features in the project site and other areas within the viewshed from I-280 mark an interruption in vegetation, and portions of the project site appear as exposed rock amidst vegetated open space areas. Motorists' views from I-280 would be of short to medium duration because they would be exposed partially screened views of the project site for short distances. Given the distinct visual quality of the area, the high number of viewers, short to moderate view duration, and distance from which the project would be viewed, visual sensitivity of I-280 to the proposed changes is considered moderate.

Appendix A provides photographs of existing conditions representative of views for motorists on I-280. The Viewpoint 3 photograph in Appendix A, Figure A-2 (page 2 of 11), shows the existing view toward the project site from the Mary Avenue Bicycle Footbridge, which spans I-280, approximately 2 miles from the project site. This perspective represents views seen by northbound motorists traveling north on I-280, looking southwest. The Viewpoint 10 photograph in Appendix A was taken from the I-280 southbound off-ramp near El Monte Road in Los Altos Hills, approximately 3 miles north of the project site. Viewpoint 10 represents the brief, partially obstructed view of the north side of the North Quarry ridgeline experienced by southbound motorists on this segment of I-280. Viewer sensitivity in this area is considered moderate because of the high number of viewers combined with the short to medium duration of partially to fully obstructed views.

State Route 85

SR 85 is a north-south highway connecting the cities of Mountain View and San Jose. From U.S. Highway 101 south to I-280, SR 85 is designated by the General Plan as a Scenic Freeway, Expressway, Arterial, or Rural Route (Santa Clara County 2008). Near the project site, the highway is six lanes, and the visual character of the landscape is mixed, comprising trees and hills in the background to the west, and residential and commercial developments in the fore and middleground to the east and west. Utility structures are an established feature along the highway, and highway on-and off-ramps are prominent along SR 85. The visual quality of the portion of SR 85 near the project site is representative of highway-oriented development in the County, with views of visually distinct hills in the background. Traffic volumes along SR 85 in the study area are high. The project site is approximately 1.5 miles west of SR 85 at its closest location, and views of the site from SR 85 would be within middleground and background ranges. Because of the orientation of the project site and intervening topography and structures, some portions of the project site (including portions of the EMSA) are visible to motorists heading northbound on SR 85. Motorist traveling north on SR 85 near Quito Road, southeast of the Saratoga Avenue on-ramp, is the segment of SR 85 from which motorists would have the most direct views of the project site. This segment is not designated scenic. Northbound motorists along this segment have clear and unobstructed background views of existing disturbed mining areas near the ridgeline. The project site is viewed within the context of mining-related disturbance and processing facilities/structures, with patches of exposed rock partially covered with stockpiles of overburden deposits visible from some portions of the segment of northbound SR 85. Views of the project site range from open and panoramic to fully obscured by the surrounding hilly terrain, curves in the road, and structures, depending on the motorist's location along this segment of SR 85. View duration is short to medium, depending on the length of time the motorist is on SR 85, the location of the motorist, and the speed with which the motorist is traveling. Given the representative to distinct visual quality of the road, the high number of viewers, the short to medium view duration and open visibility, overall viewer sensitivity is moderate to high for SR 85.

The Viewpoint 12 photograph in Appendix A, Figure A-2 (page 8 of 11), shows the view of a motorist looking northeast over SR 85 from the Bascom Avenue overpass in the city of Campbell, toward the SR 17 interchange (a segment of SR 85 that is not designated scenic). The Viewpoint 4 photograph in Appendix A shows the view from the perspective of a motorist traveling north on SR 85 near Quito Road, southeast

of the Saratoga Avenue on-ramp, looking northwest. This location represents one of the clearest views of the project site from this segment of SR 85. This perspective is representative of views seen by motorists traveling north on SR 85, and photographic simulations have been prepared for Viewpoint 4, as discussed further in Section 6 of this report.

Foothill Boulevard/Expressway

Foothill Boulevard/Expressway is a County Scenic Freeway, Expressway, Arterial, and Rural Route that generally runs in a northwest/southeast direction north of I-280 (Foothill Expressway), and a north-south direction south of I-280 (Foothill Boulevard) (Santa Clara County 2008). The areas surrounding the four-lane road are flat to the east, and characterized by residential and commercial structures. To the west of the road, the surrounding areas range from flat to hilly, and are dominated by residential structures and associated buildings such as schools and churches, as well as landscaping including trees, shrubs and flowers. Views generally encompass a suburban, residential, and commercial landscape. The visual quality of the area is representative of this portion of the County, punctuated by views of distinctive natural scenic amenities, including the Santa Cruz Mountains, to the west.

Foothill Boulevard is located directly east of the site and serves as a connecting road for vehicles traveling between the site and I-280. As viewed from Foothill Expressway the project site is within middleground and background of the viewshed. In the study area, traffic volumes range from low to moderate. To see the project site from Foothill Expressway, a motorist would need to look to the southwest, away from the direction of travel, and would only have brief glimpses of portions of the site in an opening between mature stands of trees. Views of project site along Foothill Boulevard/Expressway would be fleeting and visible primarily only while passing through intersections. With the exception of intersection crossings, views are fully obscured by intervening topography. Given the representative and distinct visual quality of the area, the low to moderate number of viewers, short view duration, and low visibility, visual sensitivity to the changes proposed by the project is considered low to moderate.

The Viewpoint 13 photograph in Appendix A, Figure A-2 (page 8 of 11), shows the view at the intersection of Foothill Expressway and South Springer Road in the city of Los Altos and is considered representative of the limited opportunities of views toward the site from Foothill Boulevard/Expressway. The photograph represents the perspective of a motorist at the traffic light on South Springer Avenue facing southwest, about to cross Foothill Expressway. As the photograph shows, to see the project site from Foothill Expressway, a motorist would need to look to the southwest, away from the direction of travel, and would only have brief glimpses of portions of the site in an opening between mature stands of trees.

Stevens Creek Boulevard

Stevens Creek Boulevard in the cities of Cupertino and Santa Clara is a major roadway in the study area. Stevens Creek Boulevard is located directly east of the site and serves as a main access point for vehicles traveling between the site and SR 85. The roadway runs east-west and ranges from a two-lane to an eight-lane arterial. Views along Stevens Creek Boulevard are dominated by the urban streetscape, low-rise commercial structures along each side of the boulevard, and a variety of landscaping, ranging from low-lying shrubs to 30-foot mature trees. The visual quality of Stevens Creek Boulevard is representative of the residential/commercial portion of the cities of Cupertino and Santa Clara. Stevens Creek Boulevard is not a designated scenic roadway.

Traffic volumes on Stevens Creek Boulevard in the study area range from moderate west of SR 85 to high east of SR 85. The project site is west of the road, and views of the site would be within middleground

and background ranges. Views of the project site from Stevens Creek Boulevard include vegetated foothills that serve as a scenic backdrop to the otherwise urban quality of the boulevard. The project site is viewed within the context of mining-related disturbance and processing facilities/structures and appears as patches of exposed rock partially covered with stockpiles of overburden deposits. The color of overburden materials appears as mostly grey in long-range views of the site and the contrast between overburden materials and the vegetated, gently sloped surrounding terrain is clearly discernible. However, views of the project site from the boulevard are moderated somewhat by the relatively long distance to the project site, and by other intervening visual features, including landscaping, roads, and buildings. Given the representative character of the road, the moderate to high number of viewers, the medium view duration and partially screened to open visibility, overall viewer sensitivity is moderate for Stevens Creek Boulevard.

The Viewpoint 14 photograph in Appendix A, Figure A-2 (page 9 of 11), shows motorists' perspective traveling east on Stevens Creek Boulevard, just east of the SR 85 interchange, approximately 2 miles from the project site, and is considered representative of views toward the site from Stevens Creek Boulevard under existing conditions.

De Anza Boulevard

De Anza Boulevard is a major roadway that traverses SR 85 in City of Campbell, approximately 3 miles southeast of the project site, and provides views of the project site from several intersections along the roadway. The roadway runs north-south and with six lanes near the SR 85 interchange. Views along De Anza Boulevard are dominated by the urban streetscape, consisting of low-rise commercial structures along each side of the boulevard including shopping centers, gas stations, and office buildings, and a variety of landscaping. The visual quality of De Anza Boulevard is representative of urban development in the County.

Traffic volumes on De Anza Boulevard in the study area are high. The project site is west/northwest of the roadway, and views of the area would be within background range. The project site is to the west and not within direct view of northbound travelers. In views from De Anza Boulevard, the project site is visible in the distance as patches of exposed rock partially covered with stockpiles of overburden deposits on the otherwise vegetated scenic foothills. However, views of the project site from De Anza Boulevard are generally partially to fully screened by intervening topography and buildings, and are moderated somewhat by the relatively long distance to the project site, and by other intervening visual features, including landscaping, roads, and commercial and residential buildings. Given the representative character of the road, the high number of viewers, the short view duration and partially to fully screened visibility, overall viewer sensitivity is low to moderate for De Anza Boulevard.

The Viewpoint 11 photograph in Appendix A, Figure A-2 (page 7 of 11), represents the view of a motorist traveling north on De Anza Boulevard near the SR 85 overpass, approximately 3 miles from the project site, and is considered representative of existing conditions along this segment of De Anza Boulevard.

Montebello Road

Montebello Road, located south of the project site in an unincorporated area of the County, is designated as a County Local Road Needing Scenic Protection (Santa Clara County 2008). However, the project site is not visible from Montebello Road. Thus, the project would not have the potential to adversely affect views from Montebello Road and it is not analyzed further in this study.

4.3.2 Motorists on Minor Travel Routes

In addition to the major roads discussed in Section 4.3.2, this evaluation considers potential visual impacts to motorists on minor travel routes, including local streets and roads. Representative areas and locations were selected for this evaluation, including Canyon View Circle in Cupertino, La Rena Lane in Los Altos Hills, Stonebrook Drive in Los Altos Hills, and Columbus Avenue and Linda Vista Drive in Cupertino. Each of these is a two-lane residential road with low travel volumes, traveled mainly by residents in the area. Canyon View Circle is located in an elevated area of Cupertino. Views along public roads in this area are of a more natural landscape combined with residential homes. With the exception of one location along the public portion of this road, views of the site are fully obstructed by foreground topography, vegetation, and structures. From La Rena Lane and Stonebrook Drive, north of the site, distant views of the North Quarry ridgeline to the south are available from limited locations. Travel along these winding roadways offers mainly foreground views of the natural landscape combined with residential homes, which obstruct distant views toward the site. The La Rena Lane and Stonebrook Drive viewpoints represent those distinct views that are intermittently and briefly available from a vehicle.

Views from Columbus Avenue and Linda Vista Drive in Cupertino are representative of public views from residential neighborhoods in the Cupertino area. The terrain is flat and foreground objects (vegetation and structures) obstruct all distant views toward the project site.

The visual sensitivity of these minor travel routes and others in the study area are considered low or low to moderate based on the partially to fully obstructed background views toward the project site, relatively low number of public viewers, and the short viewing duration from the limited locations where views toward the project site are available. Photographs of existing conditions from representative viewpoints for these roads are provided in Appendix A, Figure A-2.

4.3.3 Parks, Recreation Areas, and Scenic Vistas

This evaluation includes consideration of potential visual effects of the project on views from parks, recreation areas, and scenic vistas. Views of the project site are limited because of screening by intervening topography, structures, trees and other vegetation. However, potential views of the project site occur from areas within Rancho San Antonio Open Space Preserve, Rancho San Antonio County Park, and Fremont Older Open Space Preserve. These views are discussed in the following subsections.

Rancho San Antonio Open Space Preserve and County Park

The 3,988-acre Rancho San Antonio Open Space Preserve is located adjacent to and north of the project site. The 165-acre Rancho San Antonio County Park is located adjacent to the eastern edge of the Rancho San Antonio Open Space Preserve and approximately 0.25 mile north of the eastern portion of the project site. Visitors to the Rancho San Antonio Open Space Preserve must park at the Rancho San Antonio County Park and trails are contiguous between the preserve and the park. Therefore, two areas are addressed collectively in this document and referred to as the Rancho San Antonio Preserve/Park. These areas provide hiking, bicycling, equestrian trails, and other recreational opportunities to the public.

The Rancho San Antonio Preserve/Park provides views toward the project site from many locations. Visitors have more pronounced views toward the project site from trails. Views from Mora Drive and Mora Trail include the north side of the North Quarry ridgeline. Viewer sensitivity is considered high because of the open and panoramic views in foreground, middleground, and background; the number of public viewers; and the medium duration of the view while hiking on the Mora Trail.

Another trail in the preserve/park is the PG&E Trail, which is mostly situated on the north-facing slope of the hillside along the north side of the western portion of the project site. Views of the ridgeline from the PG&E Trail are nearly fully screened by intervening topography and vegetation.

The Hammond-Snyder Loop Trail trailhead is on Cristo Rey Drive in the City of Cupertino, approximately 1 mile northeast of the project site. The project site is visible from this location and existing conditions at the project site represent an industrial component in a viewshed that also includes residential areas representative of the local suburban landscape. From this location, the project site is partially blocked by the Permanente Cement Plant. Areas of existing disturbance within the project site are at lower elevations than the highest ridgeline and this somewhat reduces the prominence of existing disturbed areas and facilities among the adjacent vegetated hillsides. The distinctive domes and towers of the Cement Plant are visible from this vantage point. Views of the project site are visible intermittently along the approximate 3-mile Hammond-Snyder Loop Trail. Although views include the distinct industrial visual character of the existing mining-related disturbance and Permanente facilities, the overall visual sensitivity of the viewshed from the Hammond-Snyder Loop Trail is considered high due to the partially to fully screened views of the project site, the middleground viewing distance, the medium duration of view, and the high number of viewers.

The Anza Knoll is a designated scenic vista accessible from the Hammond-Snyder Loop Trail, approximately 1 mile northeast of the project site. The Anza Knoll provides a bench overlooking the San Francisco Bay, Santa Clara Valley, and surrounding mountains to the east and away from the project site. Views from this location include developed areas surrounding the bay, but are considered scenic and distinct for visitors facing north (San Francisco Bay), east (Santa Clara Valley), and south (surrounding mountains). Views toward the west contain industrial elements, including a large substation and disturbed areas and facilities associated with Permanente operations, including the distinctive domes and towers of the Cement Plant. Although the scenic vista includes open and panoramic views of the project site within the foreground when facing west, given the east-facing direction of the bench and the informational placard for viewers facing east, the project site is not a part of the viewshed that makes up the designated scenic vista. However, this evaluation anticipates that visitors at this location would also experience views toward the project site. Because of the distinct visual quality surrounding the vista, the high number of visitors, and short to medium view duration, visual sensitivity at Anza Knoll is considered moderate to high.

Photographs showing existing conditions from representative view locations are provided in Appendix A, Figure A-2, including the views toward the site from Mora Drive and Mora Trail (Viewpoint 7), the Hammond-Snyder Loop Trail trailhead (Viewpoint 16), and Anza Knoll (Viewpoint 1). Viewpoint 1 at Anza Knoll and Viewpoint 7 at the Mora Trail are considered representative of views from within the San Antonio Open Space Preserve/Park.

Fremont Older Open Space Preserve

The 739-acre Fremont Older Open Space Preserve (Fremont Older Preserve) is located approximately 1.5 miles south of the project site. The Fremont Older Preserve includes 14.7 miles of hiking, equestrian, and bicycle trails, and connects to additional trails within the adjacent Stevens Creek County Park (MROSD 2019). The project site is visible in views from within the Fremont Older Preserve primarily from the Coyote Ridge Trail, an approximately 2.1 mile trail that traverses the Fremont Older Preserve in a north/south direction. The visual quality of the trail is generally distinctive, with intermittent views of industrial electrical transmission towers and lines, and nearby residences. Views of the project site along the lower (northern) portion of the trail range from fully to partially screened by intervening topography

and trees. From segments along the trail, the WSMA, North Quarry, and Cement Plant are visible in the viewshed background. Other features in the viewshed include the Stevens Creek Quarry in the middleground view, a transmission line that runs over the trail in the foreground, and chaparral and oak-covered ridges in all directions. As the trail climbs steeply to Maisie's Peak, a designated scenic vista and the highest point in Fremont Older Preserve, the intermittent views of the project site become more open and panoramic. From Maisie's Peak the project site is clearly visible, including the WMSA, the North Quarry, a small portion of the ESMA, roads within the Quarry, and the Cement Plant. However, given the 360-degree sweeping view afforded from Maisie's Peak, the project site is a small feature in a wide and high-quality viewshed. From Maisie's Peak and other locations on the Coyote Ridge Trail, views also include the Mount Hamilton and Diablo Ranges, the San Francisco Bay, East Bay cities as far north as Berkeley, the Santa Clara Valley, Monte Bello and Picchetti Ranch Open Space Preserves, the Stevens Creek Quarry, several transmission lines, and nearby residences. The duration of view for visitors to Maisie's Peak is considered short (because the view is only available from a relatively small area), but the duration is considered medium for hikers on the Coyote Ridge Trail. Trail users primarily face away from the project site while ascending the trail, and face generally toward the project site off and on when descending. Given Fremont Older Preserve's distinct visual quality, fully screened to open and panoramic visibility, medium view duration, and high number of viewers, visual sensitivity within this viewshed is high.

Photographs showing existing conditions from representative view locations along the Coyote Ridge Trail (Viewpoint 17) and at Maisie's Peak (Viewpoint 9) are provided in Appendix A, Figure A-2.

5. REGULATORY SETTING

No federal regulations relevant to the aesthetic impact analysis presented herein apply to the project. Potentially relevant state and local programs and policies are discussed below.

5.1 California Scenic Highway Program

In 1963, the California legislature created the Scenic Highway Program to protect scenic highway corridors from changes that would diminish the aesthetic value of lands next to the highways. The state statutes governing the Scenic Highway Program are found in the Streets and Highways Code, Section 260 et seq. A highway may be designated as "scenic" depending on how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon travelers' enjoyment of the view.

Prior to official designation of a highway as scenic, a city or county must nominate the highway for designation and adopt ordinances that protect its scenic quality. The city or county then applies to the California Department of Transportation for scenic highway approval. New visual intrusions in views from Eligible State Scenic Highways could affect their future designation as Scenic Highways. A list of state scenic highways is identified in Streets and Highway Code Section 263.

The segment of I-280 from SR 17 to the northwest border of Santa Clara County is an Eligible State Scenic Highway, and the segment of I-280 from the Santa Clara–San Mateo County line north to San Bruno is an Officially Designated Scenic State Highway (DOT 2018). Santa Clara County includes ordinances (Chapter 3.30, "-sr Scenic Roads Combining District") to protect the visual character of scenic roads in the County through special development and sign regulations. The focus of these ordinances is within an area 100 feet from the scenic roads, which excludes the project site (Figure 6 shows the location of these roads relative to the project site).

5.2 Santa Clara County

5.2.1 General Plan

The General Plan, initially adopted in 1994 and amended in August 2010, is a comprehensive, long-term plan for physical development within the County. The General Plan designates the project site as Hillsides and Other Public Open Lands. The Hillsides designation is defined as unsuitable for urban development due to steep slopes and instability hazards. They are watersheds, and provide important resources including minerals, forests, plant and wildlife communities, historic and prehistoric archaeological sites, grazing and recreational areas and scenic resources that define the setting of urban areas. Other Public Open Lands are a designation within Resource Conservation Areas (RCA), or lands outside urban service areas that are not clearly established in Rural Residential uses or other specialized uses.

The General Plan designates many scenic resources in the County, including roads and highways. In its "Regional Parks and Scenic Highways" map (Santa Clara County 2008), the General Plan designates SR 85 and Foothill Expressway (north of I-280) and Stevens Canyon Road (south of Stevens Creek Boulevard) as "Scenic Freeways, Expressways, Arterial and Rural Routes." These roads are generally to the east, northeast, and southeast of the project site and are publicly accessible. Montebello Road, south of the project site, is designated as a "Local Road Needing Scenic Protection" and is also publicly accessible. (No views of the project site are available from this road.) All of the aforementioned roads are within approximately 2 miles of the project site. Scenic roadways near the project are shown in Figure 6.

The General Plan also identifies the West Valley Hillsides Preservation Area (the foothills of the Santa Cruz Mountains), within which the project site is located. The West Valley Hillsides Joint Planning Review, a collaborative effort of the cities of Cupertino, Monte Sereno, Saratoga, and Los Gatos and the County, has developed joint land use principles and objectives to minimize the visual impacts of hillside development and to provide mechanisms for resolution of future hillside land use issues. The primary purpose of this Special Area Policy within the General Plan is to limit the expansion of urban development into hillside areas. The following policies are relevant for consideration in association with the proposed project:

West Valley Hillsides Preservation Area

> **Policy R-LU 197:** The natural beauty of the West Valley hillsides area should be maintained for its contribution to the overall quality of life of current and future generations.
>
> **Policy R-LU 199:** New land uses within the West Valley hillsides area should be limited to non-urban uses that are compatible with the preservation of the natural appearance of the hillsides.
>
> **Policy R-LU 201:** The West Valley cities and the County should work cooperatively to maintain the natural appearance of the West Valley hillsides and should establish procedures for resolving inter-jurisdictional land use issues that may arise in this area.

The General Plan contains additional goals and policies that apply to all development projects in the unincorporated areas of the County. The General Plan chapters on countywide and rural unincorporated areas (Santa Clara County 1994) contain various policies associated with visual quality that are relevant for consideration in association with the proposed project:

Growth and Development Chapter

Policy R-GD 17: Design Review Zoning Districts, including Design Review Guidelines, shall apply to primary viewshed areas most immediately and directly visible from the valley floor, lands up to and including the first ridge, or those within approximately one to two miles distance from the edge of the valley floor.

Policy R-GD 31: Ridgelines and ridge areas have special significance for both public policy and private interests. Ridgeline and hillside development that creates a major negative visual impact from the valley floor should be avoided or mitigated, particularly for those areas most immediately visible from the valley floor. Ridgeline development policy should also take into account the need to allow reasonable use and development of private land.

Land Use Chapter

Policy R-LU 16: Hillsides: Mountainous lands and foothills unsuitable and/or unplanned for annexation and urban development. Lands so designated shall be preserved largely in natural resource related and open space uses in order to:

a. support and enhance rural character;
b. protect and promote wise management of natural resources;
c. avoid risks associated with the natural hazards characteristic of those areas; and
d. protect the quality of reservoir watersheds critical to the region's water supply.

Policy R-LU 17: These lands also contain such important resources as grazing lands, mineral deposits, forests, wildlife habitat, rare or locally unique plant and animal communities, historic and archeological sites, and recreational and scenic areas of regional importance, which serve to define the setting for the urbanized portions of the County. Given the importance of these lands to the County's overall quality of life, allowable uses shall be consistent with the conservation and wise use of these resources and levels of development shall be limited to avoid increased demand for public services and facilities.

Parks and Recreation Chapter

Policy R-PR 39: The natural scenery which exists along many of the County's highways should be protected from land uses and other activities which would diminish its aesthetic qualities.

Resource Conservation Chapter

Policy R-RC 98: Hillsides, ridgelines, scenic transportation corridors, major County entryways, stream environments, and other areas designated as being of special scenic significance should receive utmost consideration and protection due to their prominence, visibility, and overall contribution to the quality of life in the County.

Policy R-RC 102: Structures on ridgelines must be located, constructed or landscaped so that they do not create a major negative visual impact from the Valley floor. Land should be divided in such a way that building sites, if possible, are not located on ridgelines.

Policy R-RC 103: Development in rural areas should be landscaped with fire resistant and/or native plants which are ecologically compatible with the area.

5.2.2 Zoning Ordinance

The project site is within the Design Review Combining District, Santa Clara Valley Viewshed (d1). As stated in Section 3.20.040 of the County Code, "the -d1 combining district is intended to conserve the scenic attributes of those hillside lands most immediately visible from the valley floor. It is intended to minimize the visual impacts of structures and grading on the natural topography and landscape, using a combination of supplemental development standards, design guidelines, design review, and use of process incentives for smaller and less visible projects." Development standards and procedures use a tiered regulatory structure based primarily on building size: the"-d1" district applies to construction or modification of buildings, such as residences and accessory structures. Because the project is a modification of an existing reclamation plan and does not propose new buildings, the guidelines associated with the "-d1" district do not apply to the project.

6. PROJECT IMPACTS AND MITIGATION MEASURES

The sections below address potential impacts associated with each of the criteria listed in Section 3, "Methodology," based on the County's environmental checklist and Appendix G of the CEQA Guidelines. Each impact evaluation is separated with a discussion of effects associated with various aspects of each project component. As discussed previously, Lehigh has a vested right to mine the Rock Plant Reserve, and therefore the mining of the Rock Plant Reserve is not a component of the project. However, for the purposes of disclosure the visual effects of mining the Rock Plant Reserve are presented in Section 7, "Effects of Mining the Rock Plant Reserve," of this report. Figure 6 shows the location of each viewpoint.

a) Potential to result in a substantial adverse effect on a scenic vista.

As discussed in Section 4, "Visual Setting," two scenic vistas have views toward the project site that could be affected by disturbance or other activities associated with the project: Anza Knoll in the Rancho San Antonio County Park and Maisie's Peak in Fremont Older Open Space Preserve. The components that would be visible from each viewpoint, and the potential impacts related to these components, are discussed below.

Anza Knoll (Rancho San Antonio County Park)

The project site is approximately 1 mile to the southwest of the Anza Knoll scenic vista. Anza Knoll is identified as Viewpoint 1 for this analysis and its location is shown in Figure 6. Figures 8 through 10 provide a photograph of existing conditions from Viewpoint 1 and include photographic simulations illustrating the various project components and conditions discussed below.

North Highwall Reserve Mining

Activities near the ridgeline of the North Highwall Reserve project component (e.g., vegetation removal and excavation of materials at the ridgeline) would be visible from Anza Knoll for approximately 18–24 months after mining of this area begins and would appear as an extension of the surrounding industrial activities. Figure 8 includes a photograph of existing conditions and a photographic simulation of the North Highwall Reserve at the completion of mining. The line of sight from this location is generally in line with the ridgeline. Thus, the width of ridgeline disturbance in the view is narrow and the disturbed areas represent only a small portion of the view. Lowering this portion of the ridgeline would result in a portion of the benched highwall becoming visible from this viewpoint. Although ridgeline disturbance would be visible, it would not dominate or substantially affect the existing view. The existing visible disturbance and

existing mining-related topographic features on-site detract from the quality of this portion of the existing view, and the intervening terrain of the surrounding area is dominant. This project feature would be visible and detract only marginally from the existing quality of this view, and does not represent a substantial adverse change. Therefore, for the purposes of this analysis the visual impact at Anza Knoll associated with North Highwall Reserve mining is considered less than significant.

North Highwall Reserve Reclamation

Reclamation activities near the ridgeline of the North Highwall Reserve project component (e.g., plantings at the ridgeline) could be periodically visible from this vista. Figure 8 includes a photographic simulation at 5–10 years after vegetation of the ridgeline begins. A direct perpendicular view of the ridgeline is not available from this viewpoint, making the project changes less apparent. In addition, vegetation of the ridgeline would help to blend the surface with the surrounding vegetated areas, reducing the visibility of the surface disturbance. Therefore, for the purposes of this analysis the visual impact at Anza Knoll associated with North Highwall Reserve reclamation is considered less than significant.

West Materials Storage Area Materials Placement

The portion of the WMSA visible from this viewpoint would be small relative to the expanse of the view, and may not be discernible. The WMSA would be the most visible at the point the WMSA reaches its maximum height, which would occur approximately 8–18 years after mining of the Permanente ridgeline is complete. Figure 9 includes a photograph of existing conditions and a photographic simulation of the WMSA at the completion of materials placement. The WMSA is visible under existing conditions and would become more visible over time. The quality of this feature would remain the same: tan/grey disturbed surfaces. Regardless, low visibility of this location for viewers makes this feature relatively small within the scope of the view. Therefore, for the purposes of this analysis, the visual impact to views from Anza Knoll associated with WMSA materials placement is considered less than significant

West Materials Storage Area Reclamation

Figure 9 includes a photographic simulation of 5–10 years after reclamation of the WMSA begins. The revegetation as part of reclamation would improve the visual quality of this area of the site and reduce visual contrast from the surrounding ridgeline. Therefore, for the purposes of this analysis, the visual impact to views from Anza Knoll associated with reclamation of the WMSA is considered less than significant.

Rock Plant Reserve Reclamation

Figure 10 includes a photograph of existing conditions, a photographic simulation of the Rock Plant Reserve area at the completion of mining, and a photographic simulation of the Rock Plant Reserve area 5–10 years after mining is completed. Mining the Rock Plant Reserve would be undertaken pursuant to Lehigh's vested right. Therefore, the effects of mining and the effects of mining the Rock Plant Reserve are not impacts of the project. (For the purposes of disclosure, the effects of mining the Rock Plant Reserve are evaluated in Section 7 of this report). Project-related impacts associated with the Rock Plant Reserve are the visual effects of reclamation as compared the visual character of the site at the completion of mining. Thus, a comparison of the photographic simulation of the Rock Plant Reserve at the completion of mining (the center image in Figure 10) and 5-10 years after reclamation (the bottom image in Figure 10) are relevant to the project impact analysis. Concurrent reclamation would occur, including revegetation of some mined areas, before completion of Rock Plant Reserve mining. Thus, the initial revegetation

would begin to soften the view of disturbed mining areas while mining is still ongoing. Final revegetation following the completion of mining would improve the visual appearance as compared to mined conditions. As compared to conditions at the completion of mining, the benches of the reclaimed Rock Plant Reserve would be visible, but would be substantially softened and less apparent as a result of vegetation growth over time. The establishment of vegetative cover resulting from reclamation would improve the quality of this view as compared to mined conditions and would result in reclaimed conditions that are not substantially degraded as compared to existing conditions. Therefore, for the purposes of this analysis, the visual impact to views from Anza Knoll associated with reclamation of the Rock Plant Reserve is considered less than significant.

Maisie's Peak (Fremont Older Open Space Preserve)

Maisie's Peak offers 360-degree scenic views that include the project site approximately 3.5 miles to the northwest. To simulate project views for evaluation of potential impacts at Maisie's Peak, view location along Canyon View Circle (Viewpoint 2) was selected. This viewpoint provides a similar view perspective (looking northwest) toward the project site and is conservatively representative of the view from Maisie's Point as it is a half-mile closer to the site. Figure 11 shows existing conditions from Viewpoint 2 and includes photographic simulations illustrating the various project components and conditions discussed below.

North Highwall Reserve Mining

The North highwall and surrounding areas, including the North Quarry and WMSA, are highly disturbed under existing conditions. The mining activities on the already disturbed slope would result in a benched disturbed surface, and the character of the highwall would continue to be disturbed. Mining within the upper portion of the North Highwall Reserve lay-back area, which would result in lowering a segment of the existing ridgeline, would be completed within 18–24 months once mining is initiated. From a distance of approximately 3.75 miles from Maisie's Peak to the ridgeline, the additional mined disturbance areas and modifications to the ridgeline would be negligible. Figure 11 provides a photograph of existing conditions and a photographic simulation of the North Highwall Reserve at completion of mining as viewed from Canyon View Circle (Viewpoint 2). This viewpoint provides a similar, but closer by a half mile, angle (looking northwest) toward the project site and is conservatively (as it is closure to the site) representative of the view from Maisie's Peak. As shown in the simulation, the modifications to the North Highwall Reserve resulting from mining would not dominate the viewshed and would be subordinate to other features, including developed and disturbed areas, in the viewshed. Mining activities would not block or obstruct scenic views from Maisie's Peak and would not substantially adversely affect the viewshed from Maisie's Peak. The perceived overall visual change from mining activities to visitors at Maisie's Peak is considered low. This analysis recognizes the visual sensitivity of Maisie's Peak. However, because of the limited changes to the existing visual character of the project site and viewshed, the visual impact to views from Maisie's Peak associated with North Highwall Reserve mining is considered less than significant.

North Highwall Reserve Reclamation

Revegetation of the ridgeline and highwall associated with reclamation of the North Highwall Reserve would substantially reduce the visibility of mined surfaces on the North Highwall Reserve over time. Figure 11 includes a visual simulation of the view of the North Highwall Reserve from Viewpoint 2 5–10 years after reclamation begins. This simulation is representative of the North Quarry highwall reclamation, which can also be seen from Maisie's Peak, but to a

lesser degree, and is conservatively representative of the view from Maisie's Peak. The establishment of vegetation would soften the lines of the mined benches and blend the highwall and ridgeline with adjacent vegetation. The North Highwall Reserve would not dominate the viewshed and would be subordinate to other features, including developed and disturbed areas, in the viewshed. As discussed in the section above, the visual effects of mining the North Highwall Reserve would be less than significant. Reclamation would improve the visual character of this area and would therefore not result in additional adverse effects as compared to mining. Thus, the visual impact associated with North Highwall Reserve reclamation to views from Maisie's Peak is considered less than significant.

Rock Plant Reserve Reclamation

The Rock Plant Reserve area is visible from Maisie's Peak under existing conditions. However, mining the Rock Plant Reserve area would lower the portion of the site visible from Maisie's Peak. Mining the Rock Plant Reserve would be undertaken pursuant to Lehigh's vested right. Therefore, the effects of mining the Rock Plant Reserve are not impacts of the project. (For the purposes of disclosure, the effects of mining the Rock Plant Reserve are evaluated in Section 7 of this report). Reclamation activities within the Rock Plant Reserve area would not be visible from Maisie's. Therefore, no impact to views from Maisie's Peak related to Rock Plant Reserve reclamation would occur.

(Note that the viewshed of Viewpoint 2 from Canyon View Circle includes views of the WMSA and the Rock Plant Reserve area at the completion of mining. However, these project components would not be visible from Maisie's Peak.)

b) Potential for substantial damage to scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.

As shown on Figure 6, a segment of I-280 in the study area is an Eligible State Scenic Highway. The County has designated scenic highways and routes on other roads within the study area, including SR 85 and Foothill Boulevard/Expressway, also as shown on Figure 6. The following sections discuss potential impacts of the project to views from these eligible and designated scenic highways and routes. Impacts from roadways that are not designated as scenic are assessed separately in Section c.

Views from Southbound I-280

The project site is located approximately 1 mile southwest of the closest segment of I-280. Given the hilly topography and prevalence of tall trees along I-280, views of the project site are generally fully screened from motorists' views. However, the project site is visible periodically from segments of the highway. North of the site on I-280, views toward the site occur for southbound motorists. However, the Quarry is located south of the ridgeline and therefore is not within the viewshed. Southbound motorists do periodically have views of the ridgeline. A representative photograph of existing conditions along the segment was taken from the off-ramp pullout near El Monte Road, approximately 2.6 miles north of the Permanente ridgeline. This location offers a brief, partially obstructed view of the north side of the ridgeline north of the North Quarry. Only the North Highwall Reserve component of the project would be visible from this viewpoint; thus, potential impacts related to this component are discussed here. This location is identified as Viewpoint 10 in Appendix A. The viewpoint location is shown in Appendix A Figure A-1, and Figure A-2 (page 7 of 11) includes a photograph showing existing conditions from this viewpoint. Potential visual impacts to views from southbound I-280 associated with the North Highwall Reserve component of the project are discussed below.

North Highwall Reserve Mining

For motorists travelling southbound on I-280, views of the ridgeline (where North Highwall Reserve disturbance would occur) are infrequent, brief, and obstructed or partially obstructed by foreground vegetation and topography. Intermittent activities and disturbance of the ridgeline associated with mining activities would be noticeable along the top edge of the ridge, where vegetation would be removed and the elevation of the ridge lowered as a result of mining during an approximately 18- to 24-month period. Because of the brief and intermittent views of the ridgeline from southbound I-280, the minimal visibility of activities and disturbance during mining, and the short duration (less than two years), for the purposes of this analysis, the impact associated with mining the North Highwall Reserve on views from southbound I-280 is considered less than significant.

North Highwall Reserve Reclamation

As described above for mining-related impacts, views from southbound I-280 of the ridgeline that would be disturbed by mining the North Highwall Reserve are infrequent, brief, and obstructed or partially obstructed by foreground vegetation and topography. During reclamation of the North Highwall Reserve, the revegetation component of the project would provide coverage of disturbed areas and result in restoring the natural appearance of the ridgeline as viewed from southbound I-280 and other areas to the north of the project site. Within 5–10 years after reclamation is initiated and as vegetation reestablishes, very little to no evidence of mining or reclamation would be apparent. Therefore, for the purposes of this analysis, the impact associated with reclamation of the North Highwall Reserve on views from southbound I-280 is considered less than significant.

Views from Northbound I-280

The project site is visible from some segments of northbound I-280 northeast of the site, particularly for northbound travelers east of the I-280/SR 85 interchange. The Viewpoint 3 photograph in Appendix A shows the existing view toward the project site from the Mary Avenue Bicycle Footbridge, which spans I-280, approximately 2 miles from the project site. This perspective is representative of views seen by motorists traveling north on I-280, looking southwest, and photographic simulations have been prepared for Viewpoint 3 as referenced in the analysis below. Portions of the North Highwall Reserve, WMSA, and Rock Plant Reserve areas are visible from Viewpoint 3; thus, potential impacts related to mining and reclamation of the North Highwall Reserve, material placement and reclamation of the WMSA, and reclamation of the Rock Plant Reserve are discussed below. Motorists traveling on northbound I-280 would have similar views of the project site as shown from Viewpoint 3, but from a slightly lower elevation because they would be in vehicles traveling under the footbridge. The Viewpoint 3 location is shown in Figure 6. Figures 14 – 16 provide a photograph of existing conditions of views toward the project site from Viewpoint 3 and include simulations of the various project components, as discussed in the following sections.

North Highwall Reserve Mining

Activities near the ridgeline of the North Highwall Reserve project component (e.g., vegetation removal and excavation of materials at the ridgeline) would be visible from some segments of northbound I-280, including the segment where Viewpoint 3 is located. Mining activities within this area would occur for approximately 18–24 months. Figure 14 includes a photograph of the existing conditions and a photographic simulation of the North Highwall Reserve at the completion of mining. For motorists on I-280, the view of the recontoured ridgeline during mining would result in a moderate visual contrast. Lowering the ridgeline would allow a portion

of the benched North Quarry highwall beyond the ridgeline to become visible from the Viewpoint 3 and this segment of northbound I-280. The tan and grey colors would temporarily contrast with the surrounding natural features. This would not be considered a substantial impact to the visual character of the site itself, because the visual quality of the site is already low and additional disturbance is not expected to worsen the existing visual character of the site. The change would be the most noticeable as vegetation is removed and would be less noticeable as the surface is excavated and excavation activities move to lower elevations. Mining the ridgeline area would require approximately 18–24 months, after which time reclamation and revegetation would immediately begin. From Viewpoint 3, the ridgeline is generally in line with the direction of view, which narrows the visible disturbance in the viewshed. Disturbance associated with North Highwall Reserve mining would look similar to and blend with the existing surface disturbance near the Cement Plant and EMSA. Because mining activities and related disturbance associated with mining would not dominate or substantially alter the view as compared to existing conditions and because the disturbance would be temporary (up to approximately two years), for the purposes of this analysis, the visual impact associated with North Highwall Reserve Mining on views from northbound I-280 is considered less than significant.

North Highwall Reserve Reclamation

Figure 14 includes a photographic simulation of the North Highwall Reserve 5–10 years after reclamation begins, as viewed from Viewpoint 3 and representative of views to northbound motorists on I-280. For these viewers , reclamation of the North Highwall Reserve would appear as an increase in vegetated open space in the project site, because where tan or grey disturbed soil would be visible under mined conditions, revegetation with grasses, shrubs, and trees would provide a vegetation cover that is more consistent with the surrounding natural areas. As vegetation establishes over time, existing disturbed areas and areas disturbed as a result of the North Highwall Reserve mining component of the project would become less visible, improving the visual character as compared to existing and mined conditions. Therefore, for the purposes of this analysis the impact associated with reclamation of the North Highwall Reserve on views from northbound I-280 is considered less than significant.

West Materials Storage Area Materials Placement

Figure 15 includes a photograph of the existing conditions and a photographic simulation of the WMSA at the completion of materials placement, as viewed from Viewpoint 3 and representative of views to northbound motorists on I-280. The portion of the WMSA visible from this viewpoint would be small relative to the expanse of the view, and may not be discernible. The WMSA would be the most visible at the point the WMSA reaches its maximum height, which would occur approximately 8–18 years after mining of the North Highwall Reserve is complete. The WMSA is visible under existing conditions and would become more visible over time. The quality of this feature would remain the same: tan/grey disturbed surfaces. Regardless, low visibility of this location for viewers makes this feature relatively small within the scope of the view. Therefore, for the purposes of this analysis, the impact associated with WMSA materials placement on views from northbound I-280 is considered less than significant.

West Materials Storage Area Reclamation

Figure 15 includes a photographic simulation of 5–10 years after reclamation of the WMSA begins, as viewed from Viewpoint 3 and is representative of views to northbound motorists on I-280. Revegetation associated with reclamation would improve the visual character of the WMSA and reduce visual contrast from the surrounding ridgeline as compared to existing conditions

and conditions during and immediately following the completion of materials placement at the WMSA. Therefore, for the purposes of this analysis, the impact associated with WMSA reclamation on views from northbound I-280 is considered less than significant.

Rock Plant Reserve Reclamation

The Rock Plant Reserve area is visible from segments of northbound I-280, including the segment near Viewpoint 3. Figure 16 includes a photograph of existing conditions, a photographic simulation of the Rock Plant Reserve area at the completion of mining, and a photographic simulation of the Rock Plant Reserve of 5–10 years after mining is completed. Mining the Rock Plant Reserve would be undertaken pursuant to Lehigh's vested right. Therefore, the effects of mining and the effects of mining the Rock Plant Reserve are not impacts of the project. (For the purposes of disclosure, the effects of mining the Rock Plant Reserve are evaluated in Section 7 of this report). Concurrent reclamation would occur, including revegetation of some mined areas, before completion of Rock Plant Reserve mining. Thus, the initial revegetation would begin to soften the view of disturbed mining areas while mining is still ongoing. Final revegetation following the completion of mining would improve the visual appearance as compared to mined conditions. As compared to conditions at the completion of mining, the benches of the reclaimed Rock Plant Reserve would be visible, but would be substantially softened and less apparent as a result of vegetation growth over time. As the vegetation fills in on the benches and trees mature, mined areas of Rock Plant Reserve would be less apparent and blend in with the surrounding hillside vegetation. Portions of the 50-foot-tall bench faces (created as a result of mining, not reclamation) would remain visible and contrast against the densely vegetated surrounding hillsides. The establishment of vegetative cover resulting from reclamation would improve the quality of this view as compared to mined conditions and would result in reclaimed conditions that are not substantially degraded as compared to existing conditions. Therefore, for the purposes of this analysis the visual impact to views from northbound I-280 associated with reclamation of the Rock Plant Reserve is considered less than significant.

Views from SR 85

Views toward the project site occur from various locations along the segment of SR 85 south of I-280. This segment of SR 85 is not a designated scenic highway. Multiple viewpoints were identified for this analysis as representative of views toward the project site from SR 85. These include Viewpoint 4 from northbound SR 85 near Quito Road, Viewpoint 11 from northbound De Anza Boulevard on the SR 85 overpass looking west, and Viewpoint 12 from Bascom Avenue overpass looking northwest over SR 85. Figure A-1 of Appendix A shows these viewpoint locations and Figure A-2 includes photographs of existing conditions from each viewpoint. Viewpoint 4 is approximately 7 miles from the project site, and travelers along this segment of SR 85 have generally unobstructed views of existing surface disturbance, including the North Quarry Highwall, in the background of the viewshed. Viewpoint 11 is approximately 3 miles from the project site. Viewpoint 12 is approximately10 miles from the project site and is representative of the view of a motorist looking northeast over SR 85 from the Bascom Avenue overpass in the City of Campbell, toward the SR 17 interchange with the project site in the background. Only the North Highwall Reserve component of the project would be visible from this segment of SR 85 and each of the viewpoints. Figure 17 provides a photograph of existing conditions and photographic simulations of the North Highwall Reserve under mined conditions and under reclaimed conditions 5–10 years after mining is completed from Viewpoint 4 along northbound SR 85 near Quito Road. Viewpoint 4 simulations of the North Highwall Reserve are also considered representative of views from SR 85 at De Anza

Boulevard and SR 85 at Bascom Avenue. Potential impacts to views from SR 85 related to the North Highwall Reserve mining and reclamation components of the project are discussed below.

North Highwall Reserve Mining

For motorists traveling on SR 85, the existing view includes the surface of the North Highwall Reserve disturbed from previous and ongoing mining in the North Quarry. Mining the North Highwall Reserve would result in a marginal increase in disturbed areas along the upper slopes of the highwall and along the ridgeline. Mining would also lower the ridgeline. Figure 17 shows the existing condition and the condition at the completion of mining the North Highwall Reserve as seen from Viewpoint 4 along northbound SR 85 near Quito Road and is representative of views from SR 85. Mining-related disturbance and the ridgeline modifications would result in a moderate visual contrast as compared to existing conditions, but would not dominate the view, given the distances to the project site and existing features (e.g., transmission towers, trees, highway signs, buildings, intervening topography) and disturbance in the viewshed. Therefore, for the purposes of this analysis, this impact is considered less than significant.

North Highwall Reserve Reclamation

Reclamation of the North Highwall Reserve would include revegetation of the ridgeline and highwall. Disturbed areas would be less apparent over time as plants and trees placed on the benches and ridgeline mature. Figure 17 shows the existing condition and the simulated conditions at the completion of mining and approximately 5–10 years after the completion of mining. The establishment of vegetation would soften the lines of the benches and cause the highwall and ridgeline to blend with adjacent vegetation. This change resulting from reclamation would be perceived as an increase in mature vegetated open space in the project site, improving the visual character of the site as compared to mined conditions. . Therefore, for the purposes of this analysis the visual impact on views from SR 85 associated with North Highwall Reserve Reclamation is considered less than significant.

Views from Foothill Expressway

Foothill Boulevard/Expressway is a County Scenic Freeway, Expressway, Arterial, and Rural Route that generally runs in a northwest/southeast direction north of I-280 where it is named Foothill Expressway, and a north-south direction south of I-280 where it is named Foothill Boulevard. Views to the south from Foothill Expressway are toward the project site. Only the North Highwall Reserve component of the project would be visible from Foothill Expressway; thus, potential impacts related to this component are discussed below. The intersection of Foothill Expressway and South Springer Road in the City of Los Altos is approximately 2.5 miles from the North Highwall Reserve and is identified as Viewpoint 13 in Appendix A. Figure A-1 shows this viewpoint location and Figure A-2 (page 8 of 11) includes a photograph showing existing conditions from Viewpoint 13.

North Highwall Reserve Mining

The view to the south and southwest from Foothill Expressway includes the north side of the ridgeline where North Highwall mining would occur. For travelers on Foothill Boulevard/Expressway, mining-related disturbance and activities along the ridgeline would be temporarily visible in the distance and would result in limited visual contrast. Views of disturbance areas are not within the direction of travel along Foothill Expressway. Most views toward the site are screened by trees and, where visible, disturbance along the ridgeline associated with North Highwall Reserve mining would less dominant that other features in the viewshed, such as streetlights and commercial and residential structures in the near- and middle-

ground views. The overall visual change associated with North Highwall Reserve mining would be minimal as viewed from Foothill Expressway. In consideration of these factors and Foothill Expressway's low visual sensitivity, for the purposes of this analysis, the visual impact to viewers along Foothill Expressway associated with North Highwall Reserve mining is considered less than significant.

North Highwall Reserve Reclamation

As described above, from locations along Foothill Expressway, the area along the ridgeline where mining disturbance and reclamation activities associated with the North Highwall Reserve would occur is predominantly screened and, when visible, the ridgeline view is less dominant than other features in the viewshed. Although the ridgeline would be permanently modified as a result of mining, revegetation of disturbed areas of the ridgeline after mining would eliminate areas of visible disturbance and improve the visual character of the ridgeline as compared to mined conditions. Once revegetated, the modified ridgeline would have a natural appearance and the character of the view where the ridgeline is visible from areas along Foothill Expressway would be similar to that of existing conditions. In consideration of these factors and Foothill Expressway's low visual sensitivity, for the purposes of this analysis, the impact to viewers along Foothill Expressway associated with North Highwall Reserve reclamation is considered less than significant.

c) Potential to substantially degrade the existing visual character or quality of public views (i.e., views experienced from publicly accessible vantage points) of the site and its surroundings.

The project site is visible to the public from portions of some local roadways and recreational areas. Potential impacts to public views of the project site from scenic viewpoints and scenic and other roadways are analyzed in Sections a and b, above. Therefore, the analysis in this section focuses on possible degradation of the existing visual character or quality of the project site, followed by evaluation of views of the project site from representative major and minor roadways and recreational areas near the project site.

As discussed previously, the project site is characterized by heavy industrial features, including mining pits, stockpiles of extracted materials, equipment, buildings, machinery, siltation ponds, and conveyor belts that are present throughout the site. Other areas of the site contrast with the industrial character and provide relatively undisturbed areas with a more natural visual character.

Effects of the Proposed Project on Site Character

The effects of the project on the visual character of the site associated with mining and reclamation of the North Highwall Reserve, materials placement and reclamation of the WMSA, and reclamation of the Rock Plant Reserve mine area are discussed below. Specific views of these portions of the site are evaluated in the following sections.

North Highwall Reserve Mining

Mining the North Highwall Reserve would involve similar activities and features as existing mining operations in the North Quarry (e.g., blasting, excavation of mineral commodities using excavators, hauling of materials using trucks and conveyors, grading final slopes to engineered slopes and benches). The additional mining of the North Highwall Reserve would be consistent with the existing industrial and disturbed character of the North Highwall when viewed from public viewpoints located east and southeast of the site. However, disturbance related to mining activities along the

North Highwall Reserve segment of the ridgeline would be visible from some areas north of the site and would temporarily change the existing character of the ridgeline where no such disturbance is visible under existing conditions. Mining activities on the ridgeline would be intermittent and temporary as the ridgeline vegetation is cleared in preparation for mining and as mining along the upper portion of the North Highwall Reserve is completed over an estimate 18–24-month period. Visibility of disturbed areas would be most apparent immediately following vegetation clearing, and visible disturbance would decrease as these surfaces are excavated and the ridgeline is recontoured. Trees adjacent to the north edge of the disturbed area would remain and would partially screen and reduce the visibility of surface disturbance as viewed from areas to the north, looking south and upward toward the ridgeline. Recontouring the ridgeline would result in a modified ridgeline as compared to existing conditions, but the resulting contour would be generally consistent with other portions of the ridgeline. In consideration of the expansive views of hillsides and ridgelines in the area, the disturbance and ridgeline modifications are not considered to represent a substantial modification to the overall viewshed for viewers to the north of the site. However, this analysis recognizes the aesthetic value of the overall viewshed and the potential for even the short-term and relatively limited area of disturbance to adversely affect views and to be perceived by some viewers as substantial. Thus, for the purposes of this analysis, the impact to the visual character of the ridgeline associated with North Highwall Reserve mining as viewed from areas north of the site is considered significant.

As discussed below, reclamation of the ridgeline is planned to minimize the visual effects of disturbance on the ridgeline, and the reclamation plan specifies that revegetation will immediately follow the completion of mining activities on the ridgeline and revegetation would substantially reduce the visual effect of mining. However, other than the reclamation components of the project, no additional feasible mitigation is available to reduce the impact of mining the North Highwall Reserve to less than significant; therefore, the visual impact to the character of the site associated with mining the North Highwall Reserve is considered significant.

North Highwall Reserve Reclamation

Reclamation of the North Highwall Reserve mined areas would include revegetation immediately following the completion of mining along the ridgeline. Revegetation would improve the visual character and reduce the visual contrast of mined areas as compared to adjacent portions of the ridgeline. Initial revegetation would reduce the contrast of the surface disturbance at the peak of the ridgeline, and tree and plant growth over time would return the ridgeline's natural character. Activities associated with reclamation would involve transport and placement of plants, requiring vehicle and personnel during short periods, but would have minimal potential to adversely affect views and are not considered to have the potential for substantial adverse effects. Therefore, for the purposes of this analysis, the visual impact to the character of the site associated with reclamation of the North Highwall Reserve is considered less than significant.

West Materials Storage Area Materials Placement

Under the proposed project, material placement at the WMSA could increase the height of portions of the WMSA up to approximately 80 feet as compared to existing conditions. The existing character of the WMSA would remain disturbed and industrial, and the additional material and increased elevations would not result in a substantial adverse change in visual character. Therefore, for the purposes of this analysis, the impact to the visual character of the site associated with materials placement at the WMSA is considered less than significant.

West Materials Storage Area Reclamation

Reclamation of the WMSA following the completion of material placement would involve revegetation of the WMSA surface, including planting trees on the north-facing side of the WMSA as an additional measure to blend the surface of the WMSA with the surrounding area. As compared to existing conditions and conditions at the completion of materials placement discussed above, revegetation would reduce the contrast of surface disturbance. Tree and plant growth over time would achieve a more natural character of the WMSA surface. Therefore, for the purposes of this analysis, the impact to the visual character of the site associated with reclamation of the WMSA is considered less than significant.

Rock Plant Reserve Reclamation

Reclamation activities (vegetation of the benches with grasses, shrubs, and trees) at the Rock Plant Reserve following the completion of mining (pursuant to Lehigh's vested right) would improve the visual character of this area and reduce visual contrast from the surrounding undisturbed hillside as compared to mined conditions. Therefore, for the purposes of this analysis, the impact to the visual character of the site associated with reclamation of the Rock Plant Reserve is considered less than significant.

Effects of the Proposed Project on the Quality of Public Views

The effects of the proposed project on the quality of public views (i.e., views experienced from publicly accessible vantage points) of the site and its surroundings is evaluated below by representative viewpoint.

Major Roadways

Portions of the project site are visible from various locations in the Santa Clara Valley. De Anza Boulevard (Viewpoint 11), South Springer Road at Foothill Expressway (Viewpoint 13), and Stevens Creek Boulevard near SR 85 (Viewpoint 14) are representative major roadways based on the project's viewshed and visual exposure. Figure A-1 of Appendix A shows these viewpoint locations and Figure A-2 includes photographs of existing conditions from each. Section b, above, provides an evaluation of potential impacts to views from De Anza Boulevard and South Springer Road at Foothill Expressway. Another major roadway from which views toward the project site are visible is Stevens Creek Boulevard.

A photograph of existing conditions from westbound Stevens Creek Boulevard is provided in Appendix A (Viewpoint 14). Only the North Highwall Reserve component of the project would be visible from Stevens Creek Boulevard. Viewpoint 3 (from northbound I-280) provides a similar, but less obstructed, northwesterly view of the project site. Figure 14 includes a photographic simulation of Viewpoint 3 at completion of mining and at 5–10 years after reclamation begins. This simulation is representative of views from westbound Stevens Creek Boulevard toward the project site and North Highwall Reserve. Potential impacts to views from Stevens Creek Boulevard related to the North Highwall Reserve are discussed below.

North Highwall Reserve Mining

Mining activities and disturbance associated with the North Highwall Reserve would not dominate the visual character of views from Stevens Creek Boulevard in consideration of other elements in the foreground (e.g., vehicles, street infrastructure, buildings) and other features in the viewshed. As viewed from locations along Stevens Creek Boulevard, North Highwall Reserve

mining would not change the overall character of the viewshed and the site's existing visual character as a mining facility. As a result of these factors, for the purposes of this analysis, the impact to views from Stevens Creek Boulevard associated with North Highwall Reserve mining is considered less than significant.

North Highwall Reserve Reclamation

Revegetation as a component of reclamation of the North Highwall Reserve would improve the visual quality as compared to existing and fully mined conditions and would reduce visual contrast with adjacent areas. Therefore, for the purposes of this analysis, the impact to views from Stevens Creek Boulevard associated with North Highwall Reserve reclamation is considered less than significant.

Minor Roadways

Portions of the project site are visible from various minor roadways in the surrounding area. Canyon View Circle from Cupertino (Viewpoint 2), La Rena Lane from Los Altos Hills (Viewpoint 5), Stonebrook Drive from Los Altos Hills (Viewpoint 6), and Columbus Avenue and Linda Vista Drive from Cupertino (Viewpoint 15) are representative of views toward the project site from minor roadways in the area. Although these viewpoints are considered representative for this evaluation, it is important to note that the majority of minor roads, including the roads discussed here, do not have direct views of the site due to intervening features. For example, Viewpoint 15 offers no view of project activities given the foreground obstructions (buildings and vegetation) and topography (foreground hills). Figure A-1 of Appendix A shows this viewpoint location and Figure A-2 (page 10 of 11) includes a photograph showing existing conditions from this viewpoint. This view is representative of similar views within the surrounding area given the area's flat topography.

Because the site is not visible from most areas along local roads, the evaluation of potential impacts from viewpoints that do have views of the project site (Viewpoints 2, 5, and 6) due to the focus on the limited locations from which the site is visible. As described in Section 4.3.2, "Motorists on Minor Travel Routes," the visual sensitivity of these views is considered low or low to moderate. The North Highwall Reserve and WMSA components would be visible from these viewpoints; thus, potential impacts related to these components are discussed below.

Canyon View Circle

North Highwall Reserve mining and reclamation, WMSA materials placement and reclamation, and Rock Plant Reserve reclamation components of the project would be visible from Canyon View Circle. Viewpoint 2 is located on Canyon View Circle in Cupertino, approximately 3 miles from the project site. Figures 11 through 13 provide photographs of existing conditions and simulations of these various project components. Potential visual impacts to views from Canyon View Circle associated with these project components are discussed below.

North Highwall Reserve Mining

Figure 11 includes a photograph of the existing conditions and a photographic simulation of the North Highwall Reserve at the completion of mining from Viewpoint 2 in Canyon View Circle. The mining activities on the already disturbed slope would result in a benched disturbed surface, and the character of the highwall would continue to be disturbed. The angle of this view related to the North Highwall Reserve ridgeline minimizes the visibility of the change in ridgeline height that would result from mining. The increase in activities (construction vehicles, haul trucks on the benches) may be visible on clear days. The topmost

benches would be reclaimed concurrent with further excavation, as shown in Figure 11, in the simulated view of the completion of mining. Mining the North Highwall Reserve would add marginally to the existing disturbed and industrial quality of the view. However, the viewshed is currently disturbed and visible to a low number of public viewers from Canyon View Circle and other similar locations where views are brief and often obstructed by intervening vegetation and topography. For these reasons, for the purposes of this analysis, the visual impact to views from Canyon View Circle associated with North Highwall Reserve mining is considered less than significant.

North Highwall Reserve Reclamation

As described above, the topmost benches of the North Highwall Reserve would be reclaimed concurrent with ongoing mining activities. Vegetation would improve the visual quality of this area of the site and reduce visual contrast with adjacent portions of the ridgeline, as shown in the Figure 11 photographic simulation at 5–10 years after reclamation begins. Therefore, for the purposes of this analysis, the visual impact to views from Canyon View Circle associated with North Highwall Reserve reclamation is considered less than significant.

West Materials Storage Area Material Placement

Figure 12 includes a photograph of the existing conditions and a photographic simulation of the WMSA at the completion of materials placement from Viewpoint 2 in Canyon View Circle. The WMSA would be visible from this viewpoint, but it would blend with the existing North Highwall Reserve disturbance. The WMSA would be the most visible when the WMSA reaches its maximum height, approximately 8–18 years after mining of the North Highwall Reserve is complete. The WMSA is visible from Viewpoint 2 under existing conditions and would become more visible as additional material is placed. The visual character of the WMSA would remain similar to its existing condition of visible disturbed surfaces. Although visible, the distance of the WMSA from viewers makes this feature relatively small within the viewshed. The viewshed is currently disturbed, will be seen by a low number of public viewers given their location on minor roadways, and views are brief, and often obstructed by intervening vegetation and topography. For these reasons, for the purposes of this analysis, the visual impact to views from Canyon View Circle associated with WMSA materials placement is considered less than significant.

West Materials Storage Area Reclamation

Figure 12 includes a photographic simulation of 5–10 years after reclamation of the WMSA begins from Viewpoint 2 in Canyon View Circle. As shown in Figure 12, background views would include a portion of the WMSA. The WMSA surface would be graded and revegetated for reclamation. As vegetation matures, the WMSA surface would blend with adjacent vegetated areas. Therefore, for the purposes of this analysis, the visual impact to views from Canyon View Circle associated with WMSA reclamation is considered less than significant.

Rock Plant Reserve Reclamation

Figure 13 includes a photographic simulation of 5–10 years after reclamation of the Rock Plant Reserve begins from Viewpoint 2 in Canyon View Circle. Topmost benches of surfaces of the Rock Plant Reserve mined under Lehigh's vested right would be reclaimed concurrent with further excavation. Revegetation as a component of reclamation would improve the visual quality and reduce visual contrast from the surrounding ridgeline as compared to the mined condition. Therefore, for the purposes of this analysis, the visual impact to views from

Canyon View Circle associated with Rock Plant Reserve reclamation is considered less than significant.

La Rena Lane

The North Highwall Reserve and WMSA components of the project would be visible from La Rena Lane in Los Altos Hills. Viewpoint 5 is located on La Rena Lane approximately 3 miles north of the site. Figures 18 and 19 provide photographs of existing conditions and simulations of these various project components. Potential visual impacts to views from La Rena Lane associated with these project components are discussed below.

North Highwall Reserve Mining

Figure 18 includes a photograph of the existing conditions and a photographic simulation of the North Highwall Reserve from Viewpoint 5 at the completion of mining. The area of the ridgeline to be mined would first be cleared of vegetation, at which point the greatest extent of surface disturbance would be visible. Then the area would be excavated from the top down, bench by bench. From this viewpoint, the benches would not be visible, and the excavation would have the effect of removing the amount of disturbed surface visible on the ridgeline. Within 18–24 months, the majority of the surface disturbance would no longer be visible, as shown in Figure 18. The resulting ridgeline would be lower and have a different shape, but would blend with the surrounding ridgeline. Visibility of the North Highwall Reserve would be of short duration, seen by a low number of public viewers given their location on minor roadways, and views are partially obstructed and on winding roadways with foreground vegetation and topography. For these reasons, for the purposes of this analysis, the visual impact to views from La Rena Lane associated with North Highwall Reserve mining is considered less than significant.

North Highwall Reserve Reclamation

Figure 18 includes a photographic simulation from Viewpoint 5 at 5–10 years after reclamation begins. Revegetation associated with reclamation would improve the visual quality of the North Highwall Reserve and reduce visual contrast with adjacent areas. Therefore, for the purposes of this analysis, the visual impact to views from La Rena Lane associated with North Highwall Reserve reclamation is considered less than significant.

West Materials Storage Area Materials Placement

Figure 19 includes a photograph of the existing conditions and a photographic simulation from Viewpoint 5 on La Rena Lane of the WMSA at the completion of materials placement. The WMSA would be the most visible once it reaches its maximum height, which would occur approximately 8–18 years after mining of the Permanente ridgeline is complete. The WMSA is visible from Viewpoint 5 under existing conditions and would become more visible as additional material is placed. The visual character of WMSA would remain similar to the existing condition of disturbed surfaces. Although visible, the distance of the WMSA from viewers makes this feature relatively small within the viewshed. The WMSA would be seen by a low number of public viewers given the viewers' location on minor roadways, views are partially obstructed and on winding roadways with foreground vegetation and topography, and the existing visual quality of the WMSA is low. For these reasons, for the purposes of this analysis, the visual impact to views from La Rena Lane associated with WMSA materials placement is considered less than significant

West Materials Storage Area Reclamation

Figure 19 includes a photographic simulation of the WMSA from Viewpoint 5 of 5–10 years after reclamation of the WMSA begins. Revegetation associated with reclamation would improve the visual quality of the WMSA and reduce visual contrast with adjacent areas. Trees would be planted on the north-facing side of the WMSA as an additional measure to blend the surface of the WMSA with the surrounding area. Therefore, for the purposes of this analysis, the impact to views from La Rena Lane associated with WMSA reclamation is considered less than significant.

Stonebrook Drive

This viewpoint is located nearly 2 miles north of the Permanente ridgeline. The North Highwall Reserve and WMSA components of the project would be visible from Stonebrook Drive in Los Altos Hills. Viewpoint 6 is located on Stonebrook Drive approximately 2 miles north of the project site. Figures 20 and 21 provide photographs of existing conditions and simulations of these various project components. Potential visual impacts to views from Stonebrook Drive associated with these project components are discussed below.

North Highwall Reserve Mining

Figure 20 includes a photograph of the existing conditions and a photographic simulation from Viewpoint 6 of the North Highwall Reserve at the completion of mining. Views from this location would be similar to those from the La Rena Lane viewpoint (Viewpoint 5, discussed above), except approximately 1 mile closer to the site and with more intervening foreground topography. The surface disturbance on the ridgeline would be more visible. However, for the same reasons as provided under the La Rena Lane analysis, for the purposes of this analysis, the visual impact to views from Stonebrook Drive associated with North Highwall Reserve mining is considered less than significant.

North Highwall Reserve Reclamation

Figure 20 includes a photographic simulation from Viewpoint 6 at 5–10 years after reclamation begins. Revegetation associated with reclamation would improve the visual quality of this area of the site and reduce visual contrast from the surrounding ridgeline. Therefore, for the purposes of this analysis, the visual impact to views from Stonebrook Drive associated with North Highwall Reserve reclamation is considered less than significant.

West Materials Storage Area Materials Placement

Figure 21 includes a photograph of the existing conditions and a photographic simulation from Viewpoint 6 of the WMSA at the completion of materials placement. Views from this location would be similar to those from the La Rena Lane viewpoint, except approximately 1 mile closer and with more intervening foreground topography screening a portion of the WMSA from Viewpoint 6. Visibility of the WMSA would be minimal, views of the WMSA would be seen by a low number of public viewers given their location on minor roadways, and views are partially obstructed and on winding roadways with foreground vegetation and topography. For these reasons, for the purposes of this analysis, the visual impact to views from Stonebrook Drive associated with WMSA materials placement is considered less than significant.

West Materials Storage Area Reclamation

Figure 21 includes a photographic simulation from Viewpoint 6 of the WMSA 5–10 years after reclamation of the WMSA begins. Revegetation associated with reclamation would

improve the visual quality of the WMSA and reduce the visual contrast with adjacent areas. Trees would be planted on the north-facing side of the WMSA as an additional measure to blend the surface of the WMSA with the surrounding area. Therefore, for the purposes of this analysis, the visual impact to views from Stonebrook Drive associated with WMSA reclamation is considered less than significant.

Recreational Areas

Mora Drive and Mora Trail from Los Altos Hills, the entrance to Rancho San Antonio County Park, and Cristo Rey Drive at Hammond-Snyder Loop Trail in Rancho San Antonio County Park are representative of views from recreational areas with views of the project site. Potential visual impacts to views from each of these locations associated with the various project components are discussed below.

Mora Drive and Mora Trail

Viewpoint 7 is located at the Mora Trail trailhead on Mora Drive nearly 1 mile north of the Permanente ridgeline. The North Highwall Reserve and WMSA components would be visible from this viewpoint; thus, potential impacts related to this component are discussed below.

North Highwall Reserve Mining

Figure 22 includes a photograph of the existing conditions and a photographic simulation from Viewpoint 7 of the North Highwall Reserve at the completion of mining. Vegetation clearing and excavation activities and disturbed surfaces would be visible on the ridgeline for approximately 18–24 months. After mining is complete, the ridgeline elevation would be approximately 100 feet lower than under existing conditions. Mining activities would temporarily introduce industrial qualities to the existing natural setting. Because of the high sensitivity and clear views from this viewpoint, for the purposes of this analysis the impacts caused by mining of the North Highwall Reserve are considered significant from this viewpoint. Reclamation would alleviate the temporary impacts associated with mining operations by recontouring and revegetating mined areas, as discussed below. However, the temporary impact of mining would still occur; and for the purposes of this analysis the impact to views from Viewpoint 7 (north of the site) is considered significant. Reclamation of the ridgeline is planned to minimize the visual effects of disturbance on the ridgeline, and the reclamation plan specifies that revegetation will immediately follow the completion of mining activities on the ridgeline and revegetation would substantially reduce the visual effect of mining. However, other than the reclamation components of the project, no other feasible mitigation is available to reduce the impact of mining the North Highwall Reserve to views from Viewpoint 7 (north of the site) to less than significant; therefore, this temporary impact is considered significant.

North Highwall Reserve Reclamation

Figure 22 includes a photographic simulation from Viewpoint 7 at 5–10 years after reclamation begins. Revegetation associated with reclamation would improve the visual quality of this area of the site and reduce the visual contrast of the mined areas with adjacent areas. Therefore, for the purposes of this analysis, the impact to views from areas north associated with North Highwall Reserve reclamation is considered less than significant.

West Materials Storage Area Material Placement

Figure 23 includes a photograph of the existing conditions and a photographic simulation from Viewpoint 7 of the WMSA at the completion of materials placement. The WMSA would be the most visible at the point the WMSA reaches its maximum height, which would occur approximately 8–18 years after mining of the Permanente ridgeline is complete. The WMSA is visible under existing conditions and would become more visible over time. The visual character of this feature would remain similar to existing disturbed conditions. Because of the high sensitivity and clear views of the WMSA from Viewpoint 7, for the purposes of this analysis the impact to views from Viewpoint 7 associated with WMSA materials placement is considered significant from this viewpoint. Reclamation would alleviate the impacts associated with WMSA material placement by recontouring and revegetating disturbed areas once materials placement is complete, as discussed below. However, the period of visual disturbance until materials placement is complete would still occur; thus, the temporary impact associated with material placement prior to reclamation is considered significant. Other than reclamation, no feasible mitigation is available to reduce this impact to less than significant; therefore, the temporary visual impact to views from Viewpoint 7 associated WMSA materials placement is considered significant.

West Materials Storage Area Reclamation

Figure 23 includes a photographic simulation from Viewpoint 7 of 5–10 years after reclamation of the WMSA begins. Revegetation associated with reclamation would include trees, shrubs, and grasses and would improve the visual quality of the WMSA once materials placement is complete and would reduce visual contrast with surrounding areas. Therefore, for the purposes of this analysis, the impact to views from Viewpoint 7 associated with WMSA reclamation is considered less than significant.

Entrance to Rancho San Antonio County Park

Viewpoint 8 is located at the entrance to Rancho San Antonio County Park, approximately 1.25 miles northeast of the project site. Only the North Highwall Reserve component would be visible from this viewpoint; thus, potential impacts related to this component are discussed below. Figure 24 includes a photograph of the existing conditions and a photographic simulation from Viewpoint of the North Highwall Reserve at the completion of mining and at 5–10 years after reclamation begins.

North Highwall Reserve Mining

Vegetation clearing and excavation activities and disturbed surfaces would be visible from Viewpoint 8 on the ridgeline during North Highwall Reserve mining for approximately 18–24 months. The grey/brown surface of excavation would be visible and the ridgeline elevation would eventually be lower than under existing conditions. The nearly inline angle of the view would reduce the visibility of the disturbance. Regardless, these mining activities would temporarily introduce industrial qualities to the existing natural setting. Because of the high sensitivity and clear views from this viewpoint, for the purposes of this analysis the impacts caused by mining of the North Highwall Reserve are considered significant from this viewpoint. Reclamation would alleviate the temporary impacts associated with mining operations by recontouring and revegetating mined areas, as discussed below. However, the temporary impact of mining would still occur; thus, the mining impact is considered significant. No feasible mitigation is available to reduce the impact of mining the North

Highwall Reserve to less than significant; therefore, this temporary impact is considered significant.

North Highwall Reserve Reclamation

Revegetation would improve the visual quality of this area of the site and reduce the visual contrast of mined areas from the surrounding ridgeline. Therefore, for the purposes of this analysis, the impact associated with reclamation is considered less than significant.

Cristo Rey Drive at Hammond-Snyder Loop Trail in Rancho San Antonio County Park

This viewpoint is located just over 1 mile north of the Permanente ridgeline. The Rock Plant Reserve reclamation, North Highwall Reserve, and WMSA components would be visible from this viewpoint; thus, potential impacts related to this component are discussed below. Viewpoint 16 in Figure A-1 of Appendix A shows the Cristo Rey Drive viewpoint location and Figure A-2 (page 10 of 11) includes a photograph showing existing conditions from this viewpoint.

North Highwall Reserve Mining

Viewpoint 1 provides a similar but more expansive view of the project site as compared to this viewpoint. Figure 8 includes a photographic simulation of Viewpoint 1 at completion of mining. This simulation is representative of the North Quarry highwall mining activities, which can also be seen from this viewpoint. Activities near the ridgeline of the North Highwall Reserve project component (e.g., vegetation removal and excavation of materials at the ridgeline) would be visible from this vista and would appear as an extension of the surrounding industrial activities. A direct perpendicular view of the ridgeline is not available from this viewpoint, making the project changes less apparent. Although this project feature would be visible, the existing disturbance and features on-site and the intervening terrain of the surrounding area are dominant. This project feature would add to the existing industrial quality of this view; therefore, for the purposes of this analysis this impact is considered less than significant.

North Highwall Reserve Reclamation

Figure 8 includes a visual simulation of Viewpoint 1 5–10 years after reclamation begins. This simulation is representative of the North Quarry highwall reclamation that would be visible from Cristo Rey Drive. Vegetation would improve the visual quality of this area of the site and reduce visual contrast from the surrounding ridgeline. Therefore, for the purposes of this analysis, this impact is considered less than significant.

West Materials Storage Area Material Placement

Figure 9 includes a visual simulation of Viewpoint 1 at completion of material placement at the WMSA. This simulation is representative of the WMSA material placement that would be visible from Cristo Rey Drive. The portion of the WMSA visible from this viewpoint would be small relative to the expanse of the view, and may not be discernible. The WMSA would be the most visible at the point the WMSA reaches its maximum height, which would occur approximately 8–18 years after mining of the Permanente ridgeline is complete. While small from this viewpoint, the WMSA is visible under existing conditions and would become more visible over time. The quality of this feature would remain the same: tan/grey disturbed surfaces. Regardless, because of the low visibility of the WMSA for viewers from this location, for the purposes of this analysis, this impact is considered less than significant.

West Materials Storage Area Reclamation

Figure 9 includes a visual simulation of Viewpoint 1 5–10 years after reclamation of the WMSA begins. This simulation is representative of the WMSA reclamation that would be visible from Cristo Rey Drive. Vegetation would improve the visual quality of this area of the site and reduce visual contrast from the surrounding ridgeline. Therefore, for the purposes of this analysis, this impact is considered less than significant.

Rock Plant Reserve Reclamation

Figure 10 provides is a photographic simulation of the Rock Plant Reserve area from Viewpoint 1 5–10 years after mining is completed. This simulation is representative of the Rock Plant Reserve reclamation that would be visible from Cristo Rey Drive, but to a lesser degree. As compared to existing conditions, the benches of the reclaimed Rock Plant Reserve would be visible, but softened by the vegetation over time. Although this project feature would be visible, the existing disturbance and features on-site and the intervening terrain of the surrounding area are dominant. This project feature would add to the existing industrial quality of this view; therefore, for the purposes of this analysis, this impact is considered less than significant.

Coyote Ridge Trail (Fremont Older Open Space Preserve)

This viewpoint offers 360-degree scenic views that include the project site approximately 3 miles to the northwest. The Rock Plant Reserve reclamation and North Highwall Reserve components would be visible from this viewpoint; thus, potential impacts related to this component are discussed below. Viewpoint 17 in Figure A-1 of Appendix A shows this viewpoint location and Figure A-2 includes a photograph showing existing conditions from this viewpoint.

North Highwall Reserve Mining

Viewpoint 2 (from Canyon View Circle) provides a similar angle (looking northwest) of the project site. Figure 11 includes a photographic simulation of Viewpoint 2 at completion of mining. This simulation is representative of the North Quarry highwall benching and ridgeline, which can also be seen from Viewpoint 17 on the Coyote Ridge Trail, but to a lesser degree. From this viewpoint, the project site appears within the background, behind the Stevens Creek Quarry, a large transmission line, and intervening mountains. The results of mining activities are visible on the North Highwall Reserve and would be visible as part of the proposed project. Given the distance between Fremont Older Open Space Preserve and the project site, the project would be subordinate to or co-dominant with other features in the viewshed, including the results of mining activities at Stevens Creek Quarry, transmission towers, trees, and scenic topography. Mining activities would not block or obstruct scenic features within the Fremont Older Open Space Preserve, and the overall visual change perceived by preserve visitors would be low. Despite the high visual sensitivity of Coyote Ridge Trail, overall impacts to visitors of Fremont Older Open Space Preserve would be adverse but less than significant.

North Highwall Reserve Reclamation

Figure 11 includes a visual simulation of Viewpoint 2 5–10 years after reclamation begins. This simulation is representative of the North Quarry highwall reclamation, which can also be seen from Viewpoint 17 on the Coyote Ridge Trail, but to a lesser degree. Vegetation would improve the visual quality of this area of the site and reduce visual contrast from the surrounding ridgeline. Therefore, for the purposes of this analysis, this impact is considered less than significant.

Rock Plant Reserve Reclamation

Reclamation activities related to this area would not be visible from this viewpoint. Therefore, no impact related to this feature would occur.

Maisie's Peak (Fremont Older Open Space Preserve)

Section a of this impact analysis, above, provides an evaluation of potential visual impacts to Maisie's Peak in the Fremont Older Open Space Preserve. As discussed there, the project is considered to have less-than-significant impact related to views of the North Quarry Reserve and WMSA and no impact related to the Rock Plant Reserve.

d) Potential to create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Potential for Project Lighting to Adversely Affect Views

The hours of operation and intensity of existing operations would not change under the project as compared to baseline conditions. Surface mining activities are currently permitted to take place on-site up to 24 hours per day, 365 days per year, although actual operating days and hours vary depending on market conditions and the level of production. Most of the work occurs in 8-hour shifts, with shift hours from 6:00 a.m. to 2:30 p.m., and from 2:30 p.m. to 12:00 midnight. No night lighting would be used related to reclamation of the Rock Plant Reserve. Therefore, no lighting-related impact from reclamation of the Rock Plant Reserve would occur.

Two components of the proposed project have the potential to adversely affect views, as described below.

North Highwall Reserve

Mining activities at the North Highwall Reserve could be conducted up to 24 hours a day and would require lighting during nondaylight periods. Use of lighting on the North Highwall Reserve would be consistent with existing use of lighting, including vehicle lights and mobile light towers positioned as needed for safe and efficient operations. Mobile lights would be positioned to direct light toward work areas and minimize glare onto neighboring areas. Lighting would continue to comply with the County Zoning Code, which requires the use of certain types of light fixtures on nonresidential properties to minimize the amount of light cast on adjoining properties and to the night sky. Lighting used during mining on the North Highwall Reserve would be visible from public locations on the Santa Clara Valley floor, including roadways, with similar visibility of lighting under existing conditions. However, during mining of the upper elevations of the North Highwall Reserve, lighting used in this area could have increased visibility from off-site areas, such as in views east and southeast of the site. Such lighting could also be visible for approximately 18–24 months during work on the ridgeline in views north and northeast of the site, where viewers do not have current views of operational lighting. Thus, because of the potential sensitivity of nighttime views caused by the periodic short-term use of lighting, for the purposes of this analysis, this impact is considered significant. Limiting mining operations to daytime hours to mitigate this impact is not feasible. Nighttime operation is an important component of production schedules under which the site functions. No feasible mitigation is available to reduce this impact to less-than-significant levels and, thus, this impact would remain significant.

No night lighting would be used related to reclamation of the North Highwall Reserve. Therefore, no lighting-related impacts from reclamation of the North Highwall Reserve would occur.

West Materials Storage Area

Overburden material is currently transported to the surface of the WMSA, which is currently visible from off-site viewpoints. This activity is permitted to occur at night. Under the proposed project, material would continue to be transported to the WMSA until it reaches 2,060 feet msl. No change in lighting would occur as compared to existing conditions. Therefore, because existing conditions would continue in the same manner, for the purposes of this analysis, this impact is considered less than significant related to nighttime views from public locations in the study area.

No night lighting would be used related to reclamation of the WMSA. Therefore, no lighting-related impact from reclamation of the WMSA would occur.

Potential for New Permanent Sources of Light or Glare to Adversely Affect Views

As discussed in Section 4.2, "Existing Light Sources," night lighting is used at strategic locations as necessary for work in progress. All existing lighting within the project site would be removed at the completion of mining activities. Therefore, reclamation and monitoring and maintenance of the project would result in no use of lighting and no glare in the project site, and therefore, for the purposes of this analysis, no impact would occur related to sources of light or glare during reclamation activities.

7. EFFECTS OF MINING THE ROCK PLANT RESERVE

The sections below address potential effects of mining the Rock Plant Reserve area of the site. As discussed, Lehigh has a vested right to mine the Rock Plant Reserve and does not require County approval of mining. Thus, the requested entitlements and discretionary decisions required for the project are not required for Rock Plant Reserve mining. Mining the Rock Plant Reserve is not a component of the project and therefore visual effects of such mining are not impacts of the project under CEQA. Nonetheless, for full disclosure the aesthetic/visual effects of mining are discussed in this section. Impacts are discussed as associated with each of the criteria listed in Section 3 of this document. Each impact discussion is separated with a discussion of effects associated with various aspects of each project components.

a) Potential to result in a substantial adverse effect on a scenic vista.

Anza Knoll (Rancho San Antonio County Park)

The Rock Plant Reserve is approximately 1.25 miles to the southwest of the Anza Knoll scenic vista (Viewpoint 1). Mining activities at the Rock Plant Reserve will result in disturbance of an approximately 31-acre area that will require reclamation under the proposed project. Figure 10 includes a photograph of the existing conditions and a photographic simulation of the Rock Plant Reserve at the completion of mining. Vegetation of the benches would begin as each bench is completed and the next lower benches have begun to be created. Thus, by the time the Rock Plant Reserve area is completely mined, the revegetation would have been underway for a number of years. As compared to existing conditions, mining activities and disturbed areas within the Rock Plant Reserve will be visible as a disturbance within an otherwise vegetation-covered area of the site. The existing disturbance and features on-site and the intervening terrain of the surrounding area are

dominant, and the addition of the Rock Plant Reserve mining disturbance would detract marginally from the quality of existing views. Given the industrial and disturbed features within this view under existing conditions and the limited change in character resulting from mining, this impact is considered less than significant.

Maisie's Peak (Fremont Older Open Space Preserve)

Maisie's Peak offers 360-degree scenic views that include the project site approximately 3 miles to the northwest. Viewpoint 9 in Figure A-1 of Appendix A shows this viewpoint location and Figure A-2 (page 6 of 11) provides a photograph showing existing conditions from this viewpoint. A narrow portion of the hill and vegetation visible at the just beyond the northern portion of Stevens Creek Quarry will be removed as a result of Rock Plant Reserve mining, revealing more of the North Quarry highwall behind it. Due to the existence of surface disturbance in the foreground and background of the Rock Plant Reserve location under existing conditions, this change would be negligible and the impact is considered less than significant.

b) Potential for substantially damage to scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.

Northbound I-280, Mary Avenue Bicycle Footbridge

Viewpoint 3 is approximately 2 miles from the project site. Figure 16 includes a photograph of the existing conditions and a photographic simulation of the Rock Plant Reserve at the completion of mining. The Rock Plant Reserve (and North Highwall Reserve component of the proposed project) would be visible from this viewpoint. For motorists on I-280, the excavation of the Rock Plant Reserve will result in a high visual contrast as compared to existing conditions within this portion of the Permanente Quarry site. At the completion of mining the Rock Plant Reserve, the topmost benches would have been vegetated for a number of years, softening the contrast of the benches with the surrounding vegetated hillside. The Rock Plant Reserve is expected to take approximately 10 years to completely mine, depending on market conditions. This surface disturbance will occur within a view that includes existing surface disturbance from mining and industrial structures; however, this new mining will exist on a currently vegetated and undisturbed hillside clearly visible from an Eligible State Scenic Highway; therefore, for the purposes of this analysis this impact is considered significant. No feasible mitigation is available to reduce this impact to less than significant; therefore, this impact is considered significant.

c) Potential to substantially degrade the existing visual character or quality of public views (i.e., views experienced from publicly accessible vantage points) of the site and its surroundings.

These vested mining operations at the Rock Plant Reserve would consist of similar kinds of activities and features as under the existing setting (e.g., excavation of mineral commodities using excavators, hauling of materials using trucks and conveyors, grading final slopes to engineered slopes and benches) of the North Quarry. However, before the establishment of revegetation, the additional mining would reduce the quality of the open space area surrounding the industrial uses, which would temporarily expand the industrial character of the site when viewed from public viewpoints. The effects of the proposed project on the quality of public views (i.e., views experienced from publicly accessible vantage points) of the site and its surroundings is evaluated below by representative viewpoint.

Cristo Rey Drive at Hammond-Snyder Loop Trail in Rancho San Antonio County Park

This viewpoint is located just over 1 mile north of the Permanente ridgeline. Viewpoint 16 in Figure A-1 (page 10 of 11) of Appendix A shows this viewpoint location and Figure A-2 includes a photograph showing existing conditions from this viewpoint. Figure 10 provides is a photographic simulation of the Rock Plant Reserve area from Viewpoint 1 5–10 years after mining is completed. This simulation is representative of the Rock Plant Reserve reclamation that would be visible from Cristo Rey Drive, but to a lesser degree. Mining activities at the Rock Plant Reserve will result in disturbance of an approximately 31-acre area that will require reclamation under the proposed project. Figure 12 provides is a photographic simulation of the fully mined Rock Plant Reserve area. Vegetation of the benches would begin as each bench is completed and the next lower benches have begun to be created. Thus, by the time the Rock Plant Reserve area is completely mined, the revegetation would have been underway for a number of years. As compared to existing conditions, the Rock Plant Reserve will be visible, but is not expected to be visible in a completely unvegetated condition at the completion of mining. The existing disturbance and features on-site and the intervening terrain of the surrounding area are dominant, and the addition of the Rock Plant Reserve would add to the already industrial quality of this view; therefore, for the purposes of this analysis this impact is considered less than significant.

Canyon View Circle

Figure 13 includes a photograph of the existing conditions and a photographic simulation of the Rock Plant Reserve at the completion of mining. The existing quality of this view is partially disturbed and industrial. Stevens Creek Quarry and the North Quarry highwall are currently visible. A portion of the Rock Plant Reserve will be visible and add to the surface disturbance visible within this viewshed. In addition, the removal of this portion of the hillside will provide greater views of the WMSA (discussed as a project component above), which would be undergoing reclamation at this time. The increase in activities (construction vehicles, haul trucks) will be visible from this viewpoint. This disturbance will be temporary because the topmost benches of the Rock Plant Reserve would be reclaimed concurrent with further excavation. While the Rock Plant Reserve will add to the existing disturbed and industrial quality of the view, because the viewshed will be seen by a low number of public viewers given their location on minor roadways, and views are brief, partially obstructed, and on winding roadways with foreground vegetation and topography, for the purposes of this analysis, impacts of Rock Plant Reserve mining are considered less than significant.

Coyote Ridge Trail (Fremont Older Open Space Preserve)

Viewpoint 17 in Figure A-1 of Appendix A shows this viewpoint location and Figure A-2 includes a photograph showing existing conditions from this viewpoint. A narrow portion of the hill and vegetation within the Rock Plant Reserve area is visible to the north of Stevens Creek Quarry and will be removed as a result of Rock Plant Reserve mining, revealing more of the North Quarry highwall beyond. Due to the current existence of surface disturbance in the foreground and background of the Rock Plant Reserve location, this change is considered negligible. Therefore, for the purposes of this analysis this impact is considered less than significant.

d) Potential to create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Potential for Project Lighting to Adversely Affect Views

Mining activities at the Rock Plant Reserve could be conducted up to 24 hours a day and would require lighting during non-daylight periods. Use of lighting on the Rock Plant Reserve would be consistent with existing use of lighting, including vehicle lights and mobile light towers positioned as needed for safe and efficient operations. Mobile lights would be positioned to direct light toward work areas and minimize glare onto neighboring areas. Lighting would continue to comply with the County Zoning Code, which requires the use of certain types of light fixtures on nonresidential properties to minimize the amount of light cast on adjoining properties and to the night sky. Lighting used during mining at the Rock Plant Reserve would be visible from public locations on the Santa Clara Valley floor, including roadways, with similar visibility of lighting under existing conditions. Lighting used at the upper elevations would have increased potential for visibility from off-site areas. Lighting could be visible from the surrounding area, such as Viewpoints 1, 3, and 16, and from Viewpoints 2, 9, and 17 during the initial stages of mining while activities are located at the top of the area to be excavated. Lighting used during Rock Plant Reserve mining, as with existing lighting used at the site, would comply with the County Zoning Code, which requires the use of light fixtures that minimize the amount of light cast on adjoining properties and to the night sky. Regardless, because of the potential sensitivity of nighttime views and potential visibility of lighting during Rock Plant Reserve mining, for the purposes of this analysis, this impact is considered significant. Limiting mining operations to daytime hours to mitigate this impact is not feasible. Nighttime operation is an important component of production schedules under which the site functions. No feasible mitigation is available to reduce this impact to less-than-significant levels and, thus, this impact would remain significant.

8. SUMMARY OF IMPACTS

Table 4, "Summary of Impacts," provides a summary of the potential visual and lighting effects discussed in this report.

TABLE 4
SUMMARY OF IMPACTS

Viewpoint	California Environmental Quality Act Appendix G Criteria	Component Impact					
		Rock Plant Reserve		*North Highwall Reserve*		*West Materials Storage Area*	
		Mining	*Reclamation*	*Mining*	*Reclamation*	*Stockpiling*	*Reclamation*
1. Anza Knoll	a) Adverse Effect on Scenic Vista	LTS	LTS	LTS	LTS	LTS	LTS
2. Canyon View Circle	c) Degrade Existing Visual Character	LTS	LTS	LTS	LTS	LTS	LTS
3. Northbound I-280 from Mary Avenue Bicycle Footbridge	b) Damage Scenic Resources	S	LTS	LTS	LTS	–	–
4. Northbound SR 85 near Quito Road	b) Damage Scenic Resources	–	–	LTS	LTS	–	–
5. La Rena Lane	c) Degrade Existing Visual Character	–	–	LTS	LTS	LTS	LTS
6. Stonebrook Drive	c) Degrade Existing Visual Character	–	–	LTS	LTS	LTS	LTS
7. Mora Drive and Mora Trail	c) Degrade Existing Visual Character	–	–	S	LTS	S	LTS
8. Entrance to Rancho San Antonio County Park	c) Degrade Existing Visual Character	–	–	S	LTS	–	–
9. Maisie's Peak	a) Adverse Effect on Scenic Vista c) Degrade Existing Visual Character	LTS	NI	LTS	LTS	–	–
10. I-280 Southbound Off-Ramp near El Monte Road	b) Damage Scenic Resources	–	–	LTS	LTS	–	–
11. Northbound De Anza Boulevard on the SR 85 Overpass	b) Damage Scenic Resources c) Degrade Existing Visual Character	–	–	LTS	LTS	–	–
12. Bascom Avenue near SR 85	b) Damage Scenic Resources	–	–	LTS	LTS	–	–
13. South Springer Road at Foothill Expressway	b) Damage Scenic Resources c) Degrade Existing Visual Character	–	–	LTS	LTS	–	–
14. Stevens Creek Boulevard near SR 85	c) Degrade Existing Visual Character	–	–	LTS	LTS	–	–
15. Columbus Avenue and Linda Vista Drive	c) Degrade Existing Visual Character	–	–	–	–	–	–
16. Cristo Rey Drive at Hammond-Snyder Loop Trail	c) Degrade Existing Visual Character	LTS	LTS	LTS	LTS	LTS	LTS
17. Coyote Ridge Trail	c) Degrade Existing Visual Character	LTS	NI	LTS	LTS	–	–

C) DEGRADE EXISTING VISUAL CHARACTER		
	Mining	***Reclamation***
Rock Plant Reserve	S	LTS
North Highwall Reserve	S	LTS

Viewpoint	California Environmental Quality Act Appendix G Criteria	Component Impact					
		Rock Plant Reserve		*North Highwall Reserve*		*West Materials Storage Area*	
		Mining	*Reclamation*	*Mining*	*Reclamation*	*Stockpiling*	*Reclamation*
West Material Storage Area	LTS	LTS					
D) NEW SOURCE OF SUBSTANTIAL LIGHT OR GLARE							
POTENTIAL FOR PROJECT LIGHTING TO ADVERSELY AFFECT VIEWS							
Rock Plant Reserve	S	NI					
North Highwall Reserve	S	NI					
West Material Storage Area	LTS	NI					
POTENTIAL FOR NEW PERMANENT SOURCES OF LIGHT OR GLARE TO ADVERSELY AFFECT VIEWS: NI							

Notes: – = not visible; LTS = less than significant; S = significant; NI = no impact; SR 85 = State Route 85; I-280 = Interstate 280

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REFERENCES AND RESOURCES

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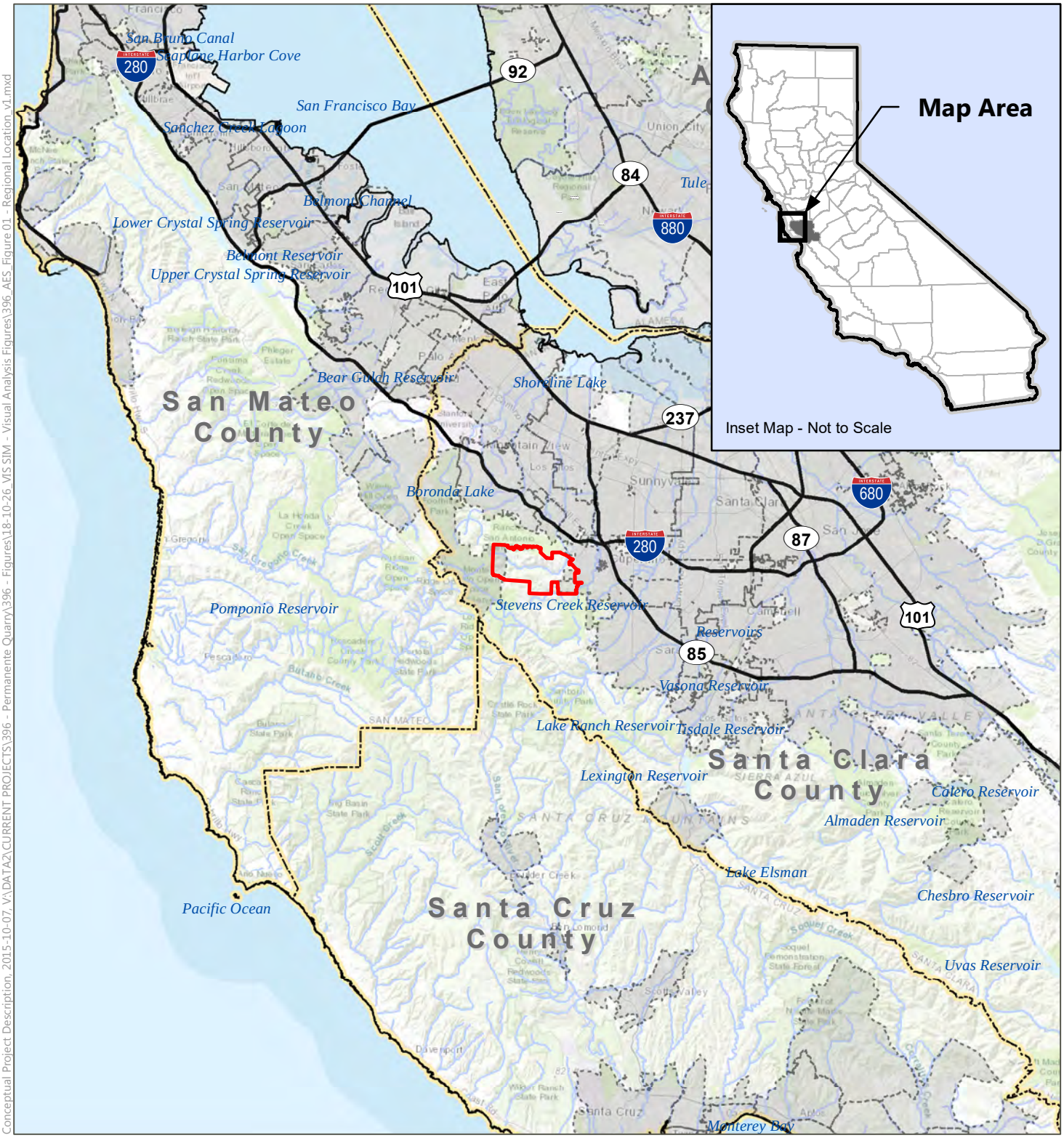
FIGURES



Conceptual Project Description, 2015-10-07, V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\18-10-26_VIS SIM - Visual Analysis Figures\396_AES_Figure 01 - Regional Location_v1.mxd

SOURCES: ESRI World Shaded Relief accessed Jan. 2019, ESRI World Topographic Map accessed Jan. 2019; ESRI World Streetmap, 2009; compiled by Benchmark Resources in 2019

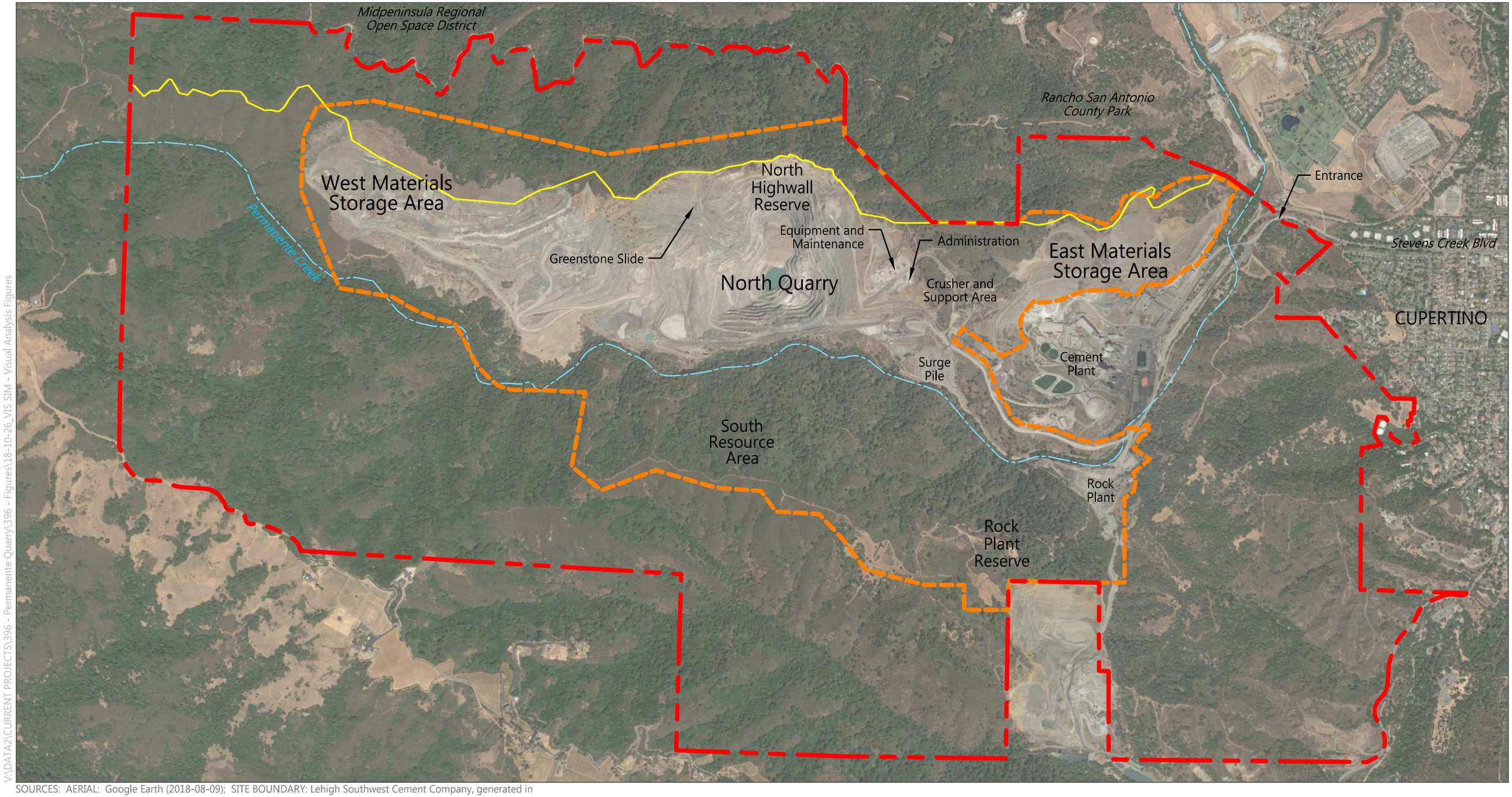
Property Boundary
City Boundary
County Boundary
Major Highway
River
Water Body

BENCHMARK RESOURCES

N

0 3 6 12 Miles

Regional Location
PERMANENTE QUARRY
AESTHETICS TECHNICAL STUDY
Figure 1



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SOURCES: AERIAL: Google Earth (2018-08-09); SITE BOUNDARY: Lehigh Southwest Cement Company, generated in 2018; compiled by Benchmark Resources in 2019

Property Boundary (±3,510 acres)

Proposed Reclamation Plan Boundary (±1,283 acres)

Permanente Ridge

BENCHMARK RESOURCES

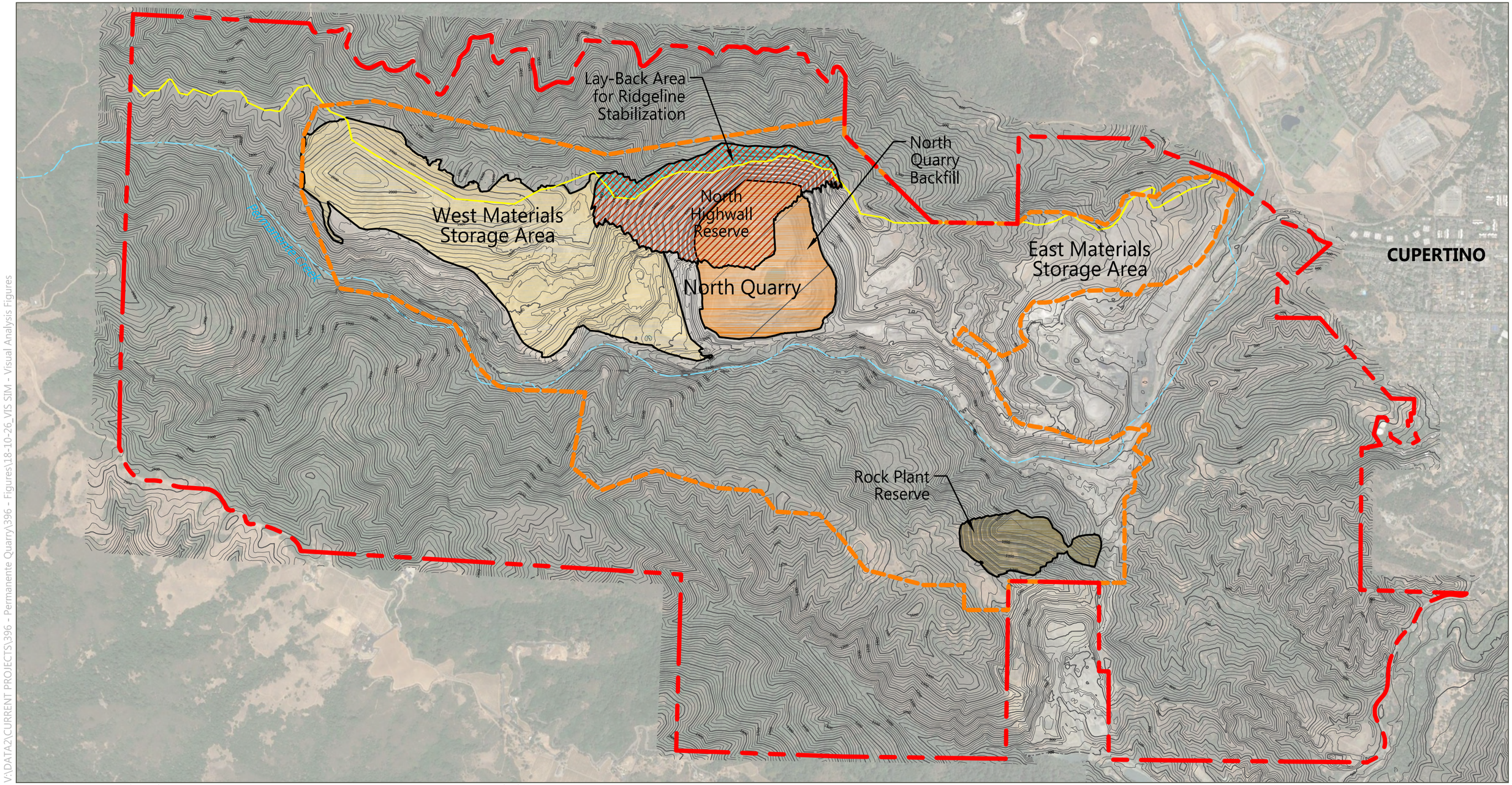
N

0 700 1,400 2,800 Feet

Existing Conditions Aerial Photograph

PERMANENTE QUARRY AESTHETICS TECHNICAL STUDY

Figure 2



SOURCES: AERIAL: Google Earth (2018-08-09); SITE BOUNDARY/RECLAMATION BOUNDARIES/RESERVES: Lehigh Southwest Cement Company, generated in 2018; compiled by Benchmark Resources in 2019

- Property Boundary (±3,510 acres)
- Reclamation Plan Boundary (±1,283 acres)
- Permanente Ridge
- North Highwall Reserve (±101 acres)
- Lay-Back Area (±20 acres)
- North Quarry Backfill (±93 acres)
- West Material Storage Area (±218 acres)
- Rock Plant Reserve (±31 acres)

BENCHMARK RESOURCES

N

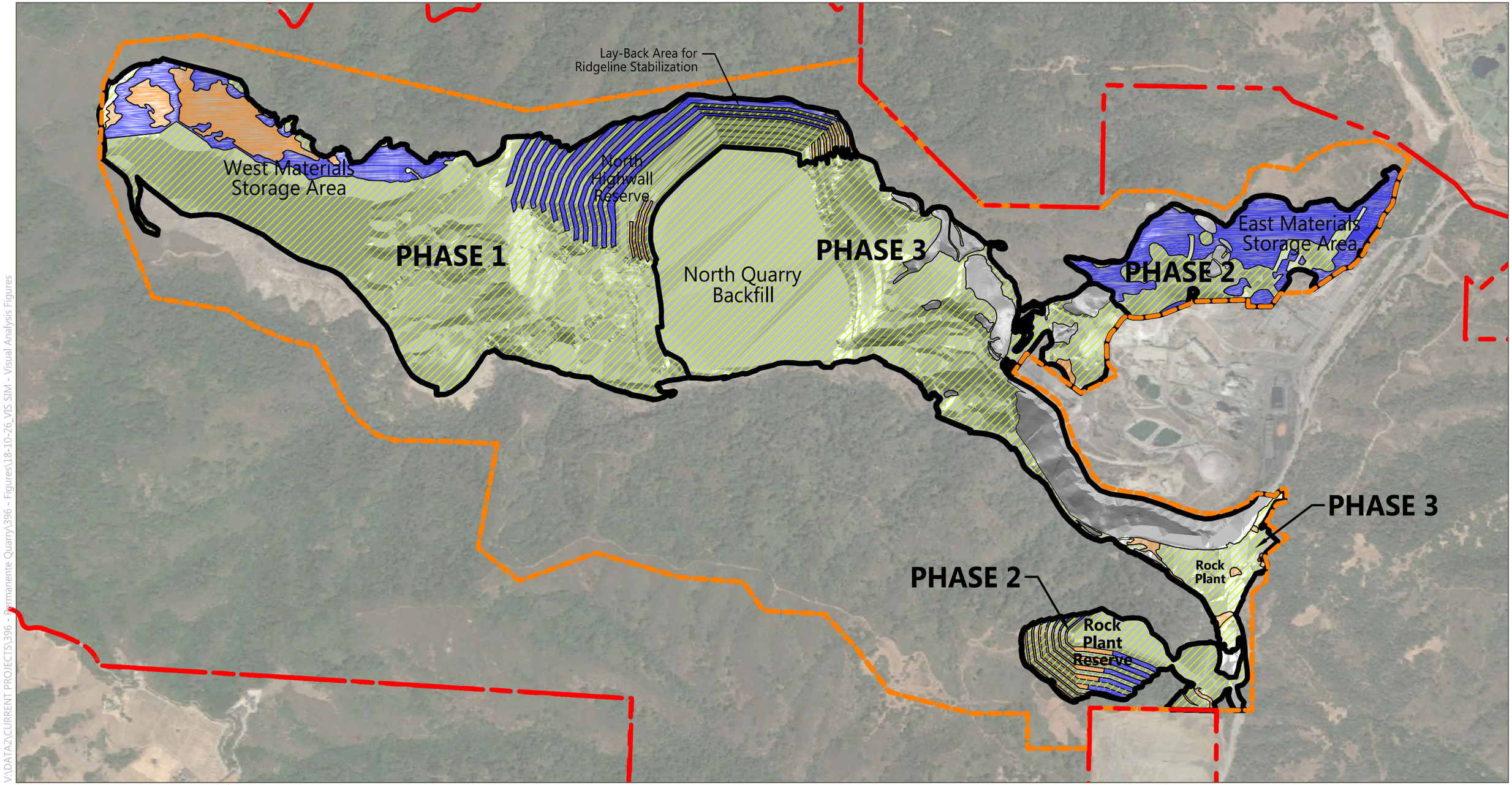
0 700 1,400 2,800 Feet

Key Project Components

PERMANENTE QUARRY AESTHETICS TECHNICAL STUDY

Figure 3

V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\18-10-26_VIS SIM - Visual Analysis Figures



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SOURCES: REVEGETATION: WRA, Inc., provided in 2019; SITE BOUNDARY/RECLAMATION BOUNDARIES/TOPOGRAPHY: Stantec, generated in 2019; compiled by Benchmark Resources in 2019

NOTES:

1. Bench faces cannot be vegetated.

Property Boundary

Proposed Reclamation Plan Boundary

Revegetation Phase Boundary

Revegetation Plan

Oak Woodland

Pine Woodland

Shrubs and Grasses

BENCHMARK RESOURCES

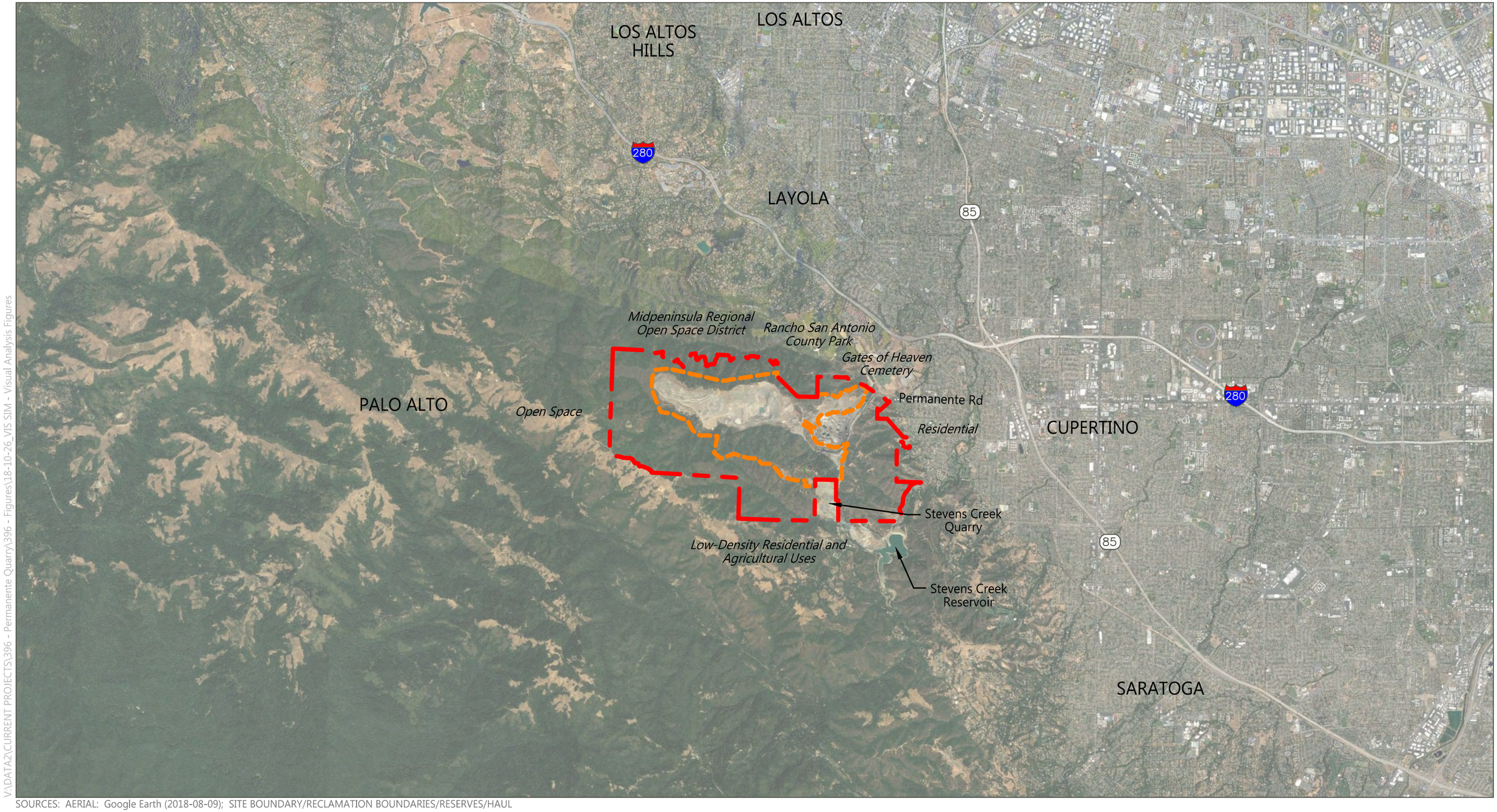
N

0 700 1,400 2,800 Feet

Final Conditions Plan

PERMANENTE QUARRY AESTHETICS TECHNICAL STUDY

Figure 4



V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\396 - Figures\18-10-26_VIS SIM - Visual Analysis Figures

SOURCES: AERIAL: Google Earth (2018-08-09); SITE BOUNDARY/RECLAMATION BOUNDARIES/RESERVES/HAUL ROUTE AREAS: Lehigh Southwest Cement Company, generated in 2018; compiled by Benchmark Resources in 2019

Property Boundary

Proposed Reclamation Plan Boundary

BENCHMARK RESOURCES

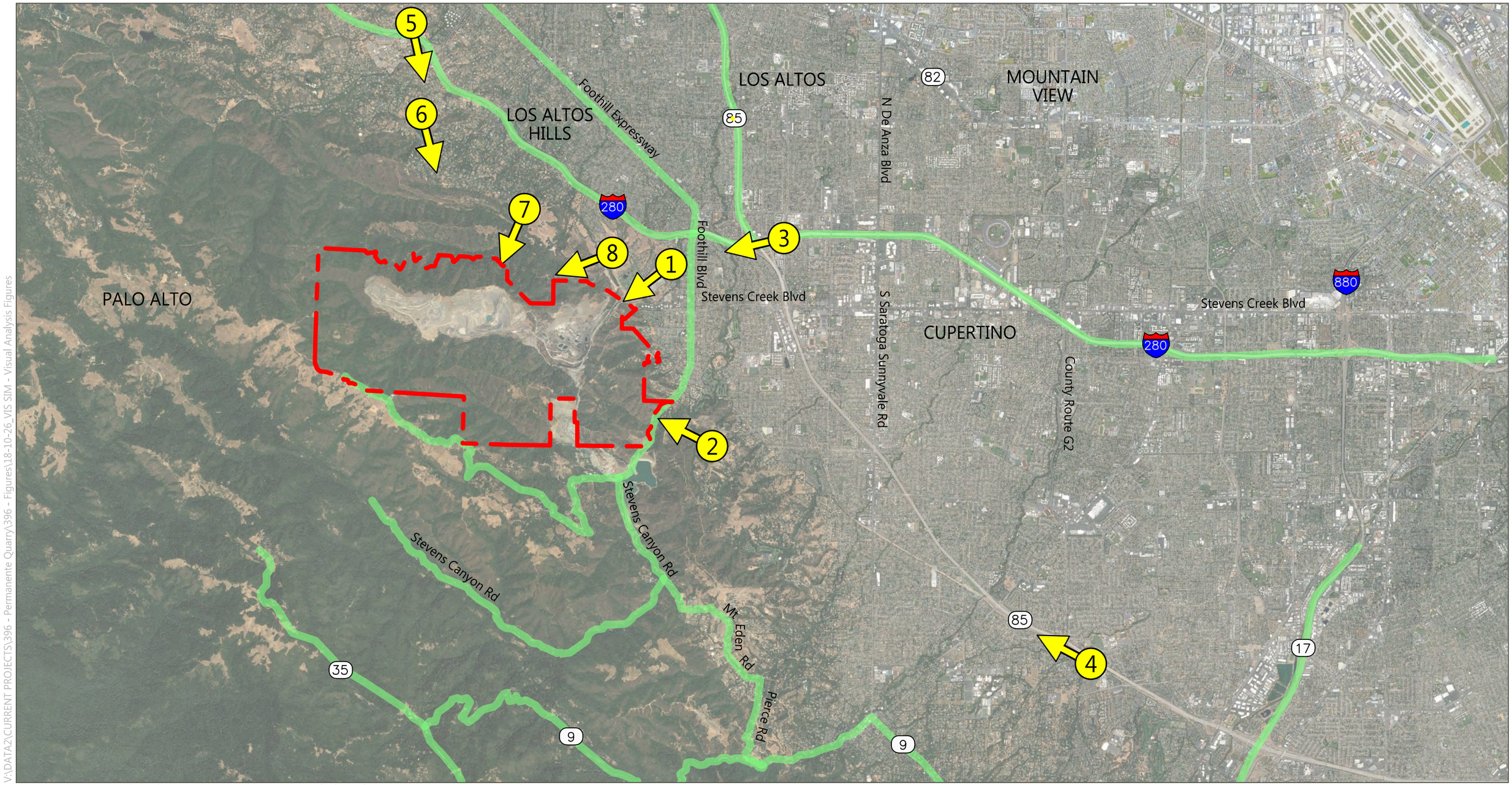
N

0 1,000 2,000 4,000 Feet

Surrounding Land Uses

PERMANENTE QUARRY AESTHETICS TECHNICAL STUDY

Figure 5



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SOURCES: AERIAL: Google Earth (2018-08-09); SITE BOUNDARY: Lehigh Southwest Cement Company, generated in 2018; SCENIC HIGHWAYS: Santa Clara County 2008; compiled by Benchmark Resources in 2019

Property Boundary

Scenic Roadway

1 Viewpoint Location, Number, and Direction

BENCHMARK RESOURCES

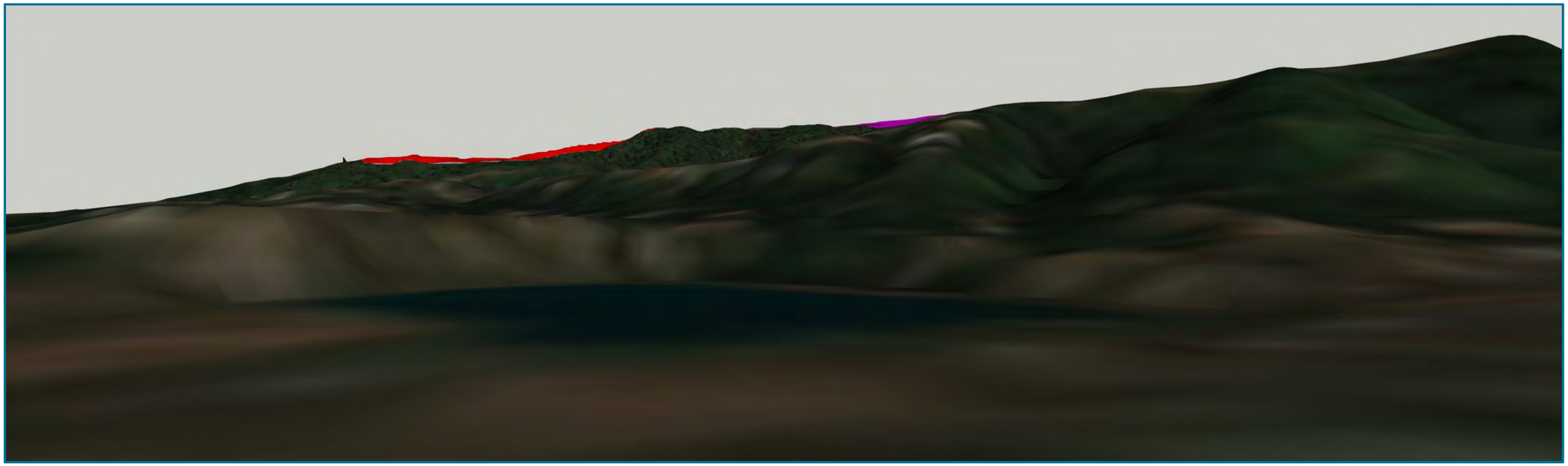
N

0 1/2 1 2 Miles

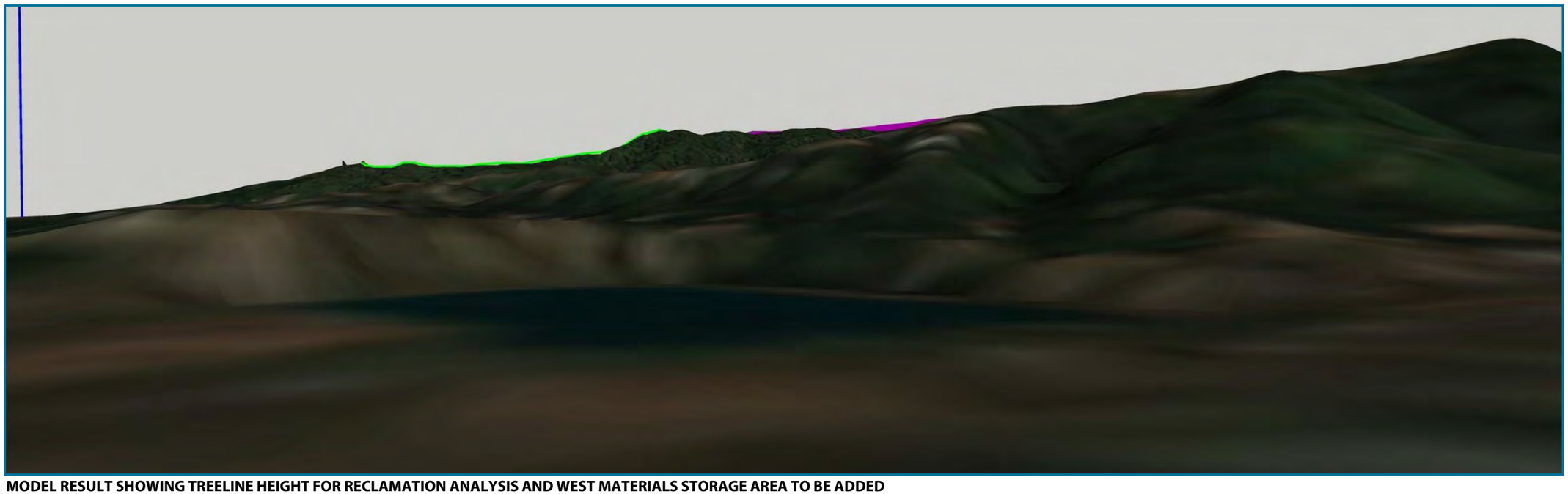
Simulated Viewpoint Locations and Scenic Roadways

PERMANENTE QUARRY AESTHETICS TECHNICAL STUDY

Figure 6



MODEL RESULT SHOWING PORTION OF RIDGELINE TO BE REMOVED AND WEST MATERIALS STORAGE AREA TO BE ADDED



MODEL RESULT SHOWING TREELINE HEIGHT FOR RECLAMATION ANALYSIS AND WEST MATERIALS STORAGE AREA TO BE ADDED



EXISTING CONDITIONS (Rancho San Antonio County Park, from Anza Knoll Looking Southwest)



SIMULATED VIEW OF NORTH HIGHWALL RESERVE AT COMPLETION OF MINING



SIMULATED VIEW OF NORTH HIGHWALL RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Rancho San Antonio County Park, from Anza Knoll Looking Southwest)



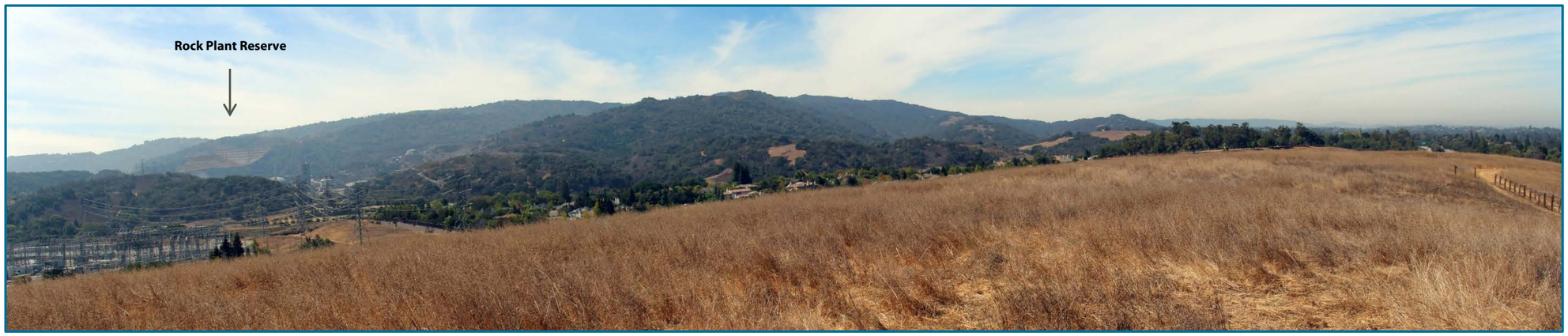
SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA AT COMPLETION OF MATERIAL PLACEMENT



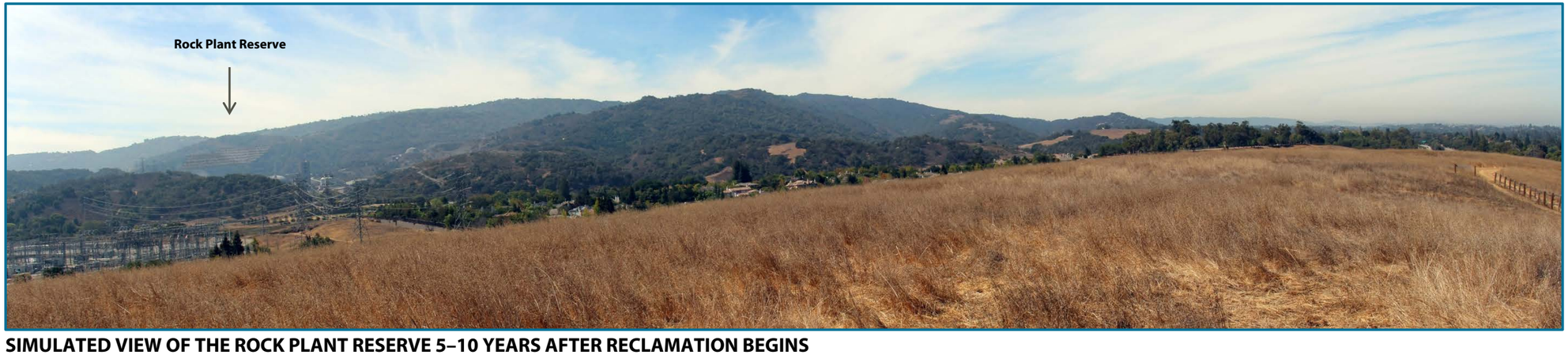
SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Rancho San Antonio County Park, from Anza Knoll Looking Southwest)



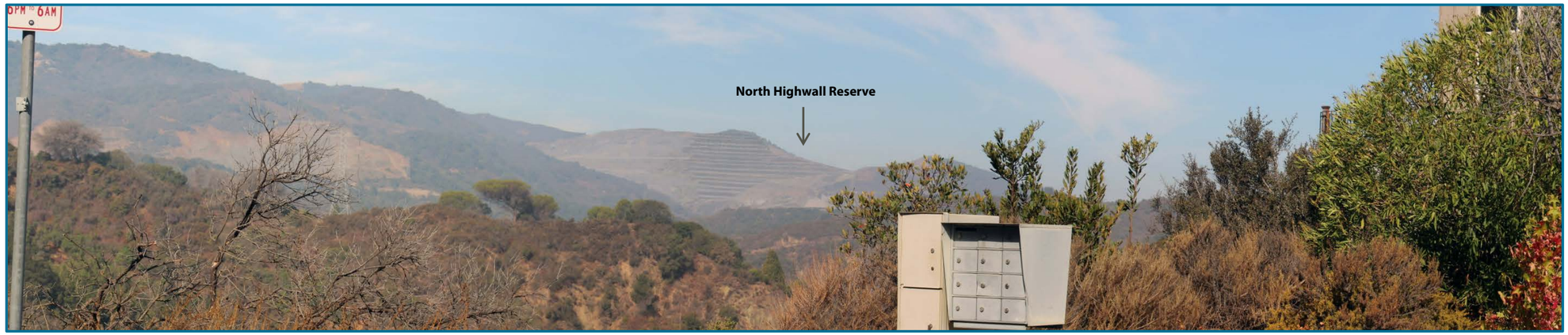
SIMULATED VIEW OF THE ROCK PLANT RESERVE AT COMPLETION OF MINING



SIMULATED VIEW OF THE ROCK PLANT RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Canyon View Circle, Looking Northwest)



SIMULATED VIEW OF NORTH HIGHWALL RESERVE AT COMPLETION OF MINING



SIMULATED VIEW OF NORTH HIGHWALL RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Canyon View Circle, Looking Northwest)



SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA AT COMPLETION OF MATERIAL PLACEMENT



SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Canyon View Circle, Looking Northwest)



SIMULATED VIEW OF THE ROCK PLANT RESERVE AT COMPLETION OF MINING



SIMULATED VIEW OF THE ROCK PLANT RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Northbound Interstate 280 from Mary Avenue Bicycle Footbridge, Looking West)



SIMULATED VIEW OF NORTH HIGHWALL RESERVE AT COMPLETION OF MINING



SIMULATED VIEW OF NORTH HIGHWALL RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Northbound Interstate 280 from Mary Avenue Bicycle Footbridge, Looking West)



SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA AT COMPLETION OF MATERIAL PLACEMENT



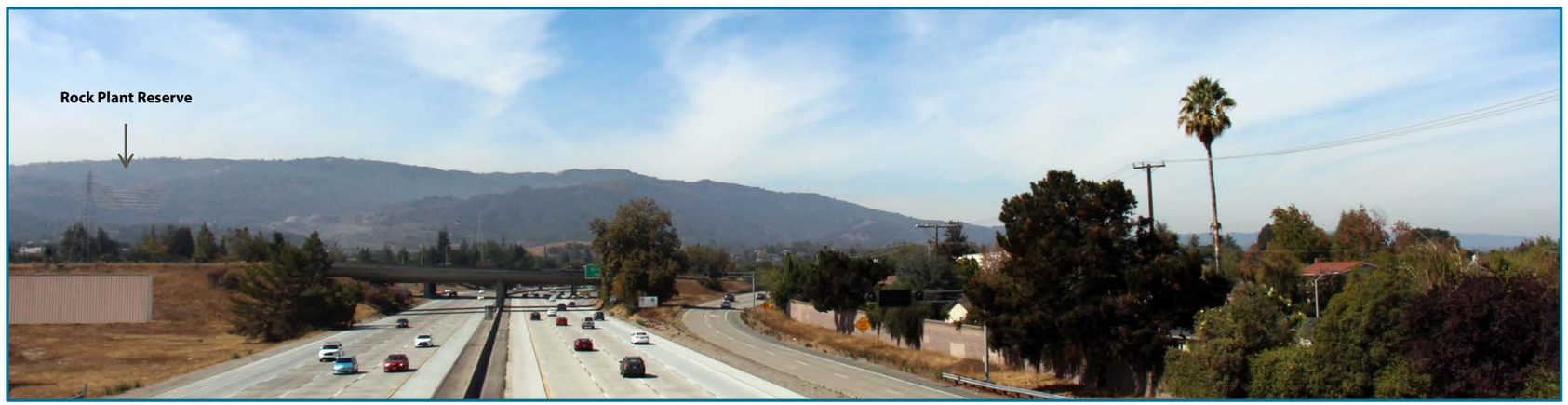
SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Northbound Interstate 280 from Mary Avenue Bicycle Footbridge, Looking West)



SIMULATED VIEW OF THE ROCK PLANT RESERVE AT COMPLETION OF MINING



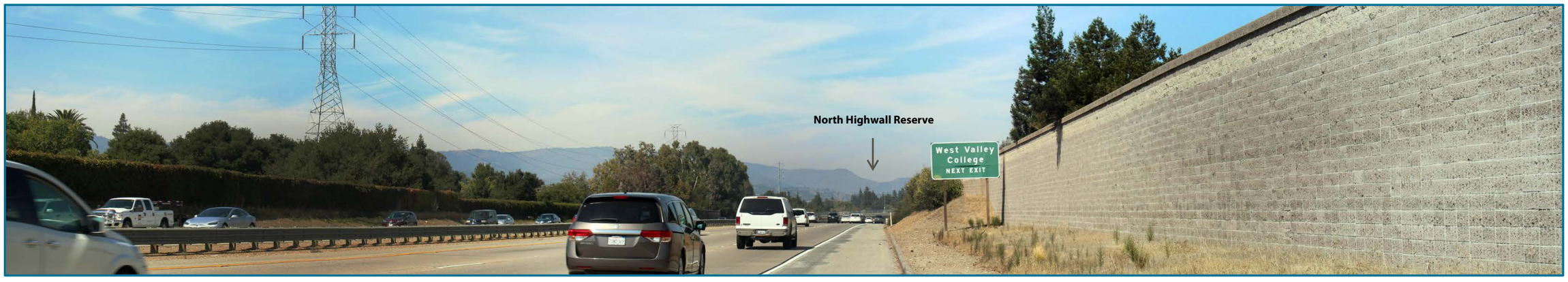
SIMULATED VIEW OF THE ROCK PLANT RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS



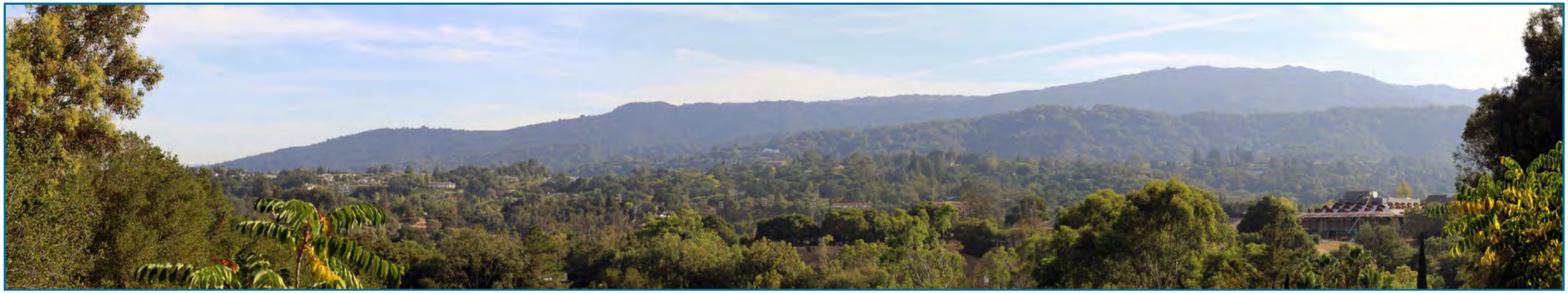
EXISTING CONDITIONS (Northbound State Route 85 near Quito Road, Southeast of Saratoga Avenue Onramp, Looking Northwest)



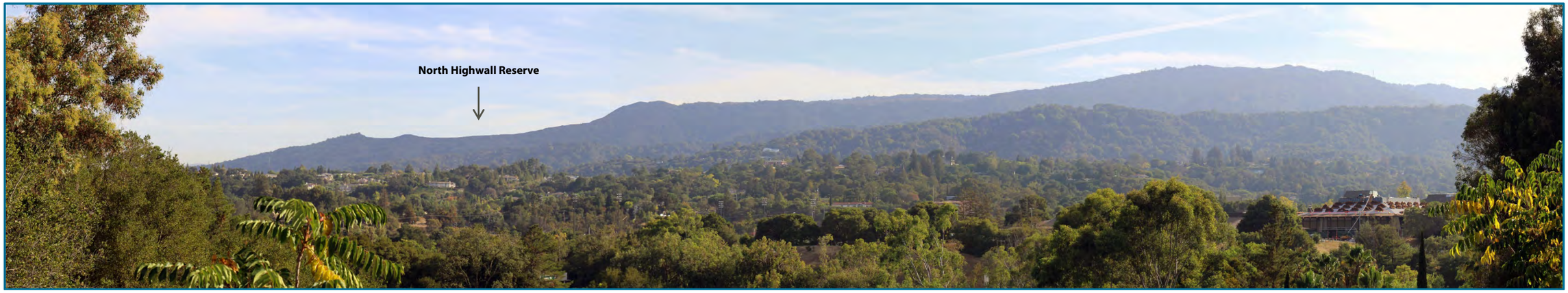
SIMULATED VIEW OF NORTH HIGHWALL RESERVE AT COMPLETION OF MINING



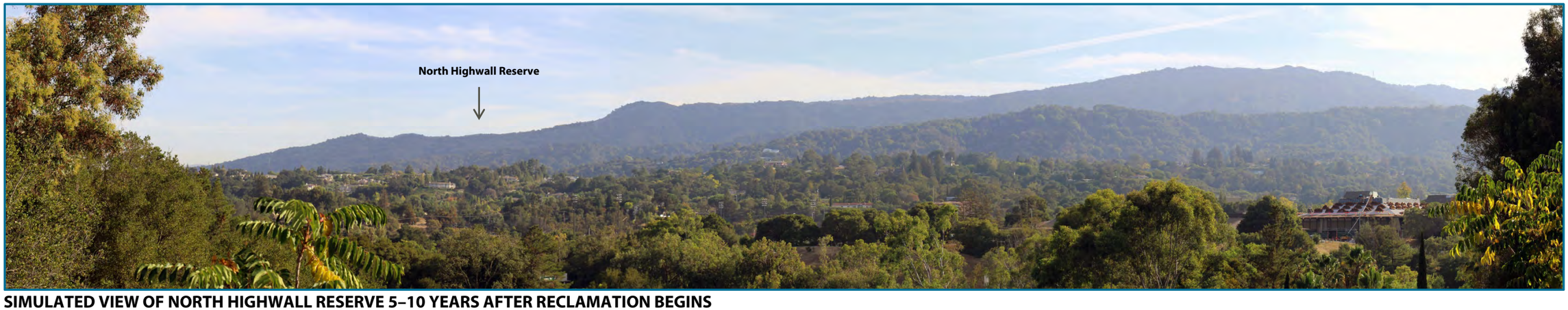
SIMULATED VIEW OF NORTH HIGHWALL RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS



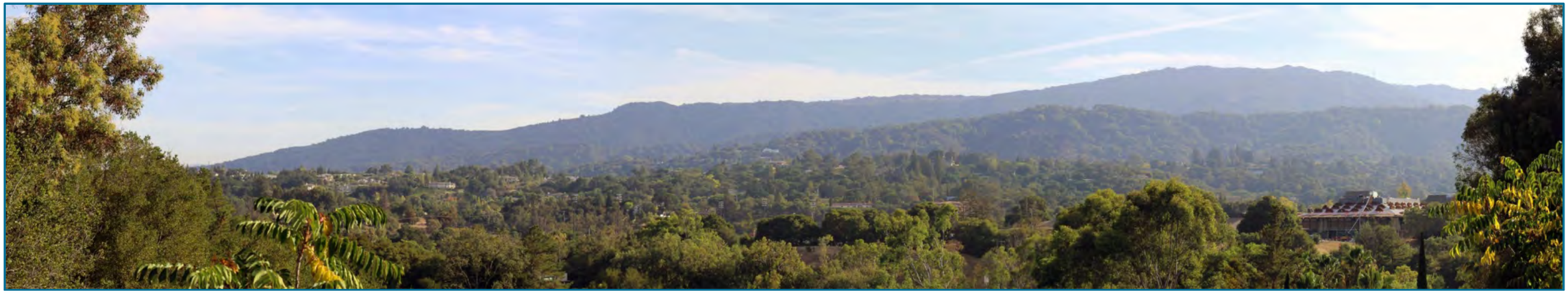
EXISTING CONDITIONS (La Rena Lane in Los Altos Hills, Looking South)



SIMULATED VIEW OF NORTH HIGHWALL RESERVE AT COMPLETION OF MINING



SIMULATED VIEW OF NORTH HIGHWALL RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (La Rena Lane in Los Altos Hills, Looking South)



SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA AT COMPLETION OF MATERIAL PLACEMENT



SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Stonebrook Drive in Los Altos Hills, Looking South)



SIMULATED VIEW OF NORTH HIGHWALL RESERVE AT COMPLETION OF MINING



SIMULATED VIEW OF NORTH HIGHWALL RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Stonebrook Drive in Los Altos Hills, Looking South)



SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA AT COMPLETION OF MATERIAL PLACEMENT



SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Mora Drive and Mora Trail in Los Altos Hills, Looking South)



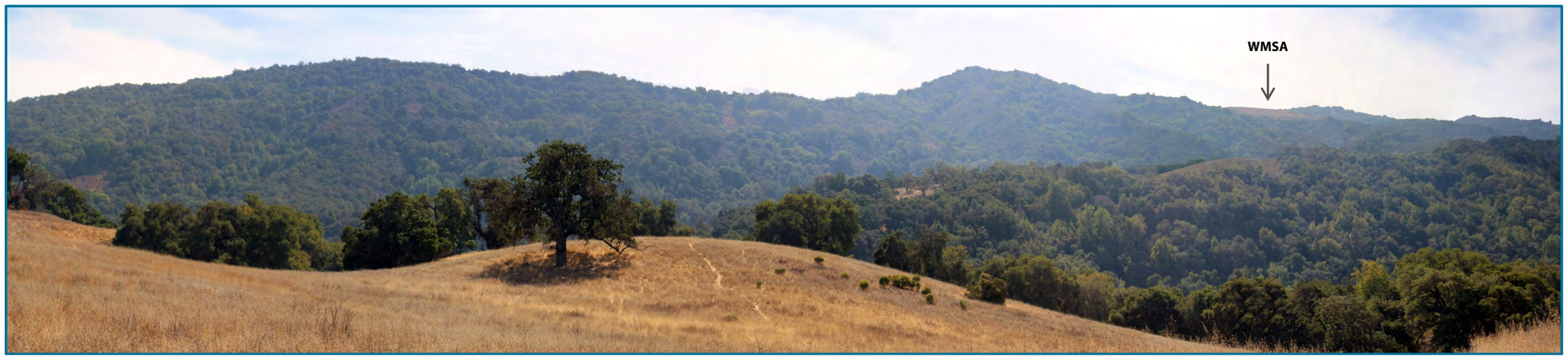
SIMULATED VIEW OF NORTH HIGHWALL RESERVE AT COMPLETION OF MINING



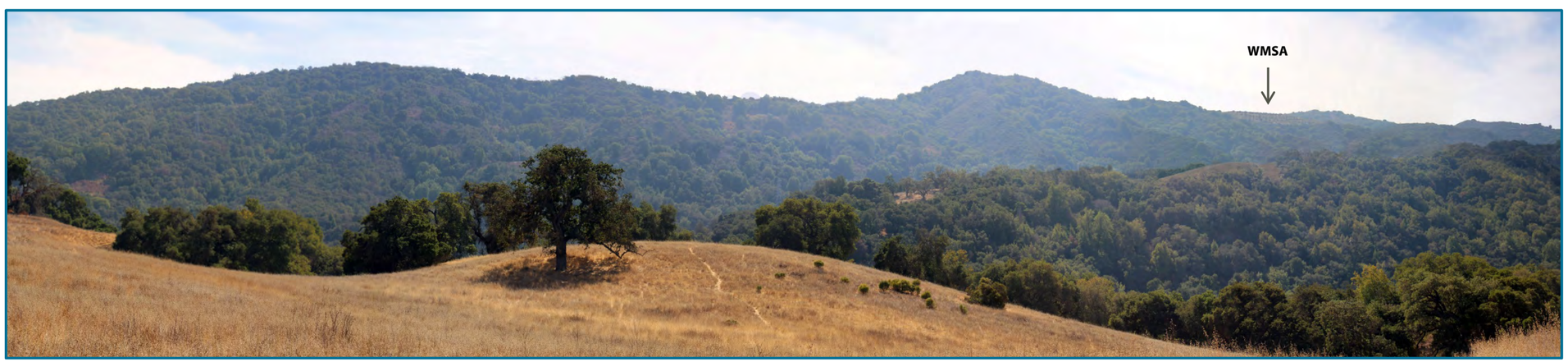
SIMULATED VIEW OF NORTH HIGHWALL RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Mora Drive and Mora Trail in Los Altos Hills, Looking South)



SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA AT COMPLETION OF MATERIAL PLACEMENT



SIMULATED VIEW OF THE WEST MATERIALS STORAGE AREA 5–10 YEARS AFTER RECLAMATION BEGINS



EXISTING CONDITIONS (Entrance to Rancho San Antonio County Park, Looking Southwest)



SIMULATED VIEW OF NORTH HIGHWALL RESERVE AT COMPLETION OF MINING



SIMULATED VIEW OF NORTH HIGHWALL RESERVE 5–10 YEARS AFTER RECLAMATION BEGINS

BENCHMARK RESOURCES

Viewpoint 8: Entrance to Rancho San Antonio County Park—Existing Conditions and Simulations of North Highwall Reserve
PERMANENTE QUARRY AESTHETIC TECHNICAL STUDY
Figure 24

APPENDIX A
VIEWPOINT SIMULATION SELECTION

APPENDIX A
VIEWPOINT SIMULATION SELECTION

Seventeen representative viewpoints were selected at publicly accessible locations considered representative of the area or of locations from which a viewer would have the most potential to experience a change in visual character as a result of implementation of the proposed *Permanente Quarry Amended Reclamation Plan*. Figure A-1, "Viewpoint Locations," shows the seventeen viewpoint locations in relation to Permanente Quarry location and direction of view. Figure A-2, "Viewpoint Photographs," shows the photographs taken looking toward Permanente Quarry from each viewpoint.

Many of the viewpoints are the same as those used in the 2012 environmental impact report (EIR) analysis prepared for the reclamation plan amendment, but photographs were retaken for this current analysis to reflect existing conditions. One viewpoint from the 2012 EIR that was not used for this current analysis is from the PG&E Trail at Rancho San Antonio Open Space Preserve. This location does not provide a view of any features of the current project. Additional viewpoints are included in this current analysis to represent views from the Los Altos, Los Altos Hills, and Cupertino areas to ensure that this analysis provides full disclosure of potential visual effects of the project. Panoramic photographs were taken on September 26 and 27, 2018 (for Viewpoints 1–7 and 10–16); on November 3, 2018 (for Viewpoints 9 and 17), and on January 1, 2019 for Viewpoint 8. Photographs from each viewpoint are included in this appendix as Figure A-2.

Some viewpoints were not simulated because terrain modeling and line-of-sight evaluations concluded that no discernable project components would be visible within a viewpoint's viewshed. In addition, some viewpoints were similar to other nearby viewpoints, making additional simulations unnecessary to complete the aesthetics analysis. Table 1, "Reasoning for Simulation Selection," provides the reasoning used for determining whether simulations for a viewpoint would be prepared for this analysis.

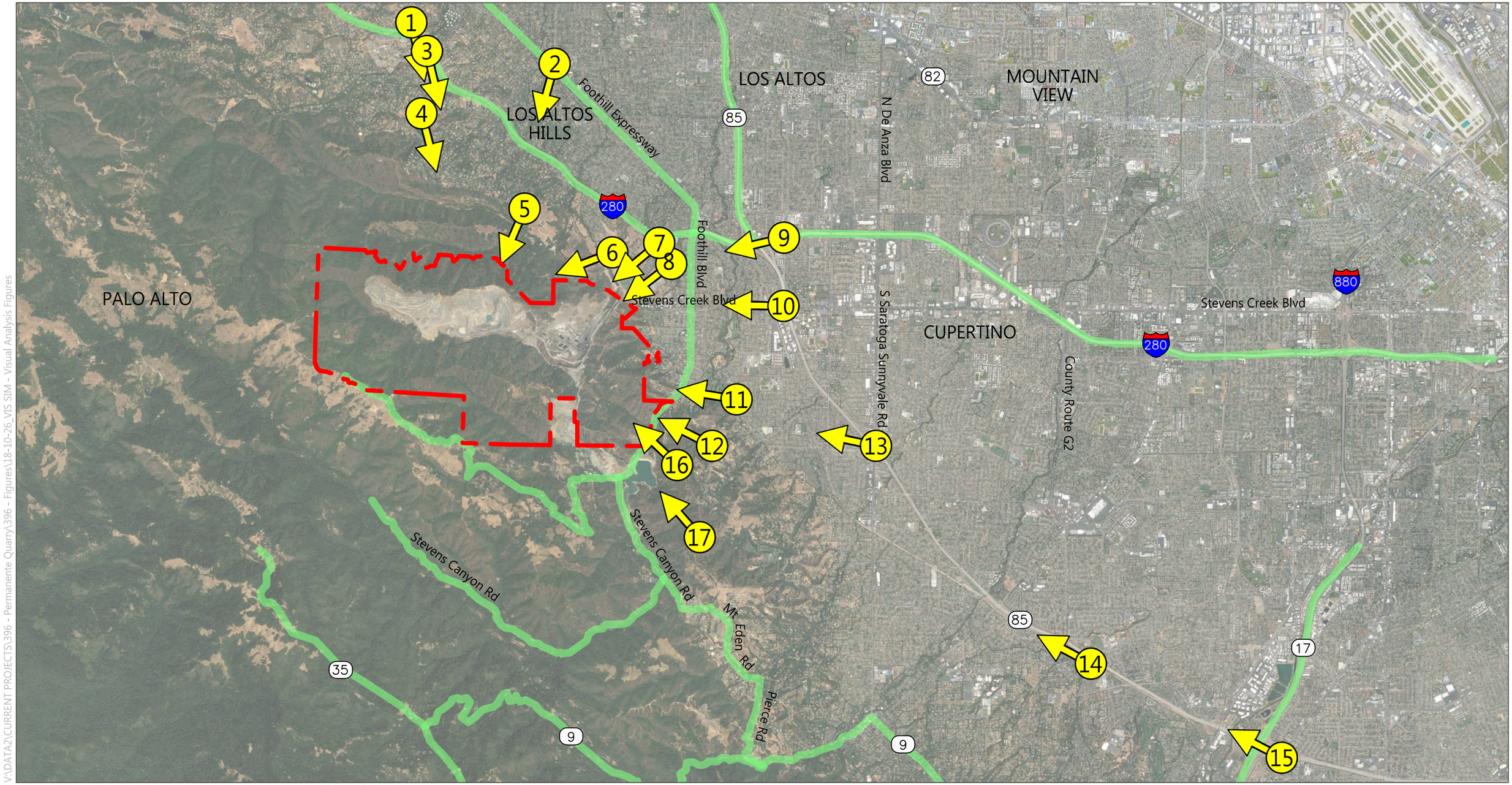
TABLE 1
REASONING FOR SIMULATION SELECTION

No.	Description	Reasoning
SIMULATED		
1	Anza Knoll	A special interest location with a view from east of the project site with high site visibility.
2	Canyon View Circle	View from southeast of the project site with high site visibility. Similar view angle to views from Masie's Peak and Coyote Ridge Trail in the Fremont Older Open Space Preserve, but closer to the project site and provides more direct views of the project components.
3	Northbound I-280 from Mary Avenue Bicycle Footbridge	Representative view from east of the project site with high site visibility. Representative of views from Steven's Creek Boulevard near SR 85, but with increased site visibility.
4	Northbound SR 85 near Quito Road	Representative view from southeast of site and SR 85. Representative of views from northbound De Anza Boulevard on the SR 85 overpass and from Bascom Avenue near SR 85, but with increased site visibility.
5	La Rena Lane	Representative view from north of the site with views of the ridgeline where North Quarry highwall lay-back activities would occur.
6	Stonebrook Drive	Representative view from north of the site with views of the ridgeline where North Quarry highwall lay-back activities would occur.

No.	Description	Reasoning
7	Mora Drive and Mora Trail	Representative view from north of the site with views of the ridgeline where North Quarry highwall lay-back activities would occur.
8	Entrance to Rancho San Antonio County Park	A special interest location northeast of the site, with potential views of the North Quarry.
NOT SIMULATED		
9	Maisie's Peak	Similar view angle to Viewpoint 2, but from a greater distance and with less site visibility. The Rock Plant Reserve would not be visible from this location. See the impact analysis in Section 6 of the visual analysis for a detailed description of what would be visible.
10	I-280 Southbound off-Ramp near El Monte Road	Low site visibility; limited or no views of project components.
11	Northbound De Anza Boulevard on the SR 85 overpass	Similar to Viewpoint 4, but less site visibility. Sufficiently represented by Viewpoint 4 simulations.
12	Bascom Avenue near SR 85	Similar to Viewpoint 4, but less site visibility. Sufficiently represented by Viewpoint 4 simulations.
13	South Springer Road at Foothill Expressway	Low site visibility; limited or no views of project components.
14	Stevens Creek Boulevard near SR 85	Similar to Viewpoint 3, but less site visibility. Sufficiently represented by Viewpoint 3 simulations.
15	Columbus Avenue and Linda Vista Drive	No site visibility.
16	Cristo Rey Drive at Hammond-Snyder Loop Trail	Similar to Viewpoint 1, but less site visibility. Sufficiently represented by Viewpoint 1 simulations.
17	Coyote Ridge Trail	Similar view angle to Viewpoint 2, but from a greater distance and with less site visibility. See the impact analysis in Section 6 of the visual analysis for a description of what would be visible.

Notes: I-280 = Interstate 280; SR 85 = State Route 85.

APPENDIX A FIGURES



SOURCES: AERIAL: Google Earth (2018-08-09); SITE BOUNDARY: Lehigh Southwest Cement Company, generated in 2018; SCENIC HIGHWAYS: Santa Clara County 2008; compiled by Benchmark Resources in 2019

Property Boundary

Scenic Roadway

1 Viewpoint Location, Number, and Direction

BENCHMARK RESOURCES

N

0 1/2 1 2 Miles

Viewpoint Locations and Scenic Roadways

PERMANENTE QUARRY AESTHETICS TECHNICAL STUDY

Figure A-1

V:\DATA2\CURRENT PROJECTS\396 - Permanente Quarry\A396 - Figures\Figures\18-10-26_VIS SIM - Visual Analysis Figures



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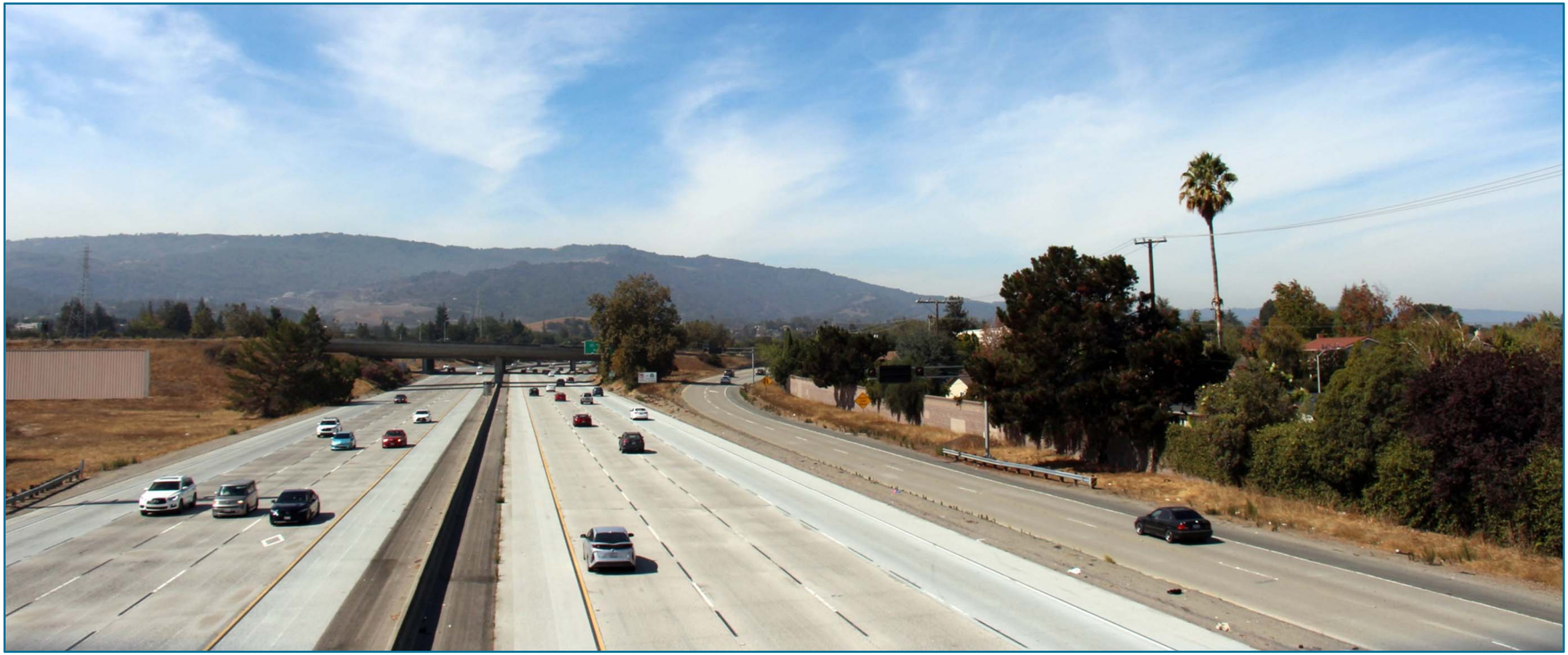

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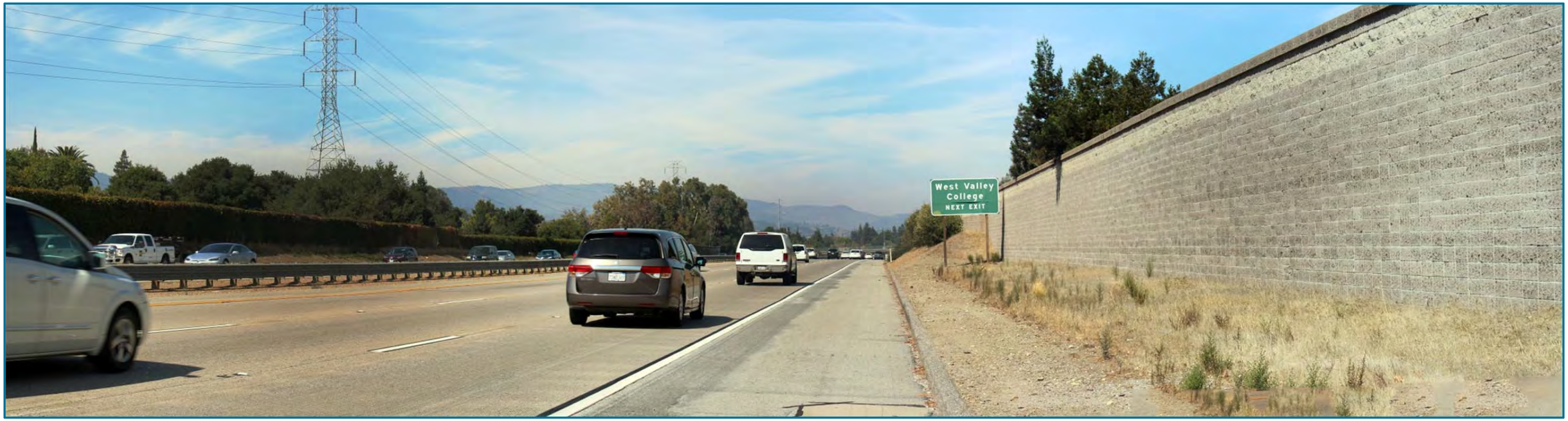

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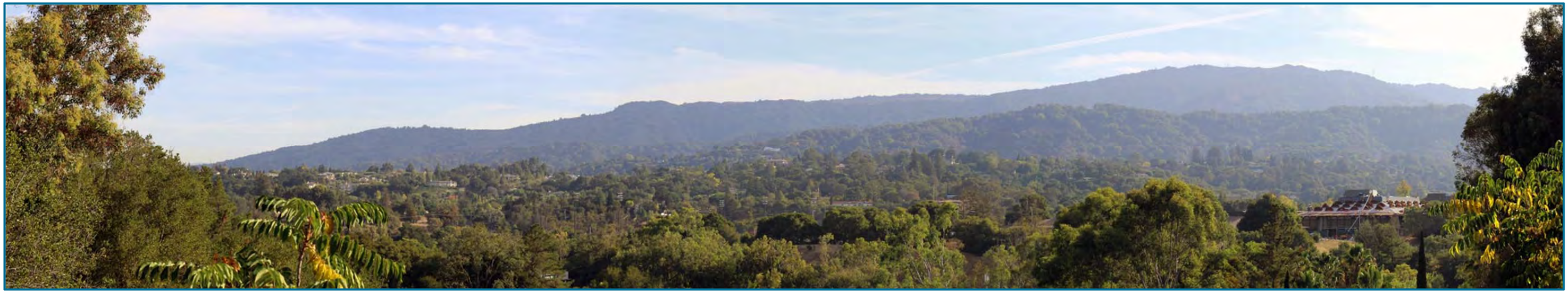

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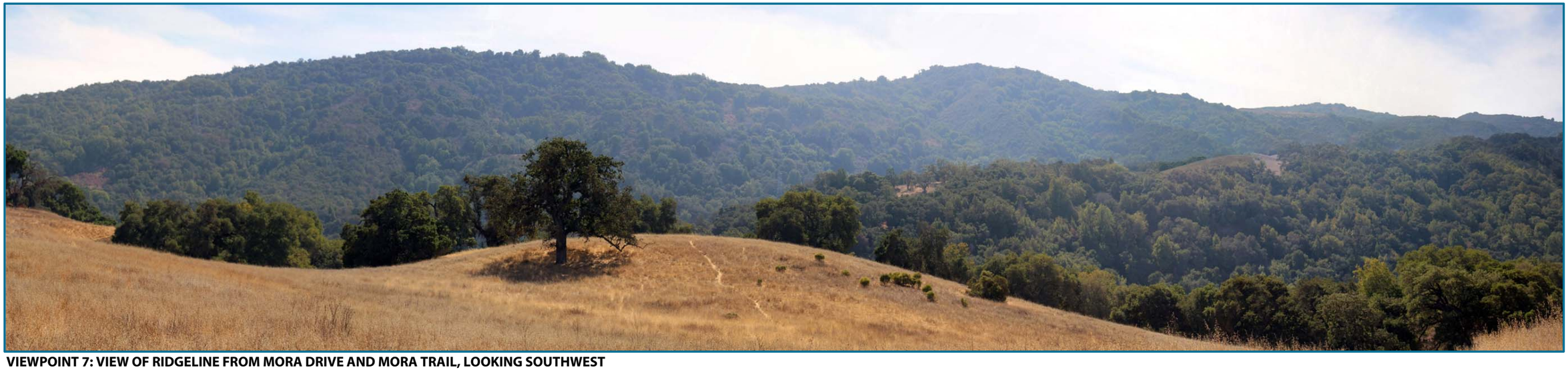

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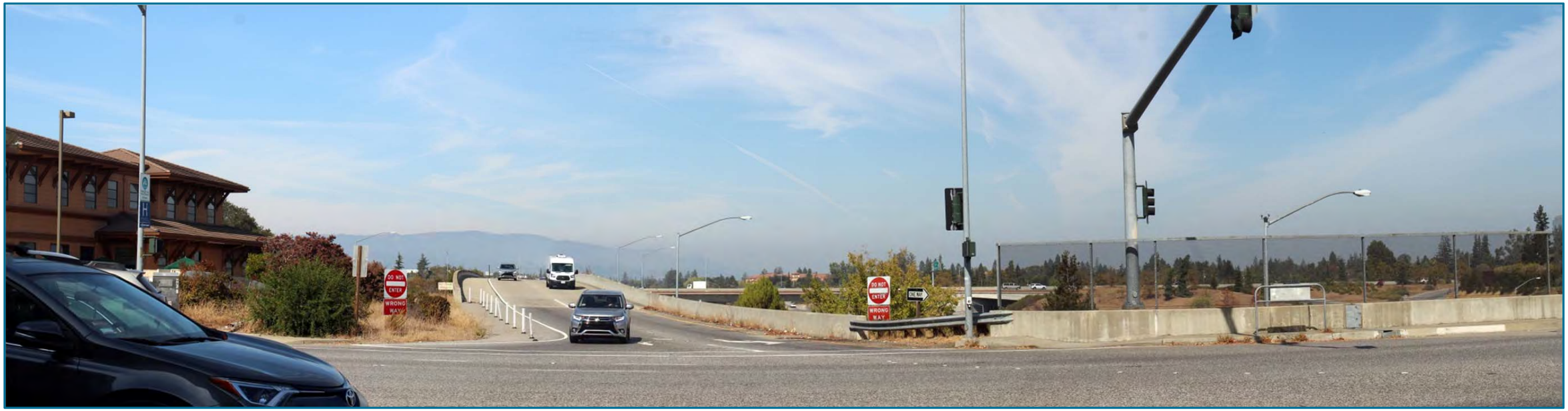

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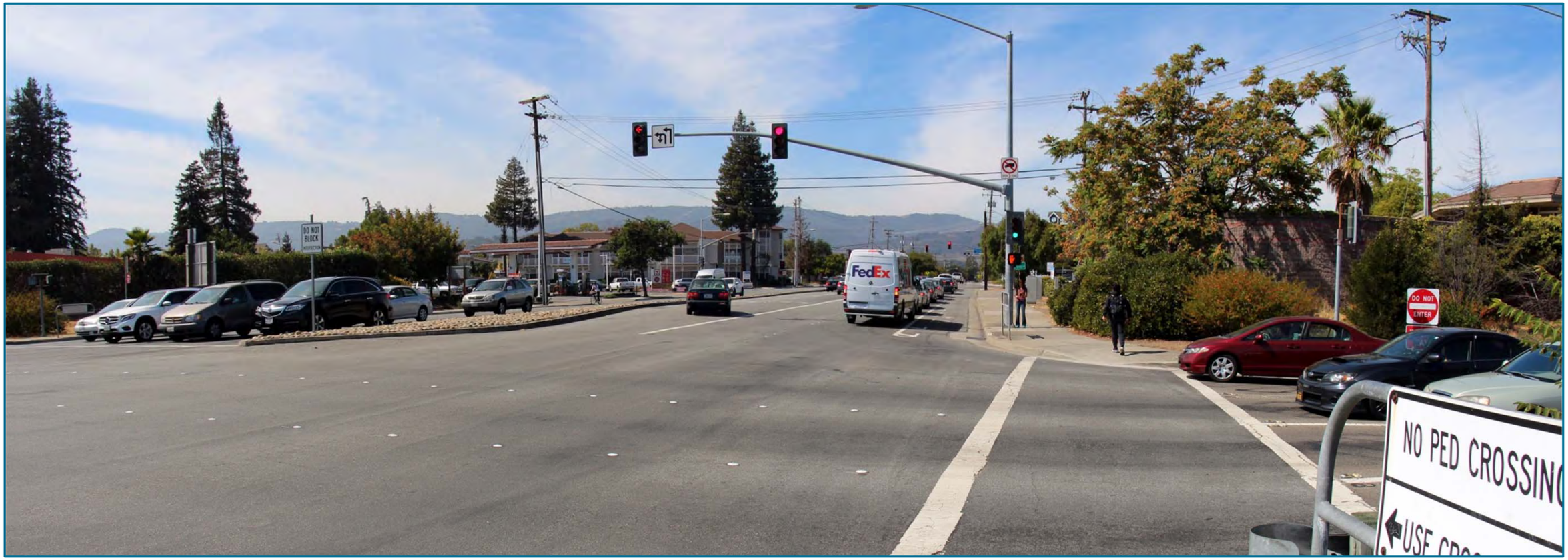

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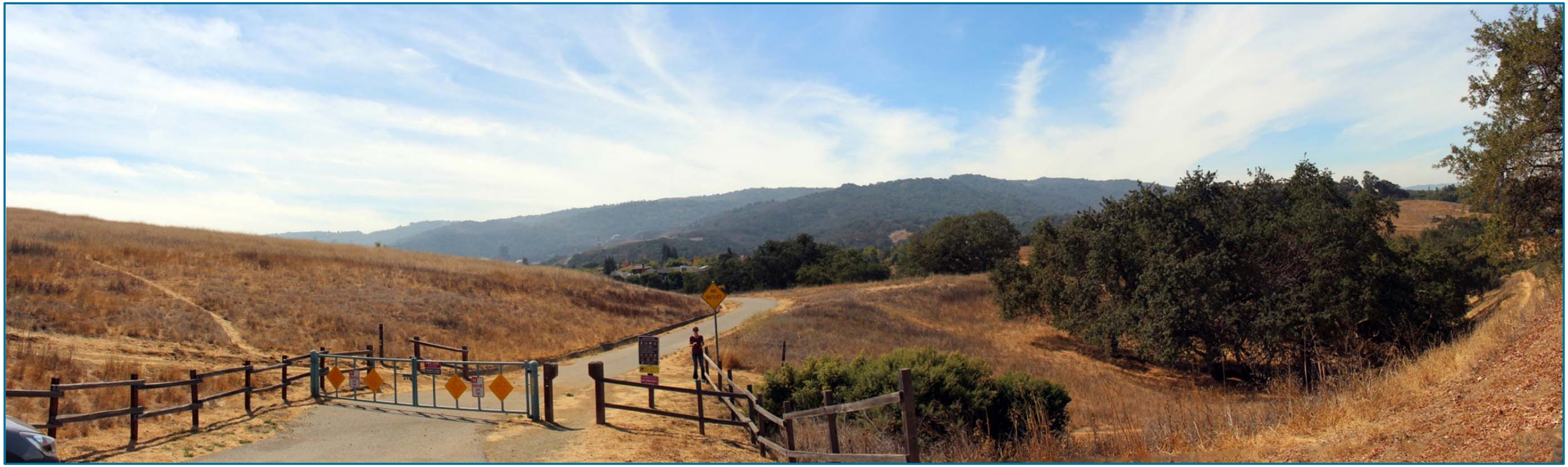

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Air Quality Impact Assessment for the Permanente Quarry Reclamation Plan Amendment

Lehigh Hanson
HEIDELBERGCEMENT Group

AIR QUALITY IMPACT ASSESSMENT

FOR THE

PERMANENTE QUARRY RECLAMATION PLAN AMENDMENT

Lehigh Southwest Cement Company > Cupertino, CA
Permanente Quarry

Lehigh Hanson
HEIDELBERGCEMENT Group

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Trinity Consultants Project 180502.0050

Trinity Consultants

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AB – Assembly Bill

AQIA – Air Quality Impact Assessment

AQMD – Air Quality Management District

AQMP – Air Quality Management Plan

BAAQMD – Bay Area Air Quality Management District

CAA – Clean Air Act (Federal)

CAAQS – California Ambient Air Quality Standards

CAFE – Corporate Average Fuel Economy

CARB – California Air Resources Board

CAT – Climate Action Team

CAP – Climate Action Plan

CCAA – California Clean Air Act

CCR – California Code of Regulations

CEQA – California Environmental Quality Act

CFR – Code of Federal Regulations

CH_4 – Methane

CO – Carbon Monoxide

CO_2 – Carbon Dioxide

CO_2e – Carbon Dioxide Equivalent

CUP – Conditional Use Permit

DEIR – Draft Environmental Impact Report

DPM – Diesel Particulate Matter

EIR – Environmental Impact Report

EMSA – East Material Storage Area

°F – degrees Fahrenheit

FDCP – Fugitive Dust Control Plan

GHG – Greenhouse Gas

GWP – Global Warming Potential

H_2S – Hydrogen Sulfide

HFCs – Hydrofluorocarbons

HRA – Health Risk Assessment

IPCC – Intergovernmental Panel on Climate Change

LCFS – Low Carbon Fuel Standard

MDAQMD – Mojave Desert Air Quality Management District

MEI – Maximally Exposed Individual

MMT – Million Metric Tons

MSL – Mean Sea Level

MT – Metric Tons

NAAQS – National Ambient Air Quality Standards

NESHAP – National Emission Standard for Hazardous Air Pollutants

NF_3 – Nitrogen Triflouride

N_2O – Nitrous Oxide

NO_X – Nitrogen Oxides

NO_2 – Nitrogen Dioxide

NSPS – New Source Performance Standard

O_3 – Ozone

OEHHA – Office of Environmental Health Hazard Assessment

Pb – Lead

PFCs – Perfluorocarbons

$PM_{2.5}$ – Particulate Matter with an Aerodynamic Diameter of Less than 2.5 Microns (Fine PM)

PM_{10} – Particulate Matter with an Aerodynamic Diameter of Less than 10 Microns (Respirable PM)

PPM – Parts per Million

PSIG – Pounds per Square Inch Gauge

RACT – Reasonably Available Control Technology

ROG – Reactive Organic Gases

SB – Senate Bill

SCAQMD – South Coast Air Quality Management District

SIP – State Implementation Plan

SF_6 – Sulfur Hexafluoride

SMARA – California Surface Mining and Reclamation Act

SO_2 – Sulfur Dioxide

TAC – Toxic Air Contaminant

TPD – Tons per Day

TPY – Tons per Year

ULSD – Ultra Low Sulfur Diesel

U.S. EPA – United States Environmental Protection Agency

VMT – Vehicle Miles Traveled

VOC – Volatile Organic Compounds

WMSA – West Material Storage Area

WRAP – Western Regional Air Partnership

Year 3 – worst case analysis year for the proposed Project as evaluated in this report

1. EXECUTIVE SUMMARY

Trinity Consultants, Inc. (Trinity) has prepared an air quality and greenhouse gas (GHG) impact assessment—collectively referred to as an Air Quality Impact Assessment (AQIA)— to evaluate potential impacts associated with a proposed amendment to the reclamation plan for the Permanente Quarry (Quarry) to incorporate the results of various hydrologic and geotechnical investigations that have occurred since Lehigh Southwest Cement Company's (Lehigh) current reclamation plan was approved in 2012 (2012 Reclamation Plan). The AQIA was prepared in accordance with the standards, procedures, and methodologies established in the Bay Area Air Quality Management District (BAAQMD) *California Environmental Quality Act Air Quality Guidelines*, dated May 2017, the *California Environmental Quality Act* (CEQA)[1] and the California Natural Resources Agency's *CEQA Guidelines*.[2]

The Quarry is a limestone and aggregate mining operation in the unincorporated foothills of western Santa Clara County, located approximately two miles west of the City of Cupertino. Lehigh manages the approximately 3,510-acre property and operates the Quarry under the *Reclamation Plan Amendment for Permanente Quarry* (2012 Reclamation Plan), which Lehigh prepared and Santa Clara County approved in 2012.

A primary feature of the 2012 Reclamation Plan is to reclaim the central mining excavation, known as the North Quarry, by backfilling the excavation with overburden material that is currently stockpiled on-site in an area known as the West Materials Storage Area (WMSA). The purpose of this strategy was to meet certain water quality and slope stability requirements. The proposed modifications to the 2012 Reclamation Plan are designed to incorporate backfill, reclamation and revegetation that would be superior to the approved plan while updating reclamation planning for continued mineral production. The proposed Project comprises four primary components:

1. Incorporate development and reclamation of the Rock Plant Reserve mining area.
2. Regrade and mine the upper slopes of the north highwall to recover limestone, eliminate the need for a large fill buttress, and achieve long-term slope stability.
3. Reclaim the majority of the WMSA in place.
4. Backfill the North Quarry using a combination of imported surplus construction soil (referred to as imported soil) that meets site-specific acceptance criteria and greenstone overburden to protect water quality.

The proposed Project will not require any construction activities, and implementation will begin immediately after Project approval. Reclamation under the proposed Project is expected to occur over 30-40 years. The post-reclamation land condition after the proposed Project will be suitable for open space uses. Some of the overburden from mining the North Quarry will be added to the WMSA. The North Quarry will be backfilled to above the groundwater elevation with a combination of materials obtained onsite and imported soil that will satisfy criteria for long-term surface and groundwater quality. Mined slopes will be graded to be stable and conform to the surrounding topography. Vegetation used for revegetation will be similar to vegetation in the surrounding undisturbed areas.

Various Project elements and recent operational changes will decrease potential operational emissions under the Project as compared to baseline conditions. The Project includes use of RWQCB-approved chemical dust suppressant application on unpaved roads which achieves improved fugitive dust suppression as compared to

[1] Public Resources Code §§ 21000-21177

[2] California Code of Regulations (CCR) Title 14, Division 6, Chapter 3, §§ 15000 - 15387

water application under baseline conditions. Recent operational changes include Lehigh's use of a new fleet of mobile equipment that Lehigh acquired and put into use in 2018, whereas older equipment with higher emissions factors was used during the baseline period. Lehigh has also recently employed the use of higher tier (Tier 3) engines to power dewatering system pumps which have lower emissions than pump engines used during the baseline period.

This AQIA includes a detailed environmental analysis of the local air quality conditions in the project area and a description of the air quality and GHG regulatory setting on a local, state and federal basis.

CEQA requires that a lead agency evaluate the potential air pollutant and GHG emissions of a project and determine whether the emissions would result in significant effects. Because Permanente Quarry is an existing operation that generates air pollutant and GHG emissions, the CEQA evaluation considers the change in emissions resulting from the proposed Project as compared to existing "baseline" emissions. The AQIA evaluates the net change in emissions related to the proposed Project through individual calculations of air emissions for a baseline period and for the proposed Project. Sources of emissions from mining and reclamation of the Quarry and associated operations include:

- Drilling and blasting;
- Bulldozing, scraping, and grading;
- Material handling;
- Wind erosion (disturbed areas and unpaved roads);
- Dust entrainment from unpaved roads;
- Rock plant equipment;
- Fuel storage and dispensing;
- Off road equipment exhaust;
- On road vehicle exhaust;
- Dewatering system combustion emissions; and
- Electricity use.

The baseline and proposed Project operations would emit the following pollutants: reactive organic gases (ROG), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), suspended particulate matter (PM_{10} and $PM_{2.5}$), GHGs, and toxic air contaminants (TACs). Criteria pollutant (e.g., ROG, CO, NO_2, SO_2, PM_{10} and $PM_{2.5}$) and GHG emissions are estimated using Bay Area Air Quality Management District (BAAQMD), California Air Resources Board (CARB), and United States Environmental Protection Agency (U.S. EPA) approved guidance and emission modeling programs. Emission factors and calculation methods used to quantify emissions are based on data available from generally accepted public sources.

The proposed Project takes place over several years and has various phases of mining and reclamation with varying operational parameters. In order to quantify the maximum annual impact for the proposed Project, a representative worst-case emissions year for the proposed Project was selected as the year with the greatest amount of material (e.g., limestone, aggregate, greenstone, imported soil) movement. This worst case year is anticipated to be the third year of operations following approval of the proposed amendment, and is referred to

as Year 3 in this report.[3] Based on anticipated approval in 2020, the evaluation assumes Year 3 to occur in 2023. Operations under existing, baseline conditions are variable and are characterized by fluctuating production and associated air emissions, in response to continually changing market demands. In contrast to use of the worst-case scenario for the proposed Project, baseline emissions for this AQIA are based on an average over the 10-year period from January 1, 2008, to December 31, 2017, which includes periods of relatively high production as well as relatively low production at the Permanente Quarry in response to changing market demands. This approach of using a relatively high estimate of emissions from the proposed Project (i.e., the worst-case, highest emissions year) compared to the 10-year historical average baseline results in a conservative estimate of the net change in emissions associated with the proposed Project.

Table 1-1 presents a summary of net operational emissions associated with the proposed Project, calculated by subtracting baseline operational emissions from operational emissions that will occur during the worst-case emissions year of the proposed Project. The analysis provides substantial evidence that the net change in emissions resulting from the Project would be below the BAAQMD's significance thresholds and would result in *less than significant* impacts associated with criteria air pollutant and GHG emissions.

Table 1-1: Summary of Net Operational Criteria Pollutant and GHG Emissions

Activity	Pollutant									
	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_x	CO_2	CH_4	N_2O	CO_2e
	Pounds per Day									
Average Daily Emissions	9.8	-3.7	108.1	-426.8	-7.1	42.5	For this analysis and comparison to thresholds, GHG emissions are calculated on an annual basis only.			
Significance Threshold	**82**	**54**	**-**	**54**	**54**	**-**				
Significant Impact?	**No**	**No**	**N/A**	**No**	**No**	**N/A**				
Activity	Tons per Year						Metric Tons per Year			
Maximum Annual Emissions	7.0	0.5	25.7	-49.8	-1.3	5.1	1,824	0.1	-0.1	1,797
Significance Thresholds	**15**	**10**	**-**	**10**	**10**	**-**	**-**	**-**	**-**	**10,000**
Significant Impact?	**No**	**No**	**N/A**	**No**	**No**	**N/A**	**N/A**	**N/A**	**N/A**	**No**

The AQIA also evaluates the potential health risks associated with the proposed Project's toxic air contaminants. The primary air toxic sources associated with both existing operations and the proposed Project is the emission of on-site diesel equipment, diesel and gasoline vehicle trips, diesel and gasoline fuel storage and dispensing, fugitive dust from mining operations, material handling, unpaved and paved road vehicle travel and wind erosion. AERMOD dispersion modeling with Hot Spots Analysis and Reporting Program (HARP), is used in the AQIA to estimate carcinogenic, chronic, and acute health risk at residential and sensitive receptors as a result of the net change in emissions associated with the Project. The analysis concludes that the health risk is below BAAQMD's health risk assessment (HRA) thresholds. The analysis concludes that the health risk associated with the Project is below BAAQMD's HRA thresholds and that the Project impact is less than significant.

[3] In Year 3, it is anticipated that mining in the North Highwall Reserve would be peak production rates and imported soil would begin to be brought on-site at the anticipated approximate maximum annual rate of 1 million cubic yards and placed for reclamation. Because the representative worst-case year is near the beginning of the project phases, it is also conservative for ROG and combustion pollutants.

Modeling of $PM_{2.5}$ for the baseline and proposed Project emissions scenarios was also conducted for the AQIA and concludes that the proposed Project would result in a *less than significant* ambient $PM_{2.5}$ increase at residential and sensitive receptors.

BAAQMD determines a project's contribution to *cumulative* impacts based on whether it individually exceeds BAAQMD's quantitative significance thresholds. For projects that would not individually exceed BAAQMD's quantitative significance thresholds, the project's contribution to any cumulative impact may be considered less than significant, provided that the project is consistent with all applicable regional air quality plans. The proposed Project will not individually exceed any of BAAQMD's quantitative significance thresholds and will not result in any significant impacts associated with any of the factors listed in the Environmental Checklist in Appendix G of the *CEQA Guidelines*. In addition, the Project will not conflict with any applicable air quality plans. For these reasons, the proposed Project will not contribute to a cumulatively considerable air quality or GHG impact.

2.1. INTRODUCTION

This Air Quality Impact Assessment (AQIA) evaluation was prepared to evaluate potential impacts associated with a proposed amendment to the Reclamation Plan for the Permanente Quarry (Quarry). This AQIA was prepared in accordance with the standards, procedures, and methodologies established in the Bay Area Air Quality Management District (BAAQMD) *California Environmental Quality Act Air Quality Guidelines*, dated May 2017, the *California Environmental Quality Act* (CEQA)[4] and the California Natural Resources Agency's *CEQA Guidelines*.[5] Air quality data posted on the California Air Resources Board (CARB) and the United States Environmental Protection Agency (U.S. EPA) websites are included to document the local air quality environment. Guidance published by the Office of Environmental Health Hazard Assessment (OEHHA) was also utilized (OEHHA, 2015).

2.2. GENERAL FACILITY BACKGROUND

The Permanente Quarry (Quarry) is a limestone and aggregate mining operation in the unincorporated foothills of western Santa Clara County, west of the City of Cupertino (see Figure 2-1 for the regional location and Figure 2-2 for the site layout). The existing and planned operational areas of the Quarry occupy approximately 680 acres of an approximately 3,510-acre property that is managed by Lehigh Southwest Cement Company (Lehigh). Lehigh operates the Quarry under the *Reclamation Plan Amendment for Permanente Quarry* (2012 Reclamation Plan), which Lehigh Southwest Cement Company (2011) prepared and Santa Clara County (County) approved in 2012.

Of the total site acreage, 2,656 acres are in unincorporated Santa Clara County and the remaining 854 acres are located within the cities of Palo Alto and Cupertino. The Permanente Cement Plant, which is also on the property, is separately permitted, is not regulated under the California Surface Mining and Reclamation Act (SMARA) as part of the Quarry, and is not a component of the proposed Project.

Lehigh's property is bordered by large open space areas to the north, south, and west, and is near urban areas to the east. To the north and northeast are Rancho San Antonio County Park and Midpeninsula Regional Open Space District land. The closest residential areas are in the cities of Cupertino, Los Altos, Palo Alto, and Saratoga. At the closest points of these residential areas to the project site, Cupertino is to the east, Los Altos is approximately 1 mile to the northeast, and Saratoga is approximately 3 miles to the southeast. Two census-designated residential areas (Loyola and Los Altos Hills) are approximately 1 mile north. A separate mining operation, the Stevens Creek Quarry, is adjacent to Lehigh's property on the south.

Figure 2-1 shows the regional location, Figure 2-2 shows the surrounding municipal areas and Figure 2-3 shows the various Project areas (Benchmark, 2019).

[4] Public Resources Code §§ 21000-21177

[5] California Code of Regulations (CCR) Title 14, Division 6, Chapter 3, §§ 15000 - 15387

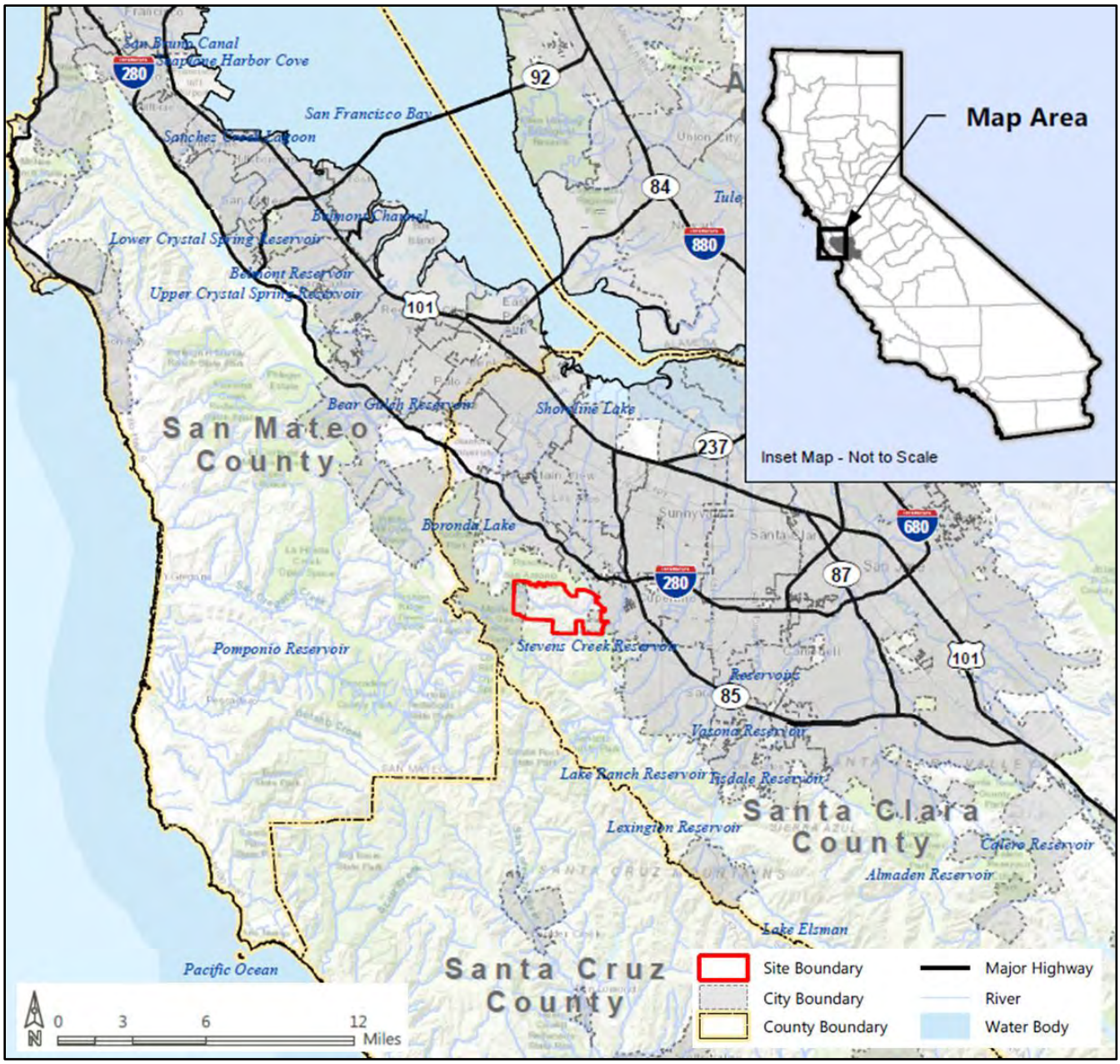

Figure 2-1: Regional Location

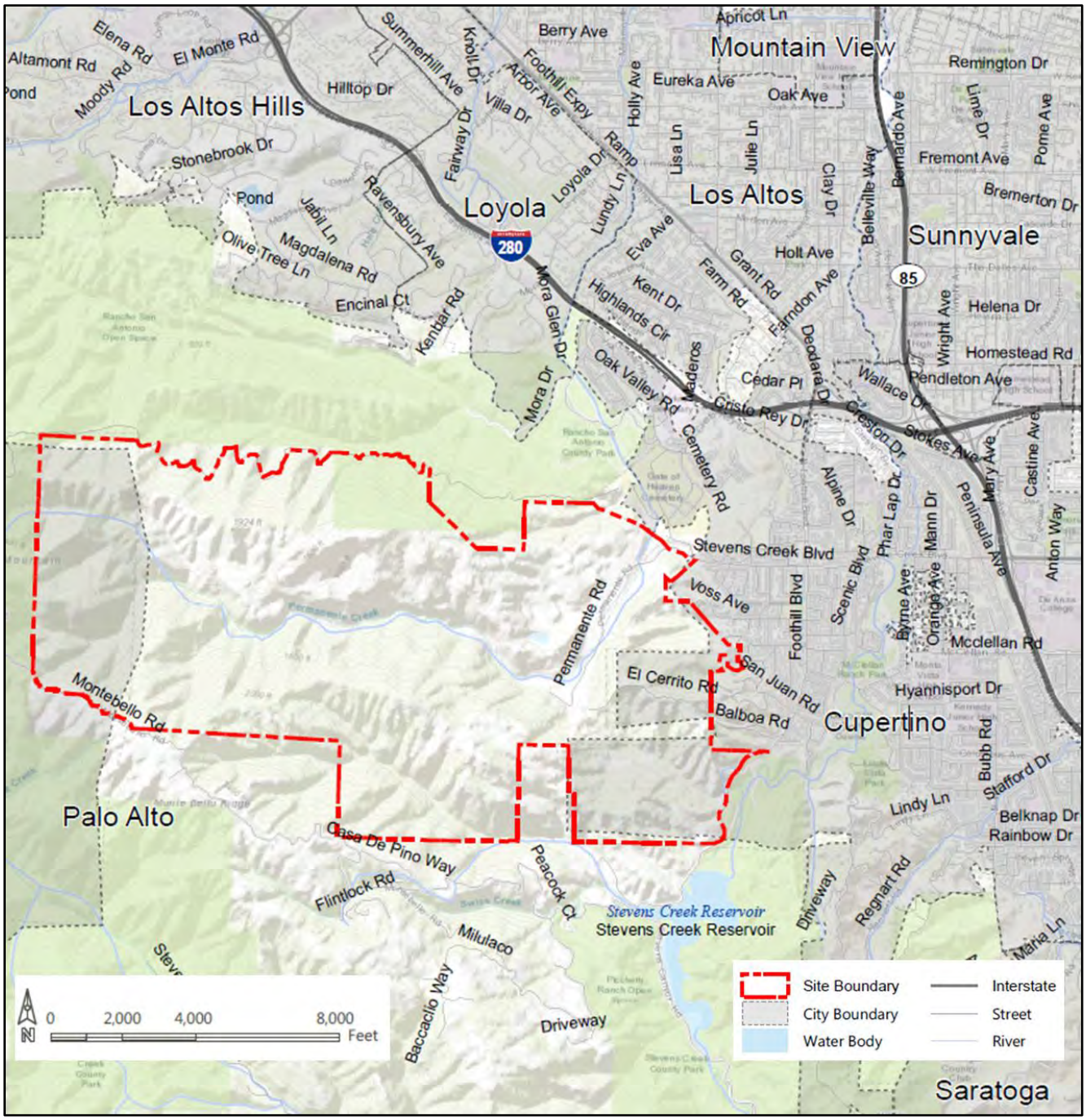

Figure 2-2: Surrounding Municipal Areas

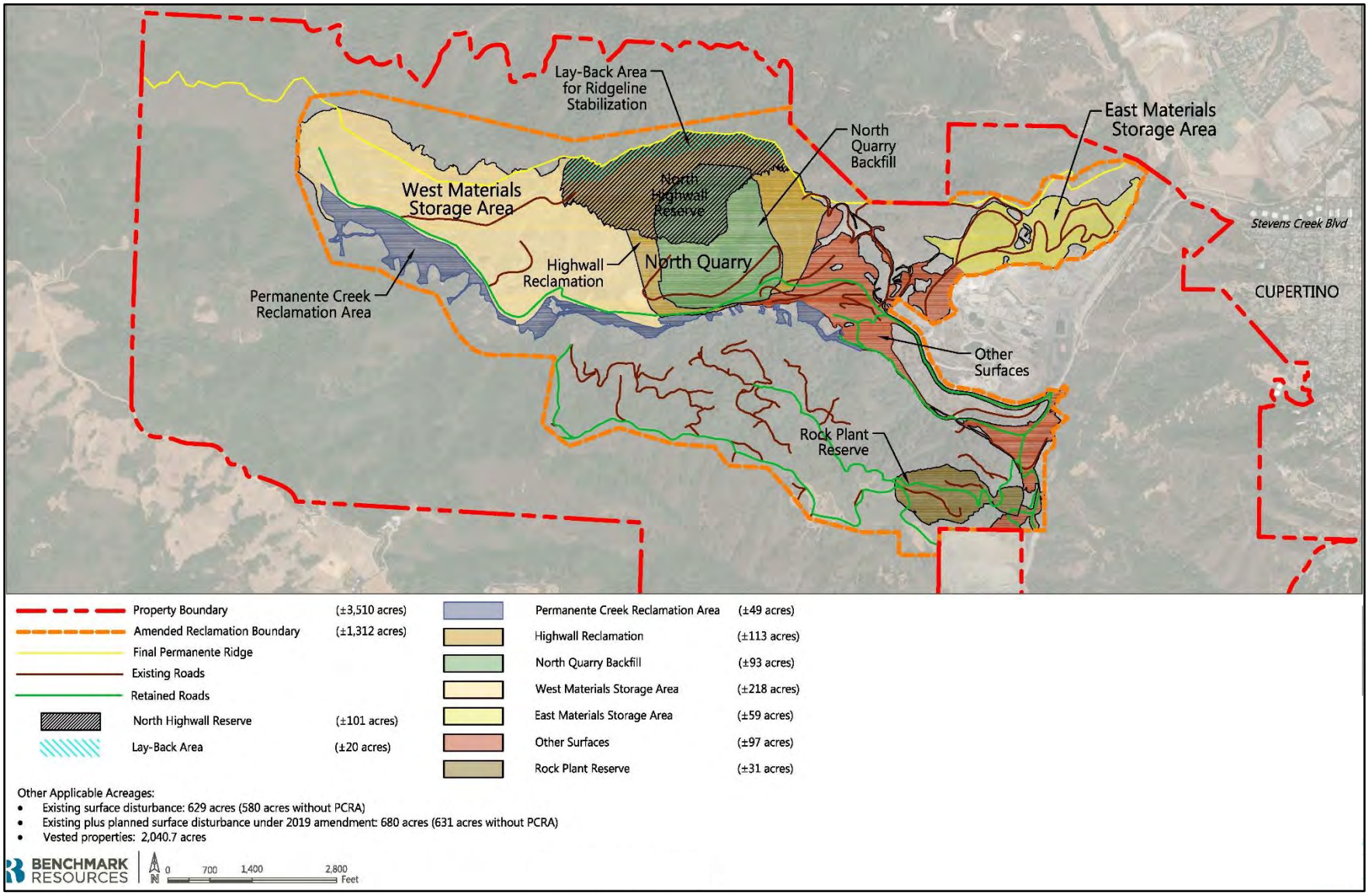

Figure 2-3: Site Layout

2.3. PROJECT DESCRIPTION

The proposed Project includes four primary components:

1. Incorporate development and reclamation of the Rock Plant Reserve mining area;
2. Regrade and mine the upper slopes of the North Highwall Reserve to recover limestone, eliminate the need for a large fill buttress, and achieve long-term slope stability;
3. Reclaim the majority of the WMSA in place; and
4. Backfill the North Quarry using a combination of imported surplus construction soil that meets site-specific acceptance criteria and greenstone overburden to protect water quality.

SMARA encourages reclamation plans to be amended as mining progresses, conditions change, and better reclamation strategies are developed. The post-reclamation land condition after the proposed Project will be suitable for open space uses. Some of the overburden from mining the North Quarry will be added to the WMSA and some will be used as backfill. The North Quarry will be backfilled to above the groundwater elevation with a combination of materials obtained onsite and imported soil that will satisfy criteria for long-term surface and groundwater quality. Mined slopes will be graded to be stable and conform with the surrounding topography. Vegetation used for revegetation will be similar to vegetation in the surrounding undisturbed areas. The specific Project components are further described in the subsequent sections.

2.3.1. Rock Plant Reserve

Lehigh proposes to open new mining in an approximately 30.5-acre extraction area in the southern portion of the property as shown on Figure 2-3. Development of the Rock Plant Reserve will include a site-specific design for surface water runoff and for placement of fill and topsoil at reclamation. The mining and reclamation activities would result in a floor elevation of approximately 915 feet above mean sea level (msl). Site preparation and mining will require approximately 5 to 10 years to complete depending on market conditions and other factors, with final reclamation grading and revegetation completed after an additional 5 years.

2.3.2. North Wall Reserve Mining and Slide Regrade

The proposed Project would include regrading of the North Wall Reserve, producing an estimated 10.9 million metric tons (MT) of limestone, and lowering the north crest by approximately 50 feet to a minimum elevation of 1,400 msl. Lehigh proposes to regrade the adjacent Main Slide for long-term stability, to eliminate the need for the buttress identified in the 2012 Reclamation Plan. Slide waste (greenstone) not suitable for aggregate production will be placed permanently on the North Quarry floor and/or the WMSA. The slope crest will be contour-graded to blend with ridgeline topography, resoiled, and planted with native trees as a first phase of the project.

2.3.3. WMSA Regrade

Under the proposed Project, the majority of the material in the WMSA will be left in place, which affords greater protection of water quality as compared to using the WMSA material for backfill of the North Quarry as identified in the 2012 Reclamation Plan. Some of the overburden from mining the North Quarry will be added to the WMSA, increasing it from final current elevation of approximately 1,900 feet msl to approximately 2,060 feet msl. Lehigh will regrade the WMSA to improve visual appearances and ensure slope stability.

2.3.4. North Quarry Backfill

Reclamation of the North Quarry will involve placing fill materials back into the North Quarry while the remaining limestone reserves are being mined and the highwall slope is being graded for stability. The North

Quarry will be backfilled to approximately 990 msl, which is above the projected post-reclamation groundwater elevation in the North Quarry and is the same minimum elevation specified in the 2012 Reclamation Plan.

Under the proposed Project, the North Quarry will be backfilled using onsite material and using imported surplus construction soil from regional construction projects. This soil would be subject to site-specific acceptance criteria developed in coordination with regulatory agencies. The North Quarry will be backfilled to above the groundwater elevation, and the proposed combined use of onsite material and imported soil will better satisfy criteria for long-term surface and groundwater quality as compared to the 2012 Reclamation Plan. This approach will also provide a location for the beneficial reuse of clean construction fill from regional construction projects. Up to approximately 30 million cubic yards of imported soil would be delivered to the site over a period of up to approximately 30 years. Lehigh proposes to accept approximately 1 million cubic yards per year of imported surplus construction soil and the soil would be delivered to the Quarry from regional construction projects in on-road trucks.

Mined slopes will be graded to be stable and conform with the surrounding topography. Vegetation used for revegetation of the North Quarry backfill areas will be similar to vegetation in the surrounding undisturbed areas.

2.4. PROJECT PHASING

Table 2-1 summarizes the various components of site reclamation and their anticipated timing for completion. Year 3, the worst-case emissions year evaluated for this AQIA, occurs during Phase 1.

Table 2-1: Reclamation Phasing

Phase[a]	Reclamation Component	Time Frame[b]	Description
I	North Highwall Reserve	10–20	• Ridgeline grading and stabilization. • Ridgeline revegetation and monitoring. • Placement of greenstone slide material on quarry floor. • North Highwall Reserve concurrently mined and reclaimed with slopes meeting geotechnical specifications.
	North Quarry		• Placement of on-site and imported fill where no conflict with access to reserves will occur.
	WMSA		• Placement of final fill and regrading of surfaces to geotechnical specifications. • Revegetation and monitoring.
II	North Quarry	15–30	• Reserves exhausted. • Continued backfill with on-site and imported fill.
	East Materials Storage Area (EMSA)[c]		• Final surface preparation, revegetation, and monitoring.
	Rock Plant Reserve		• Mining and reclamation of highwalls concurrently. • Installation of drainage controls. • Grading and revegetation of floor. • Overburden placed in North Quarry. • Vegetation monitoring.
III	North Quarry	30–40	• Final fill elevation reached (+/-990 msl). • Completion of removal of construction aggregate stockpiles. • Installation of final drainage controls. • Revegetation and monitoring.

	Operations Areas		• Reclamation of the conveyor tunnel after the conveyor is dismantled and removed. • Completion of removal of construction aggregate stockpiles. • Revegetation of all remaining areas. • Monitoring all areas for erosion and vegetation until success criteria are met.

Notes:

a. Phasing, tasks, and timing subject to specifications and future updates to waste discharge requirements by the San Francisco Bay Regional Water Quality Control Board.

b. Years after approval of the reclamation plan amendment until the phase completion.

c. Under the proposed Project, the EMSA would be reclaimed the same as prescribed in the 2012 Reclamation Plan.

Provided below is an overview of the local and regional air quality environment, the physical setting of the Project area, a discussion of global climate change, and existing regulations related to air quality and climate change.

3.1. INTRODUCTION

The Project site is located in an unincorporated area of the western foothills of Santa Clara County near the City of Cupertino, within the boundaries of the San Francisco Bay Area Air Basin (Bay Area Air Basin). The Bay Area Air Basin encompasses all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo and Santa Clara Counties; the southwestern portion of Solano County; and the southern portion of Sonoma County. The BAAQMD acts as the regulatory agency for air pollution control in the Bay Area Air Basin and is the local agency empowered to regulate air pollutant emissions for the proposed Project area.

The BAAQMD develops and adopts Air Quality Management Plans (AQMPs), which serve as a blueprint to bring the Bay Area Air Basin into compliance with federal and state clean air standards and adopts rules to reduce emissions from various sources, including specific types of equipment, activities, processes, and products.

3.2. ENVIRONMENTAL SETTING

3.2.1. Climate and Meteorology

Air quality is a function of both the rate and location of pollutant emissions under the influence of meteorological conditions and topographic features that influence pollutant movement and dispersion. Atmospheric conditions such as wind speed, wind direction, atmospheric stability, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersion of air pollutants, and consequently affect air quality (Abbott, 2003).

The climate of the San Francisco Bay Area is determined largely by a high-pressure system that is almost always present over the eastern Pacific Ocean off the West Coast of North America. High-pressure systems are characterized by an upper layer of dry air that warms as it descends, restricting the mobility of cooler marine-influenced air near the ground surface and resulting in the formation of subsidence inversions. In winter, the Pacific high-pressure system shifts southward, allowing storms to pass through the region. During summer and fall, emissions generated within the San Francisco Bay Area can combine with abundant sunshine under the restraining influences of topography and subsidence inversions to create conditions that are conducive to the formation of photochemical pollutants such as ozone (O_3) (Abbott, 2003).

More specifically, the Project Area is located in the Santa Clara Valley climatological subregion. The *CEQA Air Quality Guidelines* (BAAQMD, 2017b) characterizes the Santa Clara Valley as:

> "…bounded by the Bay to the north and by mountains to the east, south and west. Temperatures are warm on summer days and cool on summer nights, and winter temperatures are fairly mild. At the northern end of the valley, mean maximum temperatures are in the low-80's during the summer and the high-50's during the winter, and mean minimum temperatures range from the high-50's in the summer to the low-40's in the winter. Further inland, where the moderating effect of the Bay is not as strong, temperature extremes are greater…

Winds in the valley are greatly influenced by the terrain, resulting in a prevailing flow that roughly parallels the valley's northwest-southeast axis. A north-northwesterly sea breeze flows through the valley during the afternoon and early evening, and a light south-southeasterly drainage flow occurs during the late evening and early morning. In the summer the southern end of the valley sometimes becomes a "convergence zone," when air flowing from the Monterey Bay gets channeled northward into the southern end of the valley and meets with the prevailing north-northwesterly winds.

Wind speeds are greatest in the spring and summer and weakest in the fall and winter. Nighttime and early morning hours frequently have calm winds in all seasons, while summer afternoons and evenings are quite breezy. Strong winds are rare, associated mostly with the occasional winter storm.

The air pollution potential of the Santa Clara Valley is high. High summer temperatures, stable air and mountains surrounding the valley combine to promote O_3 formation. In addition to the many local sources of pollution, O_3 precursors from San Francisco, San Mateo and Alameda Counties are carried by prevailing winds to the Santa Clara Valley. The valley tends to channel pollutants to the southeast. In addition, on summer days with low level inversions, O_3 can be recirculated by southerly drainage flows in the late evening and early morning and by the prevailing northwesterlies in the afternoon. A similar recirculation pattern occurs in the winter, affecting levels of CO and PM. This movement of the air up and down the valley increases the impact of the pollutants significantly.

Pollution sources are plentiful and complex in this subregion. The Santa Clara Valley has a high concentration of industry at the northern end, in the Silicon Valley. Some of these industries are sources of air toxics as well as criteria air pollutants. In addition, Santa Clara Valley's large population and many work-site destinations generate the highest mobile source emissions of any subregion in the SFBAAB."

3.2.2. Regional Air Quality

National Ambient Air Quality Standards (NAAQS) are established by the U.S. EPA for various pollutants,: O_3, particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10}), particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$), CO, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb). These standards set maximum concentrations over different averaging periods—primarily to protect public human health and secondarily to protect public welfare (protect against decreased visibility as well as damage to animals, crops, vegetation, and buildings).

California Ambient Air Quality Standards (CAAQS) are established by the State of California and are in some cases more stringent than the NAAQS and include other pollutants in addition to the criteria pollutants. Pollutants covered by the CAAQS include O_3, PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2, Pb, sulfates, hydrogen sulfide (H_2S), and vinyl chloride.

Both state and national air quality standards consist of two parts: an allowable concentration of a pollutant, and an averaging time over which the concentration is measured. The allowable concentrations are based on the results of studies of the effects of the pollutants on human health, crops and vegetation, and, in some cases, damage to paint and other materials. The averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposure to a high concentration for a short time (e.g., one hour), or to a relatively lower average concentration over a longer period (e.g., 8 hours, 24 hours, or one year). For some pollutants there is more than one air quality standard, reflecting both its short-term and long-term effects. Table 3-1 below presents the CAAQS and NAAQS for selected common pollutants, including pollutants applicable to the Project.

The degree to which a region's air quality is healthy or unhealthy is determined by comparing pollutant concentrations in ambient air samples to the state and national standards presented in Table 3-1. California standards for O_3, CO (except 8-hour Lake Tahoe), SO_2, NO_2, PM_{10}, $PM_{2.5}$, and visibility reducing particles are values that are not to be exceeded. All other CAAQS are not to be equaled or exceeded. Compliance with the national standards (other than O_3, PM_{10}, $PM_{2.5}$, and those based on annual averages) is achieved if the standards are not exceeded more than once per year. The O_3 standard is attained when the fourth-highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the number of days per calendar year with a 24-hour average concentration above the standard is equal to or less than one, averaged over three years. Nonattainment areas are subject to additional restrictions and standards, as required by the U.S. EPA. The air quality data collected at local monitoring stations are also used to monitor progress in attaining air quality standards.

Under the provisions of the Federal Clean Air Act, the BAAQMD is classified as either in attainment, nonattainment, or unclassified/attainment with respect to the NAAQS. Table 3-2 provides the NAAQS and CAAQS classification statuses for BAAQMD based on the local criteria pollutant concentrations and federal and state designations. The region within which the proposed Project is located is designated as in attainment of the NAAQS for the CO and Pb standards and unclassified/attainment for the NO_2 and SO_2 standards (BAAQMD, 2017b). Based on CAAQS, the region is designated as nonattainment for the O_3, PM_{10}, and $PM_{2.5}$ standards (BAAQMD, 2017c).

Table 3-3 summarizes the human health and environmental effects of key criteria pollutants and the sections that follow provide a more detailed discussion of each.

Table 3-1: Summary of Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS	NAAQS	Major Pollutant Sources
Ozone (O_3)	8-hour	0.070 ppm	0.070 ppm	Formed when reactive organic gas (ROG) and NO_x react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial/ industrial mobile equipment.
	1-hour	0.09 ppm	---	
Carbon Monoxide (CO)	8-hour	9.0 ppm	9 ppm	Internal combustion engines, primarily gasoline-powered motor vehicles
	1-hour	20 ppm	35 ppm	
Nitrogen Dioxide (NO_2)	Annual Average	0.030 ppm	0.053 ppm	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads
	1-hour	0.18 ppm	0.100 ppm	
Sulfur Dioxide (SO_2)	Annual Average	---	0.030 ppm	Fuel combustion, chemical plants, sulfur recovery plants and metal processing
	24-hour	0.04 ppm	0.14 ppm	
	1-hour	0.25 ppm	0.075 ppm	
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 $\mu g/m^3$	---	Dust- and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays); also, formed from photochemical reactions of other pollutants, including NO_x, sulfur oxides, and organics.
	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 $\mu g/m^3$	12 $\mu g/m^3$	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; also, formed from photochemical reactions of other pollutants, including NO_x, sulfur oxides, and organics.
	24-hour	---	35 $\mu g/m^3$	
Lead (Pb)	Calendar Quarter	---	1.5 $\mu g/m^3$	Present sources: Pb smelters, battery manufacturing, and recycling facilities. Past source: combustion of leaded gasoline.
	30-day Average	1.5 $\mu g/m^3$	---	
	3-month Rolling Average	---	0.15 $\mu g/m^3$	
Hydrogen Sulfide (H_2S)	1-hour	0.03 ppm	No Federal Standard	Geothermal power plants, petroleum production and refining
Vinyl Chloride	24-hour	0.01 ppm	No Federal Standard	Production of PVC plastic
Visibility Reducing Particles	8-hour	Extinction of 0.23/km; visibility of ≥ 10 miles	No Federal Standard	See $PM_{2.5}$.
Sulfates	24-hour	25 $\mu g/m^3$	No Federal Standard	Formed from SO_2 emitted from combustion of petroleum-derived fuels

Sources: BAAQMD, 2017b; CARB, 2009, 2016, and 2019.
ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter

Table 3-2: Summary of BAAQMD Attainment Status

Pollutant	NAAQS[a]	California AAQS[b]
O_3—1-hour	N/A	Nonattainment
O_3—8-hour	Nonattainment	Nonattainment
PM_{10}—24-hour PM_{10}—Annual	Unclassified N/A	Nonattainment Nonattainment
$PM_{2.5}$—24-hour	Nonattainment[c]	N/A
$PM_{2.5}$—Annual	Unclassified/Attainment	Nonattainment
CO —1-hour	Attainment	Attainment
CO —8-hour	Attainment	Attainment
Nitrogen Dioxide (NO_2)—1-hour	Unclassified	Attainment
Nitrogen Dioxide (NO_2) —Annual	Attainment	Attainment
Sulfur Dioxide (SO_2)—1-hour	Unclassified	Attainment
Sulfur Dioxide (SO_2) —24-hour	Attainment	Attainment
Sulfur Dioxide (SO_2) —Annual	N/A	N/A
Lead (Pb)	Attainment	N/A[d]
Hydrogen Sulfide (H_2S)	No Federal Standard	Unclassified
Sulfates	No Federal Standard	Attainment
Vinyl Chloride	No Federal Standard	N/A[d]
Visibility Reducing Particles	No Federal Standard	Unclassified

Sources: BAAQMD, 2017a and 2017c
Notes: AAQS = ambient air quality standards.
N/A = Not Applicable
a. See 40 CFR Part 81 where CFR = Code of Federal Regulations
b. See CCR Title 17 Sections 60200-60210
c. U.S. EPA tightened the national 24-hour $PM_{2.5}$ standard from 65 to 35 µg/m^3 in 2006. On January 9, 2013, U.S. EPA issued a final rule to determine that the BAAQMD was in attainment with respect to the 24-hour $PM_{2.5}$ national standard. This U.S. EPA rule suspends key SIP requirements as long as monitoring data continue to show that the BAAQMD attains the standard. Despite this U.S. EPA action, the BAAQMD will continue to be designated as nonattainment for the national 24-hour $PM_{2.5}$ standard until the BAAQMD submits a redesignation request and a maintenance plan to U.S. EPA, and U.S. EPA approves the proposed redesignation.
d. CARB has identified Pb and vinyl chloride as "toxic air contaminants" with no threshold level of exposure below which no adverse health effects have been determined.

Table 3-3: Summary of Health and Environmental Effects of Key Criteria Pollutants

Pollutant	Health Effects	Environmental Effects	Examples of Sources
O_3	• Respiratory symptoms • Worsening of lung disease leading to premature death • Damage to lung tissue	• Crop, forest, and ecosystem damage • Damage to a variety of materials, including rubber, plastics, fabrics, paint and metals	• Formed by chemical reactions of air pollutants in the presence of sunlight; common sources are motor vehicles, industries, and consumer products
PM_{10}	• Premature death & hospitalization, primarily for worsening of respiratory disease	• Reduced visibility and material soiling	• Cars and trucks (especially diesel), fireplaces, wood stoves, windblown dust from roadways, agriculture, and construction activities
$PM_{2.5}$	• Premature death • Hospitalization for worsening of cardiovascular disease • Hospitalization for respiratory disease • Asthma-related emergency room visits • Increased symptoms, increased inhaler usage	• Reduced visibility and material soiling	• Cars and trucks (especially diesel), fireplaces, wood stoves, windblown dust from roadways, agriculture, and construction activities
CO	• Chest pain in patients with heart disease • Headache • Light-headedness • Reduced mental alertness	• None	• Any source that burns fuel such as cars, trucks, construction and farming equipment, and residential heaters and stoves
NO_2	• Lung irritation • Enhanced allergic responses	• Reacts to form acid precipitation and deposition	• Any source that burns fuel such as cars, trucks, construction and farming equipment, and residential heaters and stoves
SO_2	• Worsening of asthma: increased symptoms, increased medication usage, and emergency room visits	• Reacts to form acid precipitation and deposition	• Coal and oil burning power plants, refineries, and diesel engines

Pollutant	Health Effects	Environmental Effects	Examples of Sources
Pb	• Impaired mental functioning in children • Learning disabilities in children • Brain and kidney damage	• Soil and water pollutant	• Metal smelters, resource recovery, leaded gasoline, Pb paint

Source: CARB, 2009.

3.2.2.1. Ozone (O_3)

O_3, or smog, is a highly reactive and unstable gas not emitted directly into the environment. O_3 is formed in the atmosphere by complex chemical reactions between reactive organic gases (ROG) and NO_x in the presence of sunlight. O_3 formation is greatest on warm, windless, sunny days. The main sources of NO_x and ROG—often referred to as O_3 precursors—are combustion processes (including motor vehicle engines); the evaporation of solvents, paints, and fuels; and biogenic sources. Tailpipe emissions of ROG are highest during cold starts, hard acceleration, stop-and-go conditions, and slow speeds. ROG emission rates from on-highway vehicles decline (on a grams per mile basis) as speeds increase up to about 50 miles per hour (mph), then increase again at high speeds and high engine loads. ROG emissions associated with evaporation of unburned fuel depend on vehicle and ambient temperature cycles. NO_x emissions exhibit a different curve: emissions decrease as the vehicle approaches 30 mph and then begin to increase with increasing speeds. O_3 is a main contributor to visible smog in the BAAQMD and is also a strong oxidant (BAAQMD, 2017b). O_3 levels typically build up during the day and peak in the afternoon hours. Short-term exposure can irritate the eyes and cause constriction of the airways. Besides causing shortness of breath, O_3 can aggravate existing respiratory diseases such as asthma, bronchitis and emphysema. Chronic exposure to high O_3 levels can permanently damage lung tissue. O_3 can also damage plants and trees, and materials such as rubber and fabrics (BAAQMD, 2017b).

3.2.2.2. Respirable and Fine Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter refers to a wide range of tiny solid and/or liquid particles in the atmosphere, including smoke, dust, aerosols, and metallic oxides. Respirable PM with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. $PM_{2.5}$ is a subgroup of fine particulates that have an aerodynamic diameter of 2.5 micrometers or less. Some particulate matter, such as pollen, is naturally occurring. Atmospheric reactions between primary gaseous emissions such as SO_2 and NO_X from power plants can also form particulate sulfates as $PM_{2.5}$. Extended exposure to particulate matter can increase the risk of chronic respiratory disease. PM_{10} is of concern because it bypasses the body's natural filtration system more easily than larger particles, and can lodge deep in the lungs, which is why the U.S. EPA and the State of California developed PM_{10} standards to apply only to these small particles. $PM_{2.5}$ poses an increased health risk because the fine particles can deposit deep in the lungs and contain substances that are particularly harmful to human health. Wood burning in fireplaces and stoves are also large sources of fine particulates, especially during the winter season (BAAQMD, 2017b).

3.2.2.3. Carbon Monoxide (CO)

CO is an odorless, colorless gas. It is formed by the incomplete combustion of fuels. Because CO is emitted directly from internal combustion engines, mobile sources are the primary source of CO in the BAAQMD. Emissions are highest during cold starts, hard acceleration, stop-and-go driving, and when a vehicle is moving at low speeds. New findings indicate that CO emissions per mile are lowest at about 45 mph for the average light-duty motor vehicle and begin to increase again at higher speeds. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease or anemia, as well as fetuses. Even healthy people exposed to high CO concentrations can experience headaches, dizziness, fatigue, unconsciousness, and even death. CO can also be formed by photochemical reactions in the atmosphere from methane (CH_4) and non-CH_4 hydrocarbons and organic molecules in water and soil (BAAQMD, 2017b).

3.2.2.4. Nitrogen Oxides (NO_X)

NO_2 is a pungent-smelling gas that is brownish red in color. Of the gases referred to as NO_x, NO_2 and nitric oxide (NO) are the two most prevalent gases. Nitrogen oxides are created during combustion processes and are also created in the atmosphere when NO photochemically reacts with other pollutants to create NO_2. Automobiles and industrial operations are the main sources of NO_2. Ambient concentrations of NO_2 are related to traffic density, and as such, commuters in heavy traffic may be exposed to higher concentrations of NO_2 than the concentrations indicated by regional monitors (CARB, 2019a). Aside from its contribution to O_3 formation, NO_2 can increase the risk of acute and chronic respiratory disease and reduce visibility. NO_2 may be visible as a coloring component of a brown cloud on high pollution days, especially in conjunction with high O_3 levels (BAAQMD, 2017b).

3.2.2.5. Sulfur Dioxide (SO_2)

SO_2 is a colorless acid gas with a pungent odor. It has the potential to damage materials and can have health effects at high concentrations, including lung tissue irritation and increased risk of acute and chronic respiratory disease (BAAQMD, 2017b). It is produced by the combustion of sulfur-containing fuels, such as oil, coal and diesel. It is also formed from chemical processes occurring at chemical plants and refineries. When SO_2 oxidizes in the atmosphere, it forms sulfates (SO_4). Collectively, these pollutants are referred to as sulfur oxides (SO_x) (CARB, 2019b and CARB, 2019c).

3.2.2.6. Lead (Pb)

Pb is a metal found naturally in the environment as well as in manufactured products. The major sources of Pb emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of Pb emissions. The highest levels of Pb in the air are generally found near Pb smelters. Other stationary sources include waste incinerators, utilities, and Pb-acid battery manufacturers. Several decades ago, mobile sources were the main contributor to Pb concentrations in the ambient air due to leaded gasoline. In the early 1970s, the U.S. EPA set national regulations to gradually reduce the Pb content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The U.S. EPA banned the use of leaded gasoline in highway vehicles in December 1995. As a result of the U.S. EPA's regulatory efforts, emissions of Pb from the transportation sector and levels of Pb in the air have decreased substantially (BAAQMD, 2017b).

3.2.3. Local Air Quality

The BAAQMD operates a regional monitoring network that measures the ambient concentrations of the six criteria air pollutants within the Bay Area. Existing levels of air pollutants in the Project Area can generally be inferred from ambient air quality measurements conducted by the BAAQMD at nearby monitoring stations. Because local residents were concerned that BAAQMD's monitoring network was not collecting data representative of local air quality, BAAQMD monitored air quality in Cupertino from September 2010 to December 2013 to determine whether residents were exposed to high pollution levels that might not have reached other Bay Area monitoring stations. The Cupertino air monitoring station was located at Monta Vista Park, near the intersection of South Foothill Boulevard and Voss Avenue, about one mile east of the Lehigh site. Pollutants continuously measured included O_3, SO_2, PM, NO_x, NO_2, hydrocarbons, and CO. Every sixth day, 24-hr samples of ambient air were collected and analyzed for toxic gases and metals. After collecting three years of air quality data at the Cupertino site, the BAAQMD reviewed the data and published a report titled *Summary and Analysis of Cupertino Air Monitoring Results* (BAAQMD, 2014). Based on three years of monitoring data, the BAAQMD concluded that Cupertino air quality easily met all applicable standards for gaseous and particulate matter pollutants. Monitored concentrations were similar to those measured at other Bay Area locations (BAAQMD, 2014).

The nearest permanent station to the Project site is the Jackson Street monitoring station in San Jose, approximately 10 miles to the northeast. The Jackson Street monitoring station measures criteria pollutants, including O_3, NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$. Table 3-4 presents the most recent three years of data (2015-2017) available for the Jackson Street monitoring station, as well as the number of days that the ambient air quality standards were exceeded, which is considered to be representative of the local air quality.[6]

The ambient air quality data in Table 3-4 show that NO_2, SO_2, and CO levels are below the applicable state and federal standards. At most monitoring stations in 2017 in the BAAQMD, the federal and state ambient air quality standards (AAQS) were exceeded on one or more days for O_3, PM_{10}, and $PM_{2.5}$. In 2017, no areas within the Bay Area Air Basin exceeded federal or state standards for SO_2 or CO (BAAQMD, 2018). Attainment status designations can be seen in Table 3-2.

[6] In 2013 and 2014, the Ambient Air Assessment at Rancho San Antonio Open Space Preserve completed for the Mid-Peninsula Regional Open Space District measured certain criteria pollutants at various locations northeast of Lehigh's property boundary and in and around the open space preserve that abuts the property boundary (Winegar, 2014). The results of that monitoring showed values below or comparable to those presented in Table 3-4 of this report.

Table 3-4: Existing Air Quality Monitoring Data in Proposed Project Area

Pollutant	Monitoring Data by Year		
	2015	2016	2017
Ozone (O_3)			
Highest 1-Hour Average (State, 0.09 ppm)	0.094	0.087	***0.121***
Days over 1-Hour Standard	0	0	3
Highest 8-Hour Average (0.070 ppm)	***0.081***	0.066	***0.098***
Days over 8-Hour Standard	2	0	4
Nitrogen Dioxide (NO_2)			
Highest 1-Hour Average (State, 180 ppb)	49	51	68
98th Percentile 1-Hour Average (National, 100 ppb)	44	42	50
Annual Average (State, 30 ppb/National, 53 ppb)	13	11	12
Sulfur Dioxide (SO_2)			
Highest 1-Hour Average (State, 250 ppb)	3.1	1.8	3.6
99th Percentile 1-Hour Average (National, 75 ppb)	2	2	3
24-Hour Average (State, 40 ppb/National, 140 ppb)	1.1	0.8	1.1
Annual Average (National, 30 ppb)	0.3	0.19	0.20
Carbon Monoxide (CO)			
Highest 1-Hour Average (State, 20 ppm/National, 35 ppm)	2.4	2.0	2.1
Highest 8-Hour Average (9 ppm)	1.8	1.4	1.8
Particulate Matter (PM_{10})			
Highest 24-Hour Average (State, 50 µg/m^3/National, 150 µg/m^3)	***58***	41	***70***
Estimated Days over State Standard[a]	1.0	0	19.2
Annual Average (State, 20 µg/m^3)	***22.0***	18.5	***20.7***
Fine Particulate Matter ($PM_{2.5}$)			
24-Hour Standard 98th Percentile (National, 35 µg/m^3)	***49.4***	19	34
Estimated Days over National Standard [a]	***2.1***	0	6.0
Annual Average (State 12 µg/m^3/National 15 µg/m^3)	10.0	8.4	9.5

Sources: BAAQMD, 2018, and U.S. EPA, 2018
Notes: Measurements shown in ***bold italics*** indicate exceedances of the applicable standard.
ppm = parts per million; ppb = parts per billion; µg/m^3 = micrograms per cubic meter
a. BAAQMD measurements are from the Jackson Street monitoring station located in San Jose.
b. PM_{10} and $PM_{2.5}$ are not measured every day of the year. Agencies estimate the number of days over the applicable standard is based on 365 days per year.

The ambient background of toxic air contaminants (TACs) is the combined result of many diverse human activities, including gasoline stations, automobiles, dry cleaners, industrial operations, hospital sterilizers, and painting operations. In general, mobile sources contribute more significantly to health risks than do stationary sources. Both BAAQMD and CARB operate a network of monitoring stations that measure ambient concentrations of certain TACs that are associated with health-related effects and are present in appreciable concentrations in the Bay Area, as in all urban areas. Generally, ambient concentrations of TACs are similar throughout the urbanized areas of the Bay Area (BAAQMD, 2014).

Table 3-5 summarizes recent TAC monitoring results for the Cupertino and San Jose monitoring stations, which are considered to be representative of the local air quality.[7]

Table 3-5: Ambient Air Quality TACs – Cupertino and San Jose 2011-2013

Pollutant	Maximum 24-hour Average Concentration		Annual Average Concentration	
	Cupertino	San Jose	Cupertino	San Jose
	µg/m³	µg/m³	µg/m³	µg/m³
Acetaldehyde	4.7	4.8	1.1	1.7
Acrolein[a]	0.044	0.042	0.79	0.96
Acrylonitrile	0.088	0.34	0.017	0.056
Arsenic	0.0011	<MDL	0.00012	<MDL
Benzene	1.2	4.2	0.46	1.0
1,3-Butadiene	0.25	0.95	0.050	0.13
Carbon Tetrachloride	1.4	1.3	0.62	0.64
Chloroform	0.53	0.95	0.14	0.17
Chromium (Total)	0.011	0.0073	0.0022	0.0038
Copper	0.023	0.040	0.0083	0.012
Elemental Carbon	1.6	3.2	0.52	0.64
Diesel PM	1.7	3.4	0.54	0.66
Ethylbenzene	0.69	2.3	0.16	0.53
Ethylene Dibromide	<MDL	<MDL	<MDL	<MDL
Ethylene Dichloride	0.54	0.53	0.11	0.11
Formaldehyde	4.3	4.8	1.8	2.3
Lead (Pb)	0.022	0.013	0.0023	0.0031
Manganese	0.047	0.027	0.0086	0.0094
Mercury	0.0052	N/A	0.0022	N/A
Methyl Chloroform	0.17	0.22	0.053	0.062
Methylene Chloride	1.1	4.9	0.49	1.1
Methyl Ethyl Ketone	2.3	3.5	0.68	0.80
Nickel	0.0067	<MDL	0.0014	<MDL
Perchloroethylene	0.46	1.3	0.056	0.25
Selenium	0.0046	0.0045	0.00080	0.0011
Toluene	6.0	16	0.85	2.9
Trichloroethylene	0.20	0.17	0.035	0.040
Vanadium	0.011	0.0031	0.0023	<MDL
Vinyl chloride	<MDL	<MDL	<MDL	<MDL
M&P Xylene	2.1	9.1	0.49	1.9
O Xylene	0.70	3.0	0.22	0.72

Source: BAAQMD, 2014
MDL = minimum detection level
Notes:
a. The concentrations presented here for Acrolein are for 2013. Although ambient air monitoring samples were collected and analyzed for Acrolein during the 2011-2012 period, the results did not meet quality assurance/quality control standards.

[7] In 2013 and 2014, the Ambient Air Assessment at Rancho San Antonio Open Space Preserve measured certain TACs at various locations northeast of Lehigh's property boundary and in and around the open space preserve that abuts the property boundary (Winegar, 2014). The results from the Rancho San Antonio Open Space Preserve Ambient Air Assessment showed values primarily below or comparable to those presented in Table 3-5 of this AQIA.

3.2.4. Sensitive Land Uses Near the Proposed Project Area

For the purposes of this AQIA, sensitive receptors are considered locations with people who are more sensitive than the general public to the effects of air pollutants. The reasons for increased sensitivity include preexisting health problems, proximity to emissions sources, or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be sensitive receptors because children, the infirm, and elderly people are more susceptible to respiratory distress and other air-quality-related health problems than the general public. Residential areas are also considered sensitive to poor air quality because residents are often home for extended periods of time which results in greater exposure to ambient air quality; however, residential receptors are considered a separate receptor type from sensitive receptors. Recreational uses, such as parks and hiking trails, can also be considered sensitive due to the greater exposure to ambient concentrations of pollutants because vigorous exercise associated with some forms of recreation places a high demand on the human respiratory system. Thus, recreational uses associated with open space areas in the project vicinity are considered for short-term acute health risk impacts. Table 3-6 lists the nearest sensitive receptors within a few miles of the facility's property boundary.

Table 3-6: Sensitive Receptors near the Project Area

Name of Sensitive Receptor	Address of Sensitive Receptor	Distance From Property Boundary to Sensitive Receptor [miles]
1. Cupertino Healthcare and Wellness Center	22590 Voss Ave, Cupertino, CA 95014	0.87
2. Creative Learning Center Preschool	2100 Woods Ln, Los Altos, CA 94024	1.15
3. Stevens Creek Elementary School	10300 Ainsworth Drive, Cupertino 95014	1.15
4. Montclaire Elementary School and Development Center	1160 St. Joseph Avenue, Los Altos 94024	1.25
5. Child Development Center	Campus Dr., Cupertino, CA 95014	1.46
6. Waldorf School of the Peninsula	11311 Mora Dr, Los Altos, CA 94024	1.56
7. St. Simon Elementary School	1840 Grant Road, Los Altos 94024	1.6
8. Lincoln Elementary School	21710 McClellan Rd, Cupertino, CA 95014	1.72
9. West Valley Elementary School	1635 Belleville Way, Sunnyvale, CA 94087	1.82
10. Cupertino Middle School	1650 S Bernardo Ave, Sunnyvale, CA 94087	1.92
11. John F. Kennedy Middle School	821 Bubb Rd, Cupertino, CA 95014	2.02
12. Homestead High School	21370 Homestead Rd, Cupertino, CA 95014	2.15
13. Garden Gate Elementary School	10500 Ann Arbor Avenue, Cupertino 95014	2.20
14. South Peninsula Hebrew Day School	1030 Astoria Drive, Sunnyvale 94087	2.25
15. Regnart Elementary and CDC	1170 1180 Yorkshire Dr, Cupertino, CA 95014	2.40
16. Oak Elementary School	1501 Oak Avenue, Los Altos 94024	2.40
17. Children's House of Los Altos	770 Berry Avenue, Los Altos 94024	2.50
18. Loyola School	770 Berry Avenue, Los Altos 94024	2.50
19. Miramonte School	1175 Altamead Drive, Los Altos 94024	2.50
20. Mountain View High School	3535 Truman Avenue, Mountain View 94040	2.60
21. Los Altos Christian Preschool	625 Magdalena Avenue, Los Altos 94024	2.60
22. Los Altos United Methodist Children's Center	655 Magdalena Avenue, Los Altos 94024	2.65

Name of Sensitive Receptor	Address of Sensitive Receptor	Distance From Property Boundary to Sensitive Receptor [miles]
23. Blach Intermediate School	1120 Covington Rd, Los Altos 94024	2.75
24. Stratford School	1196 Lime Drive, Sunnyvale 94087	2.75
25. St. Francis High School	1885 Miramonte Avenue, Mountain View 94040	3.00
26. Happy Childhood Education	1091 S. DeAnza Boulevard, San Jose 95129	3.10
27. Kindercare Learning Center	1515 S. De Anza Boulevard	3.25
28. Meyerholz Elementary School	6990 Melvin Drive, San Jose 95129	3.50
Source: Google Earth, 2019		

Figure 3-1 identifies the locations of the sensitive receptors listed in Table 3-6 as pink markers. The closest areas with residences are identified with green hash marks. The site property boundary is denoted with a black outline and the reclamation plan boundary is denoted with an orange outline.

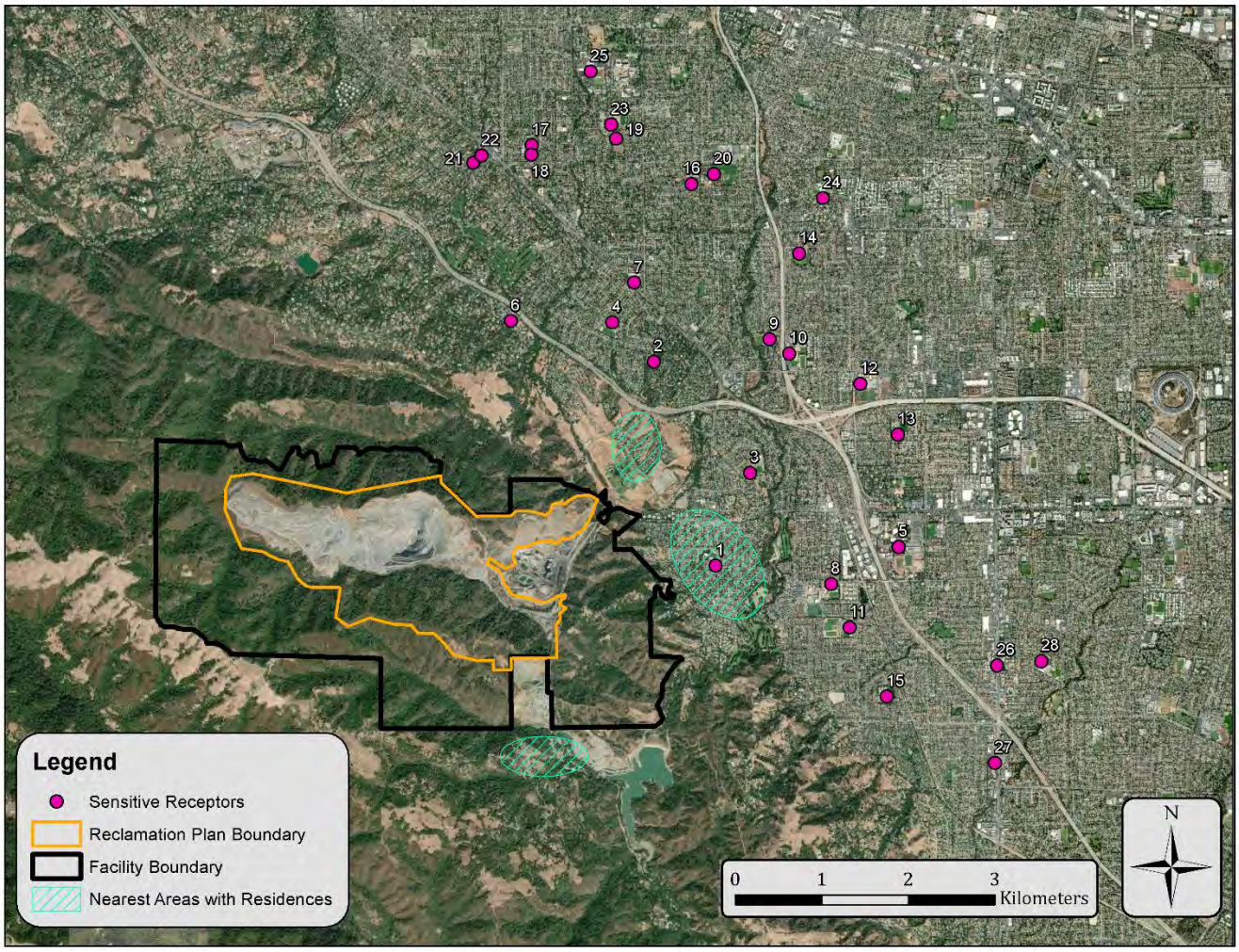

Figure 3-1: Location of Sensitive Receptors and Surrounding Residential Areas

3.2.5. Greenhouse Gases

Greenhouse gases (GHGs) comprise a set of compounds whose presence in the atmosphere is associated with the differential absorption of incoming solar radiation and outgoing radiation from the surface of the earth. In theory, GHGs in the atmosphere affect the global energy balance of the atmosphere-ocean-land system and thereby affect climate change. More specifically, GHGs absorb the long-wave radiation emitted by the earth and hence are capable of warming the atmosphere. Regulated GHGs in California are carbon dioxide (CO_2), CH_4, nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF_3). Other GHGs, such as water vapor, are not regulated.

To quantify the impact of specific GHGs, each gas is assigned a global warming potential (GWP). Individual GHG compounds have varying GWP and atmospheric lifetimes. The GWP of a GHG is a measure of how much a given mass of a GHG is estimated to contribute to global warming relative to CO_2, which is assigned a GWP of 1.0.

The GWP is used to determine the CO_2 equivalent (CO_2e) mass of each GHG. Calculation of the CO_2e is the accepted methodology for comparing GHG emissions since it normalizes various GHG emissions to a consistent reference gas, CO_2. For example, CH_4's GWP of 25 indicates that the global warming effect of CH_4 is 25 times

greater than that of CO_2 on a molecule per molecule basis. CO_2e is the mass emissions of an individual GHG multiplied by its GWP.

Natural processes and human activities emit GHGs. The presence of GHGs in the atmosphere affects the earth's temperature. As discussed in more detail below, many scientists believe that emissions from human activities, such as electricity production and vehicle use, have led to elevated concentrations of these gases in the atmosphere beyond the level of naturally occurring concentrations. Table 3-7 lists GHGs, the effects of each GHG, and sources for each of the GHGs.

Table 3-7: GWPs, Properties, and Sources of GHGs

Constituent	GWP	Description and Physical Properties	Sources
Carbon Dioxide (CO_2)	1	CO_2 is an odorless, colorless, naturally occurring GHG.	CO_2 is emitted from natural and anthropocentric (human) sources. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic out gassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood.
Methane (CH_4)	25	CH_4 is an organic, colorless, naturally occurring, flammable gas. Its atmospheric concentration is less than CO_2, and its lifetime in the atmosphere is brief (10-12 years) compared to other GHGs.	CH_4 has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of CH_4. Other anthropogenic sources include fossil-fuel and biomass combustion, as well as landfilling and wastewater treatment.
Nitrous Oxide (N_2O)	298	N_2O, commonly referred to as "laughing gas," is a colorless, nonflammable GHG. It is a powerful oxidizer and breaks down readily in the atmosphere.	Nitrous oxide is produced by microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, e.g., in whipped cream bottles, and it is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars.

Constituent	GWP	Description and Physical Properties	Sources
Hydrofluorocarbons (HFCs)	92 - 14,900	HFCs are synthetic man-made chemicals that form one of the GHGs with the highest global warming potential	HFCs are man-made for applications such as automobile air conditioners and refrigerants.
Perfluorocarbons (PFCs)	6,288 - 17,700	PFCs are colorless, non-flammable, dense gases that have stable molecular structures and do not break down through the chemical processes in the lower atmosphere. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years.	The two main sources of PFCs are primary aluminum production and semiconductor manufacture.
Sulfur Hexafluoride (SF_6)	22,800	SF_6 is an inorganic, odorless, colorless, nontoxic, nonflammable gas.	SF_6 is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.
Nitrogen Triflouride (NF_3)	17,200	NF_3 is an inorganic, colorless, odorless, nonflammable gas.	NF_3 is used primarily in the plasma etching of silicon wafers

Source: CARB, 2018b.

There is growing concern about GHG emissions and their adverse impacts on the world's climate and on our environment. These concerns relate to the change in the average weather of the earth that may be measured by changes in wind patterns, storms, precipitation, and temperature. Although there is disagreement as to the rate of global climate change and the extent of the impacts attributable to human activities, most in the scientific community agree that there is a direct link between increased emissions of GHGs and long-term global temperature increases. There are several gases that act as GHGs—their common attribute is that they allow sunlight to enter the atmosphere, but trap a portion of the outward-bound infrared radiation, which warms the air. The process is similar to the effect greenhouses have in raising the air temperature inside the greenhouse, hence the name GHGs. The presence of GHGs in the atmosphere regulates the earth's temperature; however, emissions from human activities such as fossil fuel based electricity production and the use of motor vehicles have elevated the concentration of GHGs in the atmosphere. It generally is believed that this accumulation of GHGs is contributing to global climate change (BAAQMD, 2017a).

Global climate change refers to the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms, lasting for decades or longer. The term "global climate change" is often used interchangeably with the term "global warming," but "global climate change" is preferred by some scientists and policymakers to "global warming" because it helps convey the notion that in addition to rising

temperatures, other changes in global climate may occur. Climate change may result from the following influences:

- Natural factors, such as changes in the sun's intensity or slow changes in the earth's orbit around the sun;
- Natural volcanic activity;
- Natural processes within the climate system (e.g., changes in ocean circulation); and/or
- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, and desertification).

Large-scale combustion of fossil fuels (i.e., coal, oil, and natural gas) by humans beginning in the 19th century resulted in significant increases in emissions of the GHG CO_2. The resulting increase in atmospheric levels of CO_2 has been recorded in long-term records at monitoring stations such as Mauna Loa, Hawaii, where measured background ambient CO_2 levels have increased from 285 ppm in 1877 (Stanhill, 1984) to the current level of 410 ppm (NOAA, 2018). Simultaneously, average surface temperatures have been increasing at many locations around the world. Many climate scientists have concluded that it is extremely likely that human influence has been the dominant cause of this change in global average temperature (IPCC, 2013).

As determined from worldwide meteorological measurements between 1990 and 2005, the primary observed effect of global climate change has been a rise in the average global tropospheric temperature of 0.36 degree Fahrenheit (°F) per decade. Climate change modeling shows that further warming could occur, which could induce additional changes in the global climate system during the current century. Changes to the global climate system, ecosystems, and the environment of California could include higher sea levels, drier or wetter weather, changes in ocean salinity, changes in wind patterns, or more energetic aspects of extreme weather (e.g., droughts, heavy precipitation, heat waves, extreme cold, and increased intensity of tropical cyclones). Specific effects from climate change in California may include a decline in the Sierra Nevada snowpack, erosion of California's coastline, and seawater intrusion in the Sacramento-San Joaquin River Delta.

Human activities, including fossil fuel combustion and land use changes, release CO_2 and other compounds cumulatively termed greenhouse gases. GHGs are effective at trapping radiation that would otherwise escape the atmosphere. This trapped radiation warms the atmosphere, the oceans, and the earth's surface (USGCRP, 2014). Many scientists believe "most of the warming observed over the last 50 years is attributable to human activities" (IPCC, 2013). The alleged primary cause of human-induced warming is the increased amount of CO_2 and other GHGs in the atmosphere.

GHGs are present in the atmosphere naturally, released by natural sources, or formed from secondary reactions taking place in the atmosphere. They include CO_2, CH_4, nitrous oxide (N_2O), and O_3. In the last 200 years, substantial quantities of GHGs have been released into the atmosphere, primarily from fossil fuel combustion. These human-induced emissions are increasing GHG concentrations in the atmosphere, therefore enhancing the natural greenhouse effect. The GHGs resulting from human activity are believed to be causing global climate change. While human-made GHGs include CO_2, CH_4, and N_2O, some (like chlorofluorocarbons [CFCs]) are completely new to the atmosphere. GHGs vary considerably in terms of GWP, the comparative ability of each GHG to trap heat in the atmosphere. The GWP is based on several factors, including the relative effectiveness of a gas to absorb infrared radiation and the length of time that the gas remains in the atmosphere ("atmospheric lifetime"). The GWP of each gas is measured relative to CO_2, the most abundant GHG. The definition of GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to the ratio of heat trapped by one unit mass of CO_2 over a specified time period. GHG emissions are typically measured in terms of pounds or tons of CO_2e.

Natural sources of CO_2 include the respiration (breathing) of humans and animals and evaporation from the oceans. Together, these natural sources release approximately 150 billion metric tons[8] of CO_2 each year, far outweighing the 7 billion metric tons of GHG emissions from fossil fuel burning, waste incineration, deforestation, cement manufacturing, and other human activity. Nevertheless, natural GHG removal processes such as photosynthesis cannot keep pace with the additional output of CO_2 from human activities. Consequently, GHGs are building up in the atmosphere (Enviropedia, 2017).

CH_4 is produced when organic matter decomposes in environments lacking sufficient oxygen. Natural sources of CH_4 production include wetlands, termites, and oceans. Human activity accounts for the majority of the approximately 500 million metric tons of CH_4 emitted annually. These anthropogenic sources include the mining and burning of fossil fuels; digestive processes in ruminant livestock, such as cattle; rice cultivation; and the decomposition of waste in landfills. The major removal process for atmospheric CH_4, the chemical breakdown in the atmosphere, cannot keep pace with source emissions; as such, CH_4 concentrations in the atmosphere are rising.

Worldwide emissions of GHGs in 2008 were 30.1 billion metric tons of CO_2e and have increased considerably since then (United Nations, 2011). It is important to note that the global emissions inventory data are not all from the same year and may vary depending on the source of the data (U.S. EPA, 2016a). Emissions from the top five emitting countries and the European Union accounted for approximately 55% of total global GHG emissions. The United States was the number two producer of GHG emissions. The primary GHG emitted by human activities in the United States was CO_2, representing approximately 84% of total GHG emissions (U.S. EPA, 2016a).

In 2009, the United States emitted approximately 6.6 billion metric tons of CO_2e or approximately 25 tons per year (tpy) per person. Of the six major sectors nationwide (electric power industry, transportation, industry, agriculture, commercial, and residential), the electric power industry and transportation sectors combined account for approximately 62% of the GHG emissions; the majority of the electrical power industry and all of the transportation emissions are generated from direct fossil fuel combustion. Between 1990 and 2006, total United States GHG emissions rose approximately 14.7% (U.S. EPA, 2016a).

Worldwide CO_2 emissions are expected to increase by 1.9% annually between 2001 and 2025 (U.S. Energy Information Center, 2017). Much of the increase in these emissions is expected to occur in the developing world where emerging economies, such as China and India, fuel economic development with fossil fuel energy. Developing countries' emissions are expected to grow above the world average at 2.7% annually between 2001 and 2025, and surpass emissions of industrialized countries around 2018.

CARB is responsible for developing and maintaining the California GHG emissions inventory. This inventory estimates the amount of GHGs emitted into and removed from the atmosphere by human activities within the state of California and supports the Assembly Bill (AB) 32 Climate Change Program. CARB's current GHG emission inventory covers the years 1990 through 2008 and is based on fuel use, equipment activity, industrial processes, and other relevant data (e.g., housing, landfill activity, and agricultural lands).

California's net emissions of GHGs decreased by 1.3% from 459 million metric tons (MMT) of CO_2e in 2000 to 453 MMT in 2009, with a maximum of 483.9 MMT in 2004. Driven by a noticeable drop in on-road transportation emissions, statewide GHG emissions dropped from 485 MMT CO_2e in 2008 to 457 MMT in 2009 (CARB, 2011b). (2009 also reflects the beginning of the economic recession and fuel price spikes.) As the economy recovers, GHG emissions are likely to rise again without other mitigation actions. During the same time

[8] A metric ton is 1,000 kilograms; it is equal to approximately 1.1 U.S. tons and approximately 2,204.6 pounds.

period, California's GHG emissions per person decreased by 9.7%, but the emissions reductions were offset by the state's population increase of 9.0%.

CARB estimates that transportation was the source of approximately 38% of California's GHG emissions in 2009, followed by electricity generation at 23%. Other sources of GHG emissions were industrial sources at 20%, residential plus commercial activities at 9%, and agriculture at 7% (CARB, 2011b).

CARB has projected statewide GHG emissions for the year 2020, which represent the emissions that would be expected to occur with reductions anticipated from Pavley I and the Renewables Portfolio Standard (RPS) (38 MMT CO_2e total), will be 507 MMT of CO_2e (CARB, 2014). GHG emissions from the transportation and electricity sectors as a whole are expected to increase at approximately 36% and 22% of total CO_2e emissions, respectively, as compared to 2009. The industrial sector consists of large stationary sources of GHG emissions and the percentage of the total 2020 emissions is projected to be 18% of total CO_2e emissions. The remaining sources of GHG emissions in 2020 are high global warming potential gases at 7%, residential and commercial activities at 9%, agriculture at 6%, and recycling and waste at 2%.

3.2.6. Effects of Global Climate Change

The Intergovernmental Panel on Climate Change (IPCC) has produced several trajectories of GHG emission reductions believed to be needed to stabilize global temperatures and climate change impacts. In its Fifth Assessment Report, the IPCC predicted that the global mean temperature change from 1990 to 2100 could range from 1.1 degree Celsius (°C) to 6.4 °C (8 to 10.4 degrees Fahrenheit). Global average temperatures and sea levels are expected to rise under all scenarios (IPCC, 2013). The IPCC concluded that global climate change was largely the result of human activity, mainly the burning of fossil fuels.

The effects of global climate change may arise from temperature increases, climate-sensitive diseases, extreme weather events, and degradation of air quality. There may be direct temperature effects through increases in average temperature leading to more extreme heat waves and less extreme cold spells. Those living in warmer climates are likely to experience more stress and heat-related problems. Heat-related problems include heat rash and heat stroke, drought, etc. In addition, climate-sensitive diseases may increase, such as those spread by mosquitoes and other disease-carrying insects. Such diseases include malaria, dengue fever, yellow fever, and encephalitis. Extreme events such as flooding and hurricanes can displace people and agriculture. Global warming may also contribute to air quality problems from increased frequency of smog and particulate air pollution.

According to the 2006 California Climate Action Team (CAT) Report, several climate change effects can be expected in California over the course of the next century (CalEPA, 2006). These are based on trends established by the IPCC and are summarized below.

- A diminishing Sierra Nevada snowpack, declining by 70% to 90%, and thereby threatening the state's water supply.
- A rise in sea levels, resulting in the displacement of coastal businesses and residences. During the past century, sea levels along California's coast have risen about seven inches. If emissions continue unabated and temperatures rise into the higher anticipated warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the century. Sea level rises of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.

- An increase in temperature and extreme weather events. Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in California. More heat waves can exacerbate chronic disease or heat-related illness.
- Increased risk of large wildfires if rain increases as temperatures rise. Wildfires in the grasslands and chaparral ecosystems of southern California are estimated to increase by approximately 30% toward the end of the 21st century because more winter rain will stimulate the growth of more plant fuel available to burn in the fall. In contrast, a hotter, drier climate could promote up to 90% more northern California fires by the end of the century by drying out and increasing the flammability of forest vegetation.
- Increasing temperatures from 8 to 10.4 °F under the higher emission scenarios, leading to a 25% to 35% increase in the number of days that O_3 pollution levels are exceeded in most urban areas.
- Increased vulnerability of forests due to forest fires, pest infestation, and increased temperatures.
- Reductions in the quality and quantity of certain agricultural products. The crops and products likely to be adversely affected include wine grapes, fruit, nuts, and milk.
- Exacerbation of air quality problems. If temperatures rise to the medium warming range, there could be 75% to 85% more days with weather conducive to O_3 formation in Los Angeles and the San Joaquin Valley, relative to today's conditions. This is more than twice the increase expected if rising temperatures remain in the lower warming range. This increase in air quality problems could result in an increase in asthma and other health-related problems.
- A decrease in the health and productivity of California's forests. Climate change can cause an increase in wildfires, an enhanced insect population, and establishment of non-native species.
- Increased electricity demand, particularly in the hot summer months.
- Increased ground-level O_3 formation due to higher reaction rates of O_3 precursors.

3.2.7. GHG Emissions Inventory

An emissions inventory that identifies and quantifies the primary human-generated sources of GHG emissions and GHG sinks (i.e., reactions that remove GHG from the atmosphere through the uptake of carbon and storage in forests and other vegetation, oceans, etc.) is a tool for addressing climate change. This section summarizes information on global, national, and state GHG emissions inventories. However, because some GHGs persist for a long time in the atmosphere and accumulate over time, they are generally well mixed and their impact on the atmosphere and climate change cannot be tied to a specific emission point.

- **Global Emissions.** Worldwide emissions of GHGs in 2004 totaled 27 billion MT of CO_2e per year (UNFCCC, 2007). Global estimates are based on country inventories developed as part of the programs of the United Nations Framework Convention on Climate Change (UNFCCC).
- **United States Emissions.** In 2008, the United States emitted approximately 7 billion MT of CO_2e, or approximately 25 tons per year, per person. Of the six major sectors—electric power industry, transportation, industry, agriculture, commercial, and residential—the electric power industry and transportation sectors combined account for approximately 62% of the GHG emissions; the majority of the electric power industry and all of the transportation emissions are generated from direct fossil fuel combustion. Between 1990 and 2006, total United States GHG emissions rose approximately 14.7% (U.S. EPA, 2010b).
- **State of California Emissions.** According to CARB emission inventory estimates, California emitted approximately 429.4 million MT of CO_2e emissions in 2016 (CARB, 2018a). This large number is due primarily to the sheer size of California compared to other states. By contrast, California has the fourth-

lowest per-capita CO_2e emission rate from fossil fuel combustion in the country due to the success of its energy efficiency, renewable energy programs, and commitments that have lowered the state's GHG emissions rate of growth by more than half (CEC, 2007). Based on data presented by CARB, the composition of gross climate change pollutant emissions in California in 2016 (expressed in terms of CO_2e) was calculated to be as follows: 83.2% CO_2, 9.1% CH_4, 3.1% N_2O, and 4.6% HFCs, PFC, and SF_6 (CARB, 2018a). CARB estimates that transportation was the source of approximately 39% of California's GHG emissions in 2016, followed by electricity generation (both in-state and out-of-state) at 16% and industrial sources at 21%. The remaining sources of GHG emissions were residential and commercial activities at 9%, agriculture at 8%, high-GWP gases at 5%, and recycling and waste at 2% (CARB, 2018a).

CARB is responsible for developing the California GHG Emission Inventory. The inventory estimates the volume of GHGs emitted to and removed from the atmosphere by human activities within the State of California and supports the AB 32 Climate Change Program. CARB's current GHG emission inventory covers the years 1990–2016 and is based on fuel use, equipment activity, industrial processes, and other relevant data (e.g., housing, landfill activity, and agricultural land area). The emission inventory estimates are based on the actual amount of all fuels combusted in the state, which accounts for over 85% of the GHG emissions within California (CARB, 2018a).

CARB has projected statewide unregulated GHG emissions for 2020, which represent the emissions that would be expected to occur in the absence of any GHG reduction actions, at 596 MMT of CO_2e. GHG emissions from the transportation and electricity sectors as a whole are expected to increase but remain at approximately 36% and 22% of total CO_2e emissions, respectively. The industrial sector consists of large stationary sources of GHG emissions, and the percentage of the total 2020 emissions is projected to be 18% of total CO_2e emissions. The remaining sources of GHG emissions in 2020 are high-GWP gases at 7%, residential and commercial activities at 9%, agriculture at 6%, and recycling and waste at 2% (CARB, 2018a).

3.3. EXISTING POLICIES AND REGULATIONS – AIR QUALITY

Established federal, state, and regional regulations provide the framework for analyzing and controlling air pollutant emissions and thus general air quality. The U.S. EPA is responsible for implementing the programs established under the federal Clean Air Act, such as establishing and reviewing the federal ambient air quality standards and judging the adequacy of State Implementation Plans (SIPs), described further below. However, the U.S. EPA has delegated the authority to implement many of the federal programs to the states while retaining an oversight role to ensure that the programs continue to be implemented. In California, CARB is responsible for establishing and reviewing the state ambient air quality standards, developing and managing the California SIP, securing approval of this plan from the U.S. EPA, and identifying TACs. CARB also regulates mobile emissions sources in California, such as construction equipment, trucks, and automobiles, and oversees the activities of air quality management districts (AQMDs), which are organized at the county or regional level. An AQMD is primarily responsible for regulating stationary emissions sources at facilities within its geographic areas and for preparing the air quality plans that are required under the federal Clean Air Act and 1988 California Clean Air Act. The BAAQMD is the regional agency with regulatory authority over emission sources in the nine-county San Francisco Bay Area.

3.3.1. Federal Regulatory Authority

The U.S. EPA has responsibility for enforcing, on a national basis, the requirements of many of the country's environmental laws. Region 9 is responsible for the local administration of U.S. EPA programs for California, Arizona, Nevada, Hawaii, and certain Pacific trust territories. California is under the jurisdiction of U.S. EPA Region 9, which has its offices in San Francisco. The U.S. EPA's activities, relative to the California air pollution

control program, focus principally on reviewing California's submittals for the SIP. The SIP is required by the federal Clean Air Act to demonstrate how all areas of the state will meet the NAAQS within the federally specified deadlines.

The Federal Clean Air Act (CAA) establishes a federal requirement for the U.S. EPA to develop and adopt air quality standards, the NAAQS (see Table 3-1), and specifies future dates for achieving air quality compliance. The CAA further mandates that states submit and implement SIPs for those areas not meeting these standards. The SIPs must include air pollution control measures that demonstrate how the NAAQS will be met. The 1990 amendment to the CAA requires that areas not meeting NAAQS demonstrate reasonable further progress toward attainment and incorporate sanctions for failure to attain or meet specific attainment milestones. Each state is required to adopt an implementation plan outlining pollution control measures to attain the federal standards in nonattainment areas of the state. CARB is responsible for incorporating AQMPs for local air basins into a SIP, which is then reviewed and approved by the U.S. EPA.

In addition to requiring the establishment of NAAQS and the development and maintenance of SIPs, the CAA authorizes the U.S. EPA to establish regulations on certain categories of stationary sources of air pollution. Specifically, Section 111 of the CAA authorizes the U.S. EPA to establish standards of performance for new and existing sources, commonly referred to New Source Performance Standards (NSPSs).[9]

Similarly, Section 112 of the CAA authorizes the U.S. EPA to establish emission standards for listed hazard air pollutants, commonly referred to as National Emission Standards for Hazardous Air Pollutants (NESHAPs).

The U.S. EPA also has jurisdiction over emissions from non-stationary sources that are under the authority of the federal government, including aircraft, locomotives, and emissions sources outside state waters. The U.S. EPA also establishes emission standards for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission requirements set by CARB.

3.3.2. State of California Regulatory Authority

CARB is responsible for ensuring implementation of the California Clean Air Act (CCAA) and for regulating emissions from consumer products and motor vehicles. The CCAA mandates achievement of the maximum degree of emissions reductions possible from vehicular and other mobile sources in order to attain CAAQS by the earliest practical date. CARB established the CAAQS for all pollutants for which the federal government has NAAQS. Additional standards for sulfates, visibility-reducing particles, H_2S, and vinyl chloride have been established; however, they are not considered to be a regional air quality problem at this time. H_2S, vinyl chloride, sulfates, and visibility-reducing particles are not measured at any monitoring stations in the BAAQMD. Generally, the CAAQS are equal to or more stringent than the NAAQS.

3.3.3. Regional Regulatory Authority

The Clean Air Act requires that regional planning and air pollution control agencies prepare a regional Air Quality Plan to outline the measures by which both stationary and mobile sources of pollutants can be controlled in order to achieve all standards specified in the Clean Air Act. The California Clean Air Act also requires the development of air quality plans and strategies to meet state air quality standards in areas designated as nonattainment (with the exception of areas designated as nonattainment for the state PM

[9] The majority of regulations promulgated under Section 111 of the CAA apply to newly constructed or reconstructed sources after a specified date; however, other regulations apply to affected stationary sources regardless of when construction occurred.

standards). Maintenance plans are required for attainment areas that had previously been designated nonattainment in order to ensure continued attainment of the standards.

For state air quality planning purposes, the Bay Area Air Basin is classified as a nonattainment area for the 1-hour O_3 standard. One such requirement is that the BAAQMD update the Clean Air Plan to reflect progress in meeting the air quality standards and to incorporate new information regarding the feasibility of control measures and new emission inventory data. The Bay Area's record of progress in implementing previous measures must also be reviewed. Bay Area plans are prepared with the cooperation of the Metropolitan Transportation Commission (MTC), and the Association of Bay Area Governments (ABAG). On April 19, 2017, the BAAQMD adopted the most recent revision to the Clean Air Plan - the *BAAQMD 2017 Clean Air Plan: Spare the Air, Cool the Climate* (BAAQMD, 2017a) (2017 Clean Air Plan). The 2017 Clean Air Plan serves to:

- Describe a comprehensive control strategy to protect public health and the climate;
- Update the *Bay Area 2010 Clean Air Plan* in accordance with the requirements of the California Clean Air Act to implement "all feasible measures" to reduce emissions of O_3 precursors and to reduce transport of O_3 and its precursors to neighboring air basins;
- Enhance efforts to reduce emissions of particulate matter and toxic air contaminants; and
- Lay the groundwork for a long-term effort to reduce GHG emissions in the Bay Area Air Basin.

3.3.4. Local Regulatory Authority

BAAQMD Rules and Regulations. The BAAQMD is the regional agency responsible for rulemaking, permitting, and enforcement activities affecting stationary sources of air pollutant emissions in the Bay Area Air Basin. Specific rules and regulations adopted by the BAAQMD limit the emissions that can be generated by various activities and identify specific pollution reduction measures that must be implemented in association with these activities. These rules regulate not only emissions of the six criteria air pollutants, but also toxic emissions and acutely hazardous non-radioactive materials emissions.

Emissions sources subject to these rules are regulated through the BAAQMD's permitting process and standards of operation. Through this permitting process, including an annual permit review, the BAAQMD monitors generation of stationary emissions and uses this information in developing its air quality plans. Any sources of stationary emissions constructed as part of a project within BAAQMD's jurisdiction are subject to the BAAQMD Rules and Regulations. Both federal and state O_3 plans rely upon stationary source control measures set forth in BAAQMD's Rules and Regulations.

Existing permits and plans relevant to existing and proposed operations and further discussed below. Lehigh anticipates that none of the authorizations (existing or requested) listed below will be modified or impacted by the air quality impact assessment represented in this report.

- ***Major Facility Review (MFR) Permit.*** Stationary sources associated with the Permanente Quarry and Permanente Cement Plant (Facility #A0017) operate under Lehigh's MFR Permit which lists applicable requirements including emission limits and standards, monitoring requirements, recordkeeping requirements, and reporting requirements. In addition to BAAQMD-specific requirements, the MFR Permit also incorporates the requirements of Title V of the federal CAA.[10] The MFR Permit was most recently issued

[10] 40 CFR Part 70

on August 20, 2013. As part of the ongoing permit renewal process, a proposed permit was published on August 14, 2018.

- ***Rock Plant Authority to Construct (ATC).*** The Quarry includes an existing rock plant which processes aggregate material for customer sale. Lehigh operates the rock plant pursuant to its vested mining rights. In March 2019, Lehigh submitted ATC Application #29811 to BAAQMD in order to permit new aggregate processing equipment and associated sources (e.g., road dust entrainment and storage piles). This AQIA assumes that BAAQMD will have approved the ATC application and that the new equipment will be operating by the time actions associated with the proposed Reclamation Plan amendment are implemented. ATC Application #29811 does not increase the aggregate processing throughput limit for the facility.
- ***Fugitive Dust Control Plan (FDCP).*** Lehigh's FDCP for the Permanente Cement Plant consists of dust mitigation measures to control fugitive dust emissions generated by activities at the facility and to reduce their potential impacts on the environment and the surrounding community. The purpose of the FDCP is to establish and implement dust control measures to limit particulate matter emissions from material handling operations, non-point sources, and area sources that may occur during operation and maintenance activities. The FDCP was prepared in September 2010 and last revised in June 2018. The Permanente Cement Plant FDCP covers operations generating fugitive dust in the cement plant and the quarry.

Santa Clara County General Plan. The Health and Safety Chapter of the *Santa Clara County General Plan, 1995-2010* (Santa Clara County, 1994) was amended in 2015. The *Health Element of the Santa Clara County General Plan* has been prepared as a new element, incorporating and updating certain existing subject matter and policies from the existing Health and Safety Chapters (Santa Clara County, 2015). The new Health Element includes strategies and policies that are intended to convey a comprehensive approach for improving air quality, protecting the climate, and protecting public health. Air Quality and Climate Change Strategy #1 is to "[s]trive for air quality improvement through regional and local land use, transportation, and air quality planning." Listed below are the air quality related policies related to Strategy #1 with potential relevance to the proposed Project.

- ***HE-G.1 Air quality environmental review.*** Continue to utilize and comply with the Air District's project- and plan-level thresholds of significance for air pollutants and greenhouse gas emissions.
- ***HE-G.2 Coordination with regional agencies.*** Coordinate with the Air District to promote and implement stationary and area source emission measures.
- ***HE-G.3 Fleet upgrades***. Promote Air District mobile source measures to reduce emissions by accelerating the replacement of older, dirtier vehicles and equipment, and by expanding the use of zero-emission and plug-in vehicles.
- ***HE-G.4 Off-road sources.*** Encourage mobile source emission reduction from off-road equipment such as construction, farming, lawn and garden, and recreational vehicles by retrofitting, retiring, and replacing equipment and by using alternate fuel vehicles.

3.3.5. Regulatory Authority for Odors and Nuisances

Although offensive odors from stationary sources rarely cause any physical harm, they remain unpleasant and can lead to public distress, generating citizen complaints to local governments. The occurrence and severity of odor impacts depend on the nature, frequency, and intensity of the source; wind speed and direction; and the distance from and sensitivity of receptors. The BAAQMD's CEQA Guidelines recommend that odor impacts be considered for any proposed new odor sources located near existing receptors, as well as any new sensitive receptors located near existing odor sources (BAAQMD, 2017b).

3.3.6. Toxic Air Contaminants Regulations - Air Quality

TACs are regulated under both state and federal laws. Federal laws use the term "Hazardous Air Pollutants" (HAPs) to refer to the same types of compounds that are referred to as TACs under state law. Both terms encompass essentially the same compounds. Under the 1990 Clean Air Act Amendments, 189 substances were regulated as HAPs. Since 1990, the U.S. EPA has modified the list through rulemaking to include 187 HAPs.

AB 2588. With respect to state law, in 1983 the California legislature adopted AB 1807, which establishes a process for identifying TACs and provides the authority for developing retrofit air toxics control measures on a statewide basis. Air toxics in California also may be regulated under the Air Toxics "Hot Spots" Information and Assessment Act of 1987, or AB 2588.

Under AB 2588, TACs from individual facilities must be quantified and reported to the local air pollution control agency or air quality management district. The facilities are then prioritized by the local agencies based on the quantity and toxicity of these emissions, and on their proximity to areas where the public may be exposed. In establishing priorities, the air districts are to consider the potency, toxicity, quantity, and volume of hazardous materials released from the facility; the proximity of the facility to potential receptors; and any other factors that the air district determines may indicate that the facility may pose a significant risk. High priority facilities are required to perform a Health Risk Assessment (HRA), and, if specific risk thresholds are exceeded, they are required to communicate the results to the public through notices and public meetings. Depending on the health risk levels, emitting facilities can be required to implement varying levels of risk reduction measures. CARB identified approximately 200 TACs, including the 187 federal HAPs, under AB 2588.

AB 617. In July 2017, AB 617 was approved by the Governor. AB617 aims to reduce criteria pollutant and toxic air contaminant emissions within the state of California. The bill presents four main elements in order to achieve this goal:

- Monitoring
  - Identification and recommendation of communities that have a high cumulative exposure burden
  - Establishment of a statewide monitoring plan
  - Set-up and operation of District and Community networks including public availability/presentation of statewide data
- Community Emission Reduction Plans
  - For identified communities and integration with the statewide strategy for AB617 implementation
  - Potentially resulting in development of District Community Emission Reduction Plans
  - Potentially resulting in development of state and District emission reduction strategies
- Best Available Retrofit Control Technology (BARCT)
  - Development of a Statewide BACT/BARCT clearinghouse
  - BARCT implementation and the adoption of an expedited timeline for select source categories
- Emission Reporting
  - Development of a Uniform Statewide Reporting platform
  - Establishment of a statewide pollution mapping tool

BAAQMD is responsible for administering federal and state regulations related to TACs in the Bay Air Basin. Under federal law, these regulations include NESHAPs and Maximum Achievable Control Technology (MACT) for affected sources. BAAQMD also administers the state regulations AB 1807 and AB 2588, which were discussed above. In addition, the agency requires that new or modified facilities that emit TACs perform air toxics screening analyses as part of the permit application. TAC emissions from new and modified sources are limited through the air toxics new source review program, which superseded the BAAQMD Risk Management Policy, in BAAQMD Regulation 2, Rule 5 for New Source Review of Toxic Air Contaminants. Sources must use the Best Available Control Technology for Toxics (TBACT) if health risk modeling identifies an individual source cancer risk of greater than 1 in a million or a chronic hazard index greater than 0.20.

Specific TAC regulations and considerations relevant to existing activities at Permanente Quarry and relevant for consideration in this AQIA are described below.

Diesel Exhaust Control Program. In August 1998, CARB identified particulate emissions from diesel-fueled engines (diesel particulate matter [DPM]) as TACs. CARB developed the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* and the *Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines* (CARB, 2000a and 2000b). The goal of these programs is to reduce DPM emissions and the associated health risk by 75 percent in 2010 and by 85 percent in 2020 and to implement regulations that include increasingly stringent emissions standards for on-road diesel trucks and buses, off-road diesel vehicles and equipment, and stationary diesel engines.

In 2001, the U.S. EPA promulgated regulations 40 CFR Parts 69, 80, and 86 (U.S. EPA, 2001b) requiring that the sulfur content in motor on-road vehicle diesel fuel be reduced to less than 15 ppm as of June 1, 2006. The U.S. EPA also finalized a comprehensive national emissions control program, the 2007 Heavy-duty Highway Diesel Program (also known as the HD 2007 Program), which regulates highway heavy-duty vehicles and diesel fuel as a single system. Under the HD 2007 program, the U.S. EPA established new emission standards that would significantly reduce PM and NO_X from highway heavy-duty vehicles by the time the current heavy-duty vehicle fleet has been completely replaced in 2030.

The U.S. EPA also promulgated new emission standards for nonroad diesel engines and sulfur reductions in nonroad diesel fuel that would dramatically reduce emissions attributed to nonroad diesel engines. Similar but more stringent standards have been established by CARB. This affects emissions from construction equipment, locomotives, and marine diesel equipment and vehicles. The general objective is to reduce PM emissions from diesel vehicles to levels of below 0.01 grams per brake horsepower-hour (g/bhp-hr) beginning with 2007 model year engines.

Asbestos Air Toxic Control Measure. In 2002, CARB adopted a new Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying and Surface Mining Operations. New emission control measures, such as dust suppressants, apply to any construction, grading, quarrying, and surface mining operations in areas with naturally occurring asbestos, serpentine, or ultramafic rock (CARB, 2002). Asbestos has not been detected in any of the numerous samples representative of the onsite geologic materials found at the Permanente Quarry (Santa Clara County, 2011). Accordingly, asbestos is not considered further in this AQIA.

Crystalline Silica Dust. In 2005, OEHHA added a chronic reference exposure level (REL) for crystalline silica (respirable) (California OEHHA, 2010). Silica is a hazardous substance when it is inhaled, and the airborne dust particles that are formed when the material containing the silica is broken, crushed, or sawn pose potential risks. Crystalline silica occurs in the minerals in the Project area and thus has been included in the analysis for health risk of air toxics (Santa Clara County, 2011).

3.4. EXISTING POLICIES AND REGULATIONS – GHGS

3.4.1. International Regulation - GHG

Intergovernmental Panel on Climate Change. In 1988, the United Nations created the IPCC to provide independent scientific information regarding climate change to policymakers. The IPCC does not conduct research itself, but rather compiles information from a variety of sources into reports regarding climate change and its impacts. The IPCC has thereafter periodically released reports on climate change, and in 2018 released its Global Warming of 1.5 degrees C, which concluded that "[w]arming of the climate system is unequivocal," and that "[a]nthropogenic GHG emissions … are extremely likely to have been the dominant cause of the observed warming since the mid-20th century" (IPCC, 2018).

United Nations Framework Convention on Climate Change. On March 21, 1994, the United States joined a number of countries around the world in signing the United Nations Framework Convention on Climate Change (Convention). Under the Convention, governments gather and share information on GHGs, national policies, and best practices; launch national strategies for addressing GHGs and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

Kyoto Protocol. The Kyoto Protocol is an international agreement linked to the Convention (discussed above). The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing GHGs an average of 5% against 1990 levels over the five-year period from 2008–2012. Whereas the Convention only encouraged industrialized countries to stabilize emissions, the Protocol commits them to do so. Developed countries have contributed more emissions over the last 150 years than underdeveloped countries; therefore, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities." The United States has not entered into force of the Kyoto Protocol.

3.4.2. Federal Regulations and Standards - GHG

Corporate Average Fuel Economy (CAFE) Act 1975 - Clean Vehicles. Congress first passed the CAFE law in 1975 to increase the fuel economy of cars and light-duty trucks. The law has become more stringent over time. On October 25, 2010, the U.S. EPA and the U.S. Department of Transportation proposed the first national standards to reduce GHGs and improve the fuel efficiency of heavy-duty trucks and buses. Following the proposal, two phases of fuel economy standards were established for combination tractors, heavy-duty pickups and vans, and vocational vehicles, with the first phase implemented in 2014 and the second to start in 2021.

Consolidated Appropriations Act of 2008 - Mandatory Reporting of GHG. The Consolidated Appropriations Act of 2008, passed in December 2007, requires the establishment of mandatory GHG reporting requirements. On September 22, 2009, the U.S. EPA issued the Final Mandatory Reporting of GHGs rule. The rule requires reporting of GHG emissions from large sources and suppliers in the United States and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports to the U.S. EPA.

Federal Regulation of Climate Change. The United States historically has had a voluntary approach to reducing GHG emissions. However, on April 2, 2007, the U.S. Supreme Court ruled that the U.S. EPA has the authority to regulate CO_2 emissions under the CAA. While there currently are no adopted federal regulations for

the control or reduction of GHG emissions, the U.S. EPA commenced several actions in 2009 that are required to implement a regulatory approach to global climate change, as mentioned in the sections above.

3.4.3. State Regulations and Standards - GHG

California AB 1493 - Pavley Regulations and Fuel Efficiency Standards. California AB 1493, enacted on July 22, 2002, required CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light-duty trucks. The standards were phased in for 2009 through 2016 model years. The standards have resulted in about a 30% reduction in fuel consumption compared with the 2002 fleet.

Executive Order S-01-07 - Low Carbon Fuel Standard. Executive Order S-01-07, signed on January 18, 2007, mandates that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020. In response, a Low Carbon Fuel Standard (LCFS) was adopted and the California Energy Commission, CARB, the University of California, and other agencies were directed to develop and propose protocols for measuring the "life-cycle carbon intensity" of transportation fuels. The Low Carbon Fuel Standard requires producers of petroleum-based fuels to achieve a 10% total reduction in the carbon intensity of their fuels by 2020. Petroleum importers, refiners, and wholesalers can either develop their own low carbon fuel products or buy LCFS credits from other companies that develop and sell low carbon alternative fuels, such as biofuels, electricity, natural gas, or hydrogen. Several legal challenges have delayed implementation of the LCFS.

Executive Order S-3-05. Executive Order S-3-05 was signed by the Governor in 2005 proclaiming California is vulnerable to the impacts of climate change. It states that increased temperatures could reduce the Sierra Nevada's snowpack, worsen California's air quality problems, and potentially cause a rise in sea levels. The Executive Order establishes total GHG emission targets that require reducing GHG emissions to the 2000 level by 2010, the 1990 level by 2020, and to 80% below the 1990 level by 2050. The 2050 reduction goal represents what scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be an aggressive, but achievable, midterm target.

AB 32. California's major initiative for reducing GHG emissions is outlined in AB 32, the California Global Warming Solutions Act of 2006, passed by the Legislature on August 31, 2006. This effort aims at reducing GHG emissions to 1990 levels by 2020. CARB has established the level of GHG emissions in 1990 at 427 MMT CO_2e. The emissions target of 427 MMT requires the reduction of 169 MMT from the state's projected business-as-usual 2020 emissions of 596 MMT. AB 32 requires CARB to prepare a Scoping Plan that outlines the main state strategies for meeting the 2020 deadline and to reduce GHGs that contribute to global climate change.

AB 32 requires CARB and the Climate Action Team[11] to take the following actions:

- Adopt a list of discrete early action measures by July 1, 2007, that can be implemented before January 1, 2010;
- Establish a statewide GHG emissions cap for 2020 based on 1990 emissions and adopt mandatory reporting rules for significant sources of GHGs by January 1, 2008;
- Indicate how emission reductions will be achieved from significant GHG sources via regulations, market mechanisms, and other actions by January 1, 2009; and

[11] The Climate Action Team is a consortium of representatives from state agencies who have been charged with coordinating and implementing GHG emission reduction programs that fall outside of CARB's jurisdiction.

- Adopt regulations by January 1, 2011, to achieve the maximum technologically feasible and cost-effective reductions in GHGs, including provisions for using both market mechanisms and alternative compliance mechanisms.

In June 2007, CARB approved a list of 37 early action measures, including three discrete early action measures: Low Carbon Fuel Standard, Restrictions on High GWP Refrigerants, and Landfill CH_4 Capture. Discrete early action measures are measures that were required to be adopted as regulations and made effective no later than January 1, 2010, the date established by Health and Safety Code Section 38560.5.

CARB adopted additional early action measures in October 2007 that tripled the number of discrete early action measures (CARB, 2007a). These measures relate to truck efficiency, port electrification, reduction of perfluorocarbons from the semiconductor industry, reduction of propellants in consumer products, proper tire inflation, and SF_6 reductions from the non-electricity sector. The combination of early action measures is estimated to reduce statewide GHG emissions by nearly 16 MMT of CO_2e (CARB, 2007b).

CARB AB 32 Scoping Plan. CARB adopted the initial Climate Change Scoping Plan (Scoping Plan) in 2008, which outlines actions recommended to obtain that goal. The Scoping Plan calls for an "ambitious but achievable" reduction in California's GHG emissions, cutting approximately 30% from business-as-usual emission levels projected for 2020, or about 10% from today's levels. On a per-capita basis, that means reducing annual emissions of 14 tons of CO_2 per person in California down to about 10 tons per person by 2020. The First Update to the Climate Change Scoping Plan was released on May 15, 2014, and built upon the initial Scoping Plan with new recommendations.

The Scoping Plan contains the following 18 emission reduction measures to reduce the state's emissions (CARB, 2008):

1. *California Cap-and-Trade Program Linked to Western Climate Initiative.* Implement a broad-based California Cap-and-Trade program to provide a firm limit on emissions. Link the California cap-and-trade program with other Western Climate Initiative Partner programs to create a regional market system to achieve greater environmental and economic benefits for California. Ensure California's program meets all applicable AB 32 requirements for market-based mechanisms.
2. *California Light-Duty Vehicle GHG Standards.* Implement adopted standards and planned the second phase of the program. Align zero-emission vehicle, alternative and renewable fuel and vehicle technology programs with long-term climate change goals.
3. *Energy Efficiency.* Maximize energy efficiency building and appliance standards; pursue additional efficiency including new technologies, policy, and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California.
4. *Renewable Portfolio Standard.* Achieve a 33% renewable energy mix statewide. Renewable energy sources include (but are not limited to) wind, solar, geothermal, small hydroelectric, biomass, anaerobic digestion, and landfill gas.
5. *Low Carbon Fuel Standard.* Develop and adopt the Low Carbon Fuel Standard.
6. *Regional Transportation-Related GHG Targets.* Develop regional GHG emissions reduction targets for passenger vehicles. This measure refers to Senate Bill 375 (SB 375).
7. *Vehicle Efficiency Measures.* Implement light-duty vehicle efficiency measures.
8. *Goods Movement.* Implement adopted regulations for the use of shore power for ships at berth. Improve efficiency in goods movement activities.

9. *Million Solar Roofs Program.* Install 3,000 MW of solar-electric capacity under California's existing solar programs.
10. *Medium/Heavy-Duty Vehicles.* Adopt medium- and heavy-duty vehicle efficiency measures.
11. *Industrial Emissions.* Require an assessment of large industrial sources to determine whether individual sources within a facility can cost-effectively reduce GHG emissions and provide other pollution reduction co-benefits. Reduce GHG emissions from fugitive emissions from oil and gas extraction and gas transmission. Adopt and implement regulations to control fugitive CH_4 emissions and reduce flaring at refineries.
12. *High-Speed Rail.* Support implementation of a high-speed rail system.
13. *Green Building Strategy.* Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.
14. *High* GWP *Gases.* Adopt measures to reduce high GWP gases.
15. *Recycling and Waste.* Reduce CH_4 emissions at landfills. Increase waste diversion, composting, and commercial recycling. Move toward zero-waste.
16. *Sustainable Forests.* Preserve forest sequestration and encourage the use of forest biomass for sustainable energy generation.
17. *Water.* Continue efficiency programs and use cleaner energy sources to move and treat water.
18. *Agriculture.* In the near-term, encourage investment in manure digesters; at the five-year Scoping Plan update, determine if the program should be made mandatory by 2020.

SB 375 (discussed in more detail below) took effect in 2009 and required regional municipal planning organizations to develop regional land use plans that demonstrate how the regions will achieve compliance with the GHG reduction goals of AB 32. Cities located within these regions are then required, in turn, to update their General Plans in accordance with the regional plans. Non-compliance with SB 375 will result in transportation funds being withheld from the regional and/or local agency.

AB 398. AB 398, signed in July 2017, aims to reduce GHG emissions within the state of California. The bill outlines new requirements for California's GHG Cap-and-Trade program that includes, among others, extending the program through 2030, limiting the use of offsets, and requiring CARB to establish a price ceiling for GHG allowances.

SB 1368. In September 2006, the Governor signed Senate Bill 1368, which calls for the adoption of a GHG performance standard for in-state and imported electricity generators to mitigate climate change. On January 25, 2007, the CPUC adopted an interim GHG emissions performance standard. This standard is a facility-based emissions standard requiring all new long-term commitments for base load generation to serve California consumers with power plants that have emissions no greater than those from a combined cycle gas turbine plant. The established level is 1,100 pounds of CO_2 per megawatt-hour.

SB 375. Signed into law on October 1, 2008, SB 375 provides emissions-reduction goals around which regions can plan; integrates disjointed planning activities; and provides incentives for local governments and developers to implement "smart growth" planning and development strategies, which are to include reductions in average vehicle miles traveled (VMT), commuting distances, and criteria and GHG air pollutant emissions. SB 375 has three major components:

- Using the regional transportation planning process to achieve reductions in GHG emissions consistent with AB 32's goals;
- Offering CEQA incentives to encourage projects that are consistent with a regional plan that achieves GHG emission reductions; and
- Coordinating the regional housing needs allocation process with the regional transportation process while maintaining local authority over land use decisions.

SB 375 requires each Metropolitan Planning Organization (MPO) to include a Sustainable Communities Strategy (SCS) in the regional transportation plan that demonstrates how the region will meet the GHG emission targets and creates CEQA streamlining incentives for projects that are consistent with the regional SCS. The focus of SB 375 is on the location of new residential projects and coordinated transportation planning.

Renewable Electricity Standards. There have been several recent legislative and executive actions covering renewable electricity in California. On September 12, 2002, Governor Gray Davis signed SB 1078, requiring California to generate 20% of its electricity from renewable energy by 2017. SB 107 changed the due date to 2010 instead of 2017. On November 17, 2008, Governor Arnold Schwarzenegger signed Executive Order S-14-08, which established a target for California to increase the state's Renewable Portfolio Standard to 33% renewable power by 2020.

SB 743. SB 743 of 2013 amended CEQA to change the conventional approaches to transportation impact analysis which focus on vehicle level of service (LOS) and vehicle delay. SB 743 changes the focus of transportation impact analysis in CEQA from measuring impacts to drivers, to measuring the impact of driving on the environment, including GHG emissions. SB 743 amendments to CEQA require that the LOS metric be replaced with a metric considering vehicle mile traveled (VMT). This shift in transportation impact focus is expected to better align transportation impact analysis and mitigation outcomes with the State's goals to reduce GHG emissions, encourage infill development, and improve public health through more active transportation. Amendments to the CEQA Guidelines were approved in December 2018, and included incorporation of changes to address SB 743. Guidelines, Section 15064.3(c) states, "A lead agency may elect to be governed by the provisions of this section immediately. Beginning on July 1, 2020, the provisions of this section shall apply statewide."

3.4.4. Regional Policies - GHG

BAAQMD 2017 Clean Air Plan. The BAAQMD 2017 Clean Air Plan includes climate protection as a primary goal, and specifies the GHG-related priorities listed below.

- Reduce emissions of "super-GHGs" such as CH_4, black carbon and fluorinated gases
- Decrease demand for fossil fuels (gasoline, diesel and natural gas)
  - Increase efficiency of industrial processes, energy, and transportation systems
  - Reduce demand for vehicle travel, and high-carbon goods and services
- Decarbonize our energy system
  - Make the electricity supply carbon-free
  - Electrify the transportation and building sectors

The Clean Air Plan lays the groundwork for a long-term effort to reduce Bay Area GHG emissions 40% below 1990 levels by 2030 and 80% below 1990 levels by 2050, consistent with the state GHG reduction targets. The

Plan includes a comprehensive control strategy for GHGs that the District intends to implement over the next three to five years.

Santa Clara County Climate Action Plan. Adopted by the Board of Supervisors in September 2009, the Santa Clara County Climate Action Plan (CAP) focuses on County operations, facilities, and employee actions to reduce greenhouse gas emissions, energy and water consumption, solid waste, and fuel consumption. The Plan focuses on steps needed to reach a 10% GHG reduction goal by 2015 and also identifies policies and actions needed to reduce emissions beyond 2015.

Along with the municipal climate action plan, the Silicon Valley 2.0 project is a countywide effort to minimize the anticipated impacts of climate change and reduce local greenhouse gas emissions. The project uses a risk management framework to evaluate the exposure of populations to climate impacts, examines the potential consequences of this exposure, and develops adaptation strategies that improve community resilience.

Santa Clara County General Plan. The Santa Clara County General Plan was updated in 2015 to include a revised Health Element that includes climate change and sustainability-related goals, strategies, and policies (Santa Clara County, 2015). The strategy and policies with potential relevance to the proposed Project are summarized below.

Strategy #1: Strive for air quality improvement through regional and local land use, transportation, and air quality planning.

- ***HE-G.1 Air quality environmental review***. Continue to utilize and comply with the Air District's project- and plan-level thresholds of significance for air pollutants and greenhouse gas emissions.
- ***HE-G.2 Coordination with regional agencies***. Coordinate with the Air District to promote and implement stationary and area source emission measures.
- ***HE-G.3 Fleet upgrades***. Promote Air District mobile source measures to reduce emissions by accelerating the replacement of older, dirtier vehicles and equipment, and by expanding the use of zero-emission and plug-in vehicles.
- ***HE-G.4 Off-road sources***. Encourage mobile source emission reduction from off-road equipment such as construction, farming, lawn and garden, and recreational vehicles by retrofitting, retiring and replacing equipment and by using alternate fuel vehicles.
- ***HE-G.5 GHG reduction.*** Support efforts to reduce GHG emissions from mobile sources, such as reducing vehicle trips, vehicle use, VMT, vehicle idling, and traffic congestion. These efforts may include improved transit service, better roadway system efficiency, state-of-the-art signal timing, and Intelligent Transportation Systems (ITS), transportation demand management, parking and roadway pricing strategies, and growth management measures.

4.1. SIGNIFICANCE CRITERIA

Appendix G of the California state *CEQA Guidelines*[12] and the County of Santa Clara Environmental Checklist recognize the following significance criteria related to air quality and GHG. Based on the criteria, potential impacts to air quality would be significant if the proposed Project would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard;
- Expose sensitive receptors to substantial pollutant concentrations; and/or
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

Based on CEQA Guidelines §§ 15064.4 and 15064.7(c), as well as Appendix G, the Project would cause adverse impacts associated with GHG emissions if it would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

The *CEQA Air Quality Guidelines* (BAAQMD, 2017b) contains numerical thresholds of significance that are designed to implement the above general criteria for air quality impacts. The BAAQMD thresholds are based on extensive studies, and serve as a means of translating the general standards set forth in Appendix G into quantitative thresholds against which a proposed project's air pollutant emissions can be measured (BAAQMD, 2017b). Thus, the BAAQMD thresholds are considered appropriate for use in evaluating the proposed Project.

Table 4-1 presents the BAAQMD Thresholds of Significance used as applicable in this AQIA for criteria pollutant and GHG emissions associated with the proposed Project. The table presents thresholds for operational-related emissions.[13] The applicability and use of the specific project-level thresholds for evaluation of the proposed Project is explained in the discussion of each impact in Section 4.4. below.

[12] CCR Title 14, Division 6, Chapter 3, §§ 15000 - 15387, as amended December 28, 2018

[13] Construction-related emission Thresholds of Significance are not listed as they are not applicable to the proposed Project.

Table 4-1: BAAQMD Air Quality CEQA Thresholds of Significance

Pollutant/Criteria	Operational-Related[a]
ROG	54 lb/day OR 10 tpy
NO_X	54 lb/day OR 10 tpy
PM_{10}	82 lb/day OR 15 tpy
$PM_{2.5}$	54 lb/day OR 10 tpy
PM_{10} /$PM_{2.5}$ (Fugitive Dust)	None
Local CO	9.0 ppm (8-hour average), 20.0 ppm (1-hour average) OR meet screening criteria: 1. Consistent with applicable congestion management plan 2. Not increase intersection volumes to more than 44,000 vehicle per hour 3. Not increase intersection volumes to more than 24,000 where mixing is substantially limited
GHGs –Stationary Sources	10,000 MT CO_2e/yr
Risk and Hazards for new sources and receptors (Individual Project)	Compliance with Qualified Community Risk Reduction Plan OR Increased cancer risk of >10.0 in a million Increased non-cancer risk of > 1.0 Hazard Index (Chronic or Acute) Ambient $PM_{2.5}$ increase: > 0.3 µg/m^3 annual average
Risk and Hazards for new sources and receptors (Cumulative Threshold)	Compliance with Qualified Community Risk Reduction Plan OR Cancer: > 100 in a million (from all local sources) Non-cancer: > 10.0 Hazard Index (from all local sources) (Chronic) $PM_{2.5}$: > 0.8 µg/m^3 annual average (from all local sources)
Accidental Release of Acutely Hazardous Air Pollutants	Storage or use of acutely hazardous materials locating near receptors or new receptors locating near stored or used acutely hazardous materials considered significant
Odors	5 confirmed complaints per year averaged over 3 years

Source: BAAQMD, 2017b

Notes:

a. BAAQMD construction-related thresholds and operational-related thresholds that are not applicable to the Project are not listed. The daily emission thresholds reflect average daily emissions values. The annual emission thresholds reflect maximum annual emissions values.

4.2. PROJECT EMISSIONS

4.2.1. Project Construction Emissions

The proposed Project involves ongoing mining and reclamation activities and does not include construction activities. Therefore, evaluation of construction emissions is not relevant to this assessment.

4.2.2. Operational Emissions Calculation Methodology

This section discusses methods used for calculating emissions associated with the proposed Project and baseline scenarios. An overview of each scenario is provided below and details for each emission source under both scenarios are provided in Tables 4-2 through 4-18.

Proposed Project Overview. Operational air pollutant and GHG emissions are those that result from mining operations and reclamation activities that would occur under the proposed Project. As the proposed Project involves various phases of mining and reclamation over several years and the rate of mining is influenced by market and other factors, daily and annual emissions fluctuate. For the purposes of comparison to baseline emissions (discussed below) and the BAAQMD maximum annual significance thresholds, a representative worst-case emissions year is used as the basis of the proposed Project emission calculations.

The majority of the equipment utilized in the Project operations is equipment already being utilized at the Permanente Quarry or vehicles already coming on-site to export material. Haul trucks delivering surplus construction soil to the site for use in reclamation will be the only new on-site activities and emissions source. Otherwise, the Project includes the same types of activities and equipment use for operations that currently occur under baseline conditions.

Onsite operations involve a variety of activities that emit air pollutants. These activities may be grouped as mobile sources, stationary sources, or fugitive sources. Fractions of the fugitive emissions from dust are PM_{10} and $PM_{2.5}$ emissions. Engine exhaust emissions include all pollutants and may be directly emitted at the Project site, or emitted by vehicles in route to and from the Project site, such as employee, material haul, and delivery vehicle trips.

Sources of operational emissions associated with ongoing operations and the proposed Project include the following:

- Drilling and blasting;
- Bulldozing, scraping, and grading;
- Material handling;
- Wind erosion (disturbed areas and unpaved roads);
- Dust entrainment from paved and unpaved roads (on and off site);
- Rock plant equipment;
- Fuel storage and dispensing;
- Off road equipment exhaust;
- On road vehicle exhaust (on and off site);
- Dewatering system combustion emissions; and
- Electricity use.

Various Project elements and recent operational changes will decrease potential operational emissions under the Project as compared to baseline conditions. The Project includes use of RWQCB-approved chemical dust suppressant application on unpaved roads which achieves improved fugitive dust suppression as compared to water application under baseline conditions. Recent operational changes include Lehigh's use of a new fleet of mobile equipment that Lehigh acquired and put into use in 2018, whereas older equipment with higher emissions factors was used during the baseline period. Lehigh has also recently employed the use of higher tier

(Tier 3) engines to power dewatering system pumps which have lower emissions than pump engines used during the baseline period.

Based on the sources of operational emissions, the factor with the greatest impact on emissions, particularly PM_{10} and $PM_{2.5}$ emissions, is the movement of material (limestone, aggregate, greenstone, imported soil). As such, the representative worst-case year for which the emission calculations are based is the year with the greatest amount of material mined on-site combined with emissions associated with delivery and placement of imported soil for North Quarry backfill for reclamation purposes. The representative worst-case year selected for this analysis is anticipated to be the third year of operations following approval of the proposed amendment, and is referred to as Year 3 in this report. Based on the estimate schedule for activities following approval of the proposed Project, in Year 3 mining in the North Highwall Reserve is assumed to be at maximum production levels and soil imports of approximately 1 million cubic yards per year would begin to be brought on-site and placed for reclamation. Selecting a representative worst-case year in the beginning of the Project phases is also conservative for ROG and combustion pollutants because, over time, vehicles and diesel-fired equipment are expected to have more efficient, cleaner engines with lower emission rates.

As discussed, the proposed Project includes annual imports of up to approximately 1 million cubic yards of surplus construction soil for use in reclamation. Studies conducted for the proposed Project conclude that the use of surplus construction soil for reclamation at Permanente Quarry will provide a local reuse option for this soil that would otherwise be transported farther distances and that the Project would reduce vehicle miles traveled by soil haul trucks as compared to future conditions without Permanente's use of this soil (Pinnacle Consulting, 2019). The Project's reduction in VMT would result in a corresponding reduction in regional criteria air pollutant and greenhouse gas emissions. For the purposes of this AQIA, criteria pollutant and greenhouse gas emissions associated with soil transport conservatively include emissions associated with the entire distance of travel between surplus soil source locations (i.e., various construction sites in San Francisco, San Mateo, and Santa Clara counties) and the Project site based on Pinnacle Consulting estimates. Although these emissions would be less under the proposed Project than under future conditions without the Project, the impact analysis in this AQIA does not account for the net reduction that would be achieved by the Project. Instead, the analysis conservatively attributes all emissions associated with 1 million cubic yards per year of construction soil transport to the Project. For informational purposes, the emission calculations in Appendix A (Tables 1-1, 1-8 and 1-12) present estimated emissions from the surplus construction soil haul trucks under the "no-Project" scenario in which the import of soil to Permanente does not occur (i.e., surplus construction soil from regional construction projects must be transported to alternative more distant locations). Since this represents the no-project scenario with regards to soil imports and is not a component of baseline conditions, emissions from the delivery of imported soil to alternative destinations is not incorporated into the net emissions comparison to significance thresholds (subsequently shown in Tables 4-21 and 4-22).

Baseline Overview. Because Permanente Quarry is an existing operation that generates air pollutant and GHG emissions, this CEQA evaluation appropriately considers the change in emissions resulting from the proposed Project as compared to existing "baseline" emissions. To determine the net change in emissions related to the proposed Project, this section documents estimated baseline emissions of the existing operation. Although CEQA anticipates that the baseline for a CEQA analysis normally consists of the physical environmental conditions in the vicinity of the Project as they exist when the environmental review begins, CEQA and CEQA court decisions also recognize that alternative approaches to establishing baseline may be appropriate.

The baseline condition at the Project site involves an existing quarry operation and reclamation activities. Such activities are characterized by fluctuating production and associated air emissions, in response to continually changing market demands and other factors. An emission inventory that considers only conditions existing at the time of environmental review could substantially over- or under-represent typical conditions. Accordingly, and consistent with the approach taken in the 2012 EIR prepared by the County when considering adoption of

the 2012 Reclamation Plan, baseline annual air pollutant and GHG emissions for this AQIA are based on estimated emissions associated with annual average production levels at the site over the 10-year period from January 1, 2008, to December 31, 2017. This timeframe includes periods of relatively high production as well as relatively low production at the Permanente Quarry in response to changing market demands. This approach of using a relatively high estimate of emissions from the proposed Project (i.e., the worst-case, highest emissions year) compared to the 10-year historical average baseline results in a conservative (i.e., tending to overstate potential impacts as opposed to potentially understating impacts) estimate of the net change in emissions associated with the proposed Project.

Emissions associated with the operation of the adjacent cement plant are not included in the baseline analysis since the cement plant is not within the reclamation plan boundary, it has a separate industrial use, and the Project would not affect the cement plant's use permit, operating permits, or regulatory status. Emissions from the cement plant have been quantified by Lehigh as part of the BAAQMD's Title V Operating Permit renewal process and are reported to the BAAQMD annually.

Sources of operational baseline emissions consist of the same source types as the proposed Project and include the following:

- Drilling and blasting;
- Bulldozing, scraping, and grading;
- Material handling;
- Wind erosion (disturbed areas and unpaved roads);
- Dust entrainment from unpaved roads;
- Rock Plant equipment;
- Fuel storage and dispensing;
- Off road equipment exhaust;
- On road vehicle exhaust;
- Dewatering system combustion emissions; and
- Electricity use.

Calculation Methodology Description. The calculation methods utilized for estimating the baseline operational emissions and proposed Project operational emissions are explained in detail in the following tables. Emission factors and calculation methods used to quantify emissions from the proposed Project and baseline are based on facility information and data available from the generally accepted public sources. Where available, local (BAAQMD and California) and recently developed emission factors were selected. In the absence of local emission factors, the most appropriate federal or international emission factor was applied.

Table 4-2: Emission Calculation Methodology – Drilling Operations

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	Drilling during the 10-year baseline period was conducted as needed to prepare areas in the North Quarry for blasting to achieve desired mine production rates. An annual average of 3,927,063 tons of material was mined during the 10-year baseline period, requiring an average of 7,541 holes/year. Drilling during the baseline period was done in various areas of the North Quarry, and this AQIA uses a central location in the North Quarry for modeling purposes to represent the location of drilling-related emissions over the 10-year baseline period (grouped with similar sources).	During the worst-case analysis year, this AQIA assumes an annual production of 6,419,949 tons of material, requiring an average of 12,311 holes/year. Drilling during this period will primarily occur within the North Highwall Reserve area of the North Quarry, and this AQIA uses a central location in the North Quarry for modeling purposes to represent the location of drilling-related emissions for the proposed Project (grouped with similar sources).
Basis of Calculation	Based on the average number of holes drilled per year during baseline period. Value calculated as the ratio of holes drilled per ton of material blasted from 2018 records and scaled to the baseline average annual quarry production.	Same as baseline calculation basis, but drilling frequency scaled to annual production for anticipated worst-case emission year.
Emission Factor	PM_{10} and $PM_{2.5}$ emission factors (lb/hole) from Section A. Blast Hole Drilling in the MDAQMD Emission Inventory Guidance: Mineral Handling and Processing Industries.	Same as baseline factor.
Control Efficiency	Controls include a dust collector on the drills as well as water spray and operation below grade. Control efficiency conservatively selected from the WRAP Fugitive Dust Handbook Section 11.3 Demonstrated Control Techniques for fabric filtration.	Same as baseline control efficiency.

Table 4-3: Emission Calculation Methodology – Blasting Operations (Fugitive Dust)

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	Blasting during the 10-year baseline period was conducted as needed to prepare areas in the North Quarry for blasting to achieve desired mine production rates. An annual average of 3,927,063 tons of material was mined during the 10-year baseline period, requiring an average of 79 blasts/year. Blasting during the baseline period was done in various areas of the North Quarry, and this AQIA uses a central location in the North Quarry for modeling purposes to represent the location of blasting-related emissions over the 10-year baseline period (grouped with similar sources).	During the worst-case analysis year, this AQIA assumes an annual production of 6,419,949 tons of material, requiring an average of 130 blasts/year. Blasting during this period will primarily occur within the North Highwall Reserve area of the North Quarry, and this AQIA uses a central location in the North Quarry for modeling purposes to represent the location of blasting-related emissions for the proposed Project (grouped with similar sources).
Basis of Calculation	Based on the surface area per blast and the total number of blasts per year. The 'most complex' equation option from the MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.B. is used to calculate emissions.	Same as baseline calculation basis.
Emission Factor	PM_{10} and $PM_{2.5}$ emission factors (as a size factor) come from MDAQMD Emission Inventory Guidance: Mineral Handling and Processing Industries, Section VI.B.	Same as baseline factor.
Control Efficiency	Controls include prohibition of blasting when wind speeds are greater than 25 mph (according to Lehigh's BAAQMD FDCP) and blasting below grade. The control efficiency is conservatively selected from Table 3-7 of the WRAP Fugitive Dust Handbook for prohibition of blasting when wind speeds exceed 25 mph.	Same as baseline control efficiency.

Table 4-4: Emission Calculation Methodology – Blasting Operations (Explosive Detonation)

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	Blasting during the 10-year baseline period was conducted as needed to prepare areas in the North Quarry for blasting to achieve desired mine production rates. An annual average of 3,927,063 tons of material was mined during the 10-year baseline period, requiring an average of 675 tons/year of explosives. Blasting during the baseline period was done in various areas of the North Quarry, and this AQIA uses a central location in the North Quarry for modeling purposes to represent the location of blasting-related emissions over the 10-year baseline period (grouped with similar sources).	During the worst-case analysis year, this AQIA assumes an annual production of 6,419,949 tons of material, requiring an average of 1,101 tons per year of explosives. Blasting during this period will primarily occur within the North Highwall Reserve area of the North Quarry, and this AQIA uses a central location in the North Quarry for modeling purposes to represent the location of blasting-related emissions for the proposed project (grouped with similar sources).
Basis of Calculation	Based on the tons of explosives used annually and the total number of blasts per year. This comes from the MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.C.	Same as baseline calculation basis.
Emission Factor	Criteria pollutant emission factors from MDAQMD Emission Inventory Guidance: Mineral Handling and Processing Industries, Section VI.C. An emission factor for ammonium nitrate (ANFO) is used as a conservative estimate for emulsion which is used by Lehigh. The emission factor for CO_2 comes from the National Greenhouse Accounts (NGA) Factors, Australian Government Department of Climate Change, January 2008, Section 1.3 (Explosives).	Same as baseline factor.
Control Efficiency	No controls are applied for emissions from explosive detonation.	Same as baseline control efficiency.

Table 4-5: Emission Calculation Methodology – Bulldozing, Scraping, and Grading Operations

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	Bulldozing, scraping, and grading during the 10-year baseline period was conducted as needed to prepare and maintain operational areas within the North Quarry and WMSA. Bulldozing, scraping, and grading equipment was used for an average of 6,019 hours/year during the baseline period. These operations occurred throughout the WMSA and North Quarry, and this AQIA uses a central location within each area for modeling purposes to represent the location of bulldozing, scraping, and grading emissions over the 10-year baseline period (grouped with similar sources).	During the worst-case analysis year, this AQIA assumes 16,529 hours per year for bulldozing, scraping, and grading operations to support operations within the North Quarry and WMSA. Operations will primarily occur within the North Highwall Reserve area of the North Quarry related to mining, with secondary operations in the North Quarry and WMSA related to reclamation. This AQIA uses a central location within each area for modeling purposes to represent the location of bulldozing, scraping, and grading emissions for the proposed Project (grouped with similar sources).
Basis of Calculation	Based on the hours of operation for bulldozing, scraping, and grading equipment. Operating hours are calculated by scaling the applicable material throughput with the bulldozing, scraping, and grading ratio (hr/ton) in Lehigh's 2012 Reclamation Plan Amendment.	Same as baseline calculation basis.
Emission Factor	A material movement emission factor is calculated in accordance with MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.D. The particulate aerodynamic factor for PM_{10} comes from MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.D. The particulate aerodynamic factor for $PM_{2.5}$ is calculated as 0.15 x PM_{10} Aerodynamic Factor, according to Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors, Midwest Research Institute, November 1, 2006, Table 1 (Proposed Particle Size Ratios for AP-42 for Rock Handling & Storage Piles [transfer]). The silt content is taken from the MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries Section G, Stockpile Table 2 for Limestone. The moisture content comes from AP-42 Section 13.2.4 for Aggregate Handling And Storage Piles, Table 13.2.4-1 for various limestone products.	Same as baseline factor.

Parameter	Baseline Scenario	Proposed Project Scenario
Control Efficiency	Controls include reductions due to cross-wind ridges since the quarry is below grade and water sprays as required in Lehigh's BAAQMD FDCP. Control efficiencies are from the WRAP Fugitive Dust Handbook.	Same as baseline control efficiency.

Table 4-6: Emission Calculation Methodology – Material Handling Operations

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	An annual average of 3,927,063 tons of material was mined during the 10-year baseline period, which was transported from the quarry to the WMSA, rock plant, and cement plant. During this transportation process, material was transferred (i.e. dropped) to/from loaders, trucks, storage piles, and various equipment (e.g. crushers, conveyors). This AQIA uses central locations in the North Quarry, WMSA, and rock plant for modeling purposes to represent the location of material handling emissions over the 10-year baseline period (grouped with similar sources).	Materials handling under the proposed Project assumes annual production of 6,419,949 tons/year of material mined during the worst-case emissions year. This material is transferred to/from loaders, trucks, storage piles, and various equipment (e.g. crushers). The proposed Project scenario also includes import and placement of 1,291,301 tons/year (approximately 1 million cubic yards) of imported soil which does not occur under existing conditions and is not a component of the baseline scenario. Imported soil is assumed to be delivered to an intermediate staging area near the rock plant before being loaded onto haul trucks for transport into the quarry for placement. This AQIA uses central locations in the North Quarry, WMSA, and rock plant to represent the location of material handling emissions for the proposed Project (grouped with similar sources).
Basis of Calculation	Based on the material throughput and the number of transfer points.	Same as baseline calculation basis. Additional transfer points are included for imported soil transfer and placement.
Emission Factor	Material handling emission factors are calculated according to the MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.E. The average wind speed is the annual average as measured by Lehigh's meteorological tower from 2008-2017. Moisture content comes from AP-42 Section 13.2.4 for Aggregate Handling and Storage Piles, Table 13.2.4-1 for various limestone products and clay/dirt mix. The particulate aerodynamic factor for PM_{10} comes from MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.D. The particulate aerodynamic factor for $PM_{2.5}$ is calculated as 0.15 x PM_{10} Aerodynamic Factor, according to Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors, Midwest Research	Same as baseline factor.

Parameter	Baseline Scenario	Proposed Project Scenario
	Institute, November 1, 2006, Table 1 (Proposed Particle Size Ratios for AP-42 for Rock Handling & Storage Piles [transfer]).	
Control Efficiency	Controls include water sprays for all transfer points and additional control for the three-sided enclosure of the primary crusher drop point, according to the MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries Section E, Table 5.	Same as baseline control efficiency.

Table 4-7: Emission Calculation Methodology – Wind Erosion (Non-Road Disturbed Area)

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	During the 10-year baseline period, a total of 448 acres/year were available for wind erosion based on SMARA reports and rock plant storage pile records. Of which 405 acres/year were non-road areas within the North Quarry, WMSA, and rock plant, which is calculated using road to non-road ratios from the 2012 Reclamation Plan Amendment. It is estimated that 30% of the North Quarry and 10% of the WMSA acreage was actively disturbed as defined by MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.L. for Wind Erosion from Unpaved Operational Areas and Roads (i.e. disturbed once per day). The remaining acreage is thus considered inactive. Wind erosion occurred throughout the North Quarry, WMSA, and Rrock plant during the baseline period. This AQIA assumes a central location in each area for modeling purposes to represent the location of wind erosion emissions (grouped with similar sources).	The total disturbed acreage in the proposed Project scenario is assumed to be 470 acres/year based on the addition of disturbed area for the North Highwall Reserve in the North Quarry and the change in disturbed area associated with the rock plant. Of which 423 acres/year are non-road areas within the North Quarry, WMSA, and rock plant which is calculated using road and non-road ratios from the 2012 Reclamation Plan Amendment. It is estimated that 30% of the North Quarry (including areas of backfill placement) and 10% of the WMSA acreage is actively disturbed as defined by MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.L. for Wind Erosion from Unpaved Operational Areas and Roads (i.e. disturbed once per day). This AQIA assumes a central location in each area for modeling purposes to represent the location of wind erosion emissions (grouped with similar sources).
Basis of Calculation	Based on the acreage disturbed.	Same as baseline calculation basis.
Emission Factor	Non-road wind erosion emission factors are calculated based on AP-42 Section 13.2.5, Industrial Wind Erosion, using windspeed and precipitation data from Lehigh's meteorological tower for the baseline years of 2008-2017. Particle size multipliers for PM_{10} and $PM_{2.5}$ are from AP-42 Section 13.2.5.	Same as baseline factor.
Control Efficiency	Controls for disturbed areas include cross-wind ridges for areas below grade, gravel-like material in WMSA, and water sprays for various material storage piles. Control efficiencies come from WRAP Fugitive Dust Handbook, AP 42 Section 13.2.2, and BAAQMD Permit Handbook, respectively.	Same as baseline control efficiency.

Table 4-8: Emission Calculation Methodology – Wind Erosion (Unpaved Roads)

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	During the 10-year baseline period, a total of 448 acres/year were available for wind erosion based on SMARA reports. Of which 43 acres/year were unpaved roads within the North Quarry and WMSA, which is calculated using road and non-road ratios from the 2012 Reclamation Plan Amendment. It is assumed that 100% of the unpaved road acreage was actively disturbed as defined by MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.L. for Wind Erosion from Unpaved Operational Areas and Roads (i.e. disturbed once per day). Wind erosion occurred throughout the North Quarry and WMSA roads during the baseline period. Wind erosion is abated by water spray. This AQIA assumes a central location in each area for modeling purposes to represent the location of wind erosion emissions (grouped with similar sources).	The total disturbed acreage in the proposed project scenario is assumed to be 470 acres/year based on the addition of disturbed area for the North Highwall Reserve in the North Quarry and the change in disturbed area associated with the rock plant. Of this, 47 acres/year are unpaved roads within the North Quarry, WMSA, and rock plant which is calculated based on anticipated changes in unpaved road locations. It is assumed that 100% of the unpaved road acreage is actively disturbed as defined by MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.L. for Wind Erosion from Unpaved Operational Areas and Roads (i.e. disturbed once per day). Wind erosion is abated by chemical suppressant. This AQIA assumes a central location in each area for modeling purposes to represent the location of wind erosion emissions (grouped with similar sources).
Basis of Calculation	Based on the acreage disturbed.	Same as baseline calculation basis.
Emission Factor	Unpaved road wind erosion emission factors are calculated based on AP 42 Section 13.2.5, Industrial Wind Erosion, using windspeed and precipitation data from Lehigh's meteorological tower for the baseline years of 2008-2017. Particle size multipliers for PM_{10} and $PM_{2.5}$ are from AP 42 Section 13.2.5.	Same as baseline factor.
Control Efficiency	Controls include application of water sprays to the road surface and cross-wind ridges for quarry roads located below grade. Control efficiencies come from AP-42 Section 13.2.2 and WRAP Fugitive Dust Handbook, respectively.	Same as baseline control efficiency except water sprays are replaced with chemical dust suppressants using the control efficiency in AP-42 Section 13.2.2.

Table 4-9: Emission Calculation Methodology – Unpaved Road Dust Entrainment (On Road Vehicles)

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	In the 10-year baseline period, on road vehicles traveled an average of 215,600 miles per year on unpaved roads based on historical records. Dust entrainment is abated by water spray. Unpaved road dust entrainment emissions are located on each road segment where the emissions occur for modeling purposes (grouped with similar sources).	For the proposed Project scenario, on road vehicles are assumed to travel 98,000 miles per year on unpaved roads based on projected mining operations and reclamation activities, including onsite transport of imported soil. The reduction in unpaved road miles travelled is primarily due to the reduction in employees and contractors on-site during the proposed Project. Dust entrainment is abated by chemical suppressant. Unpaved road dust entrainment emissions are located on each road segment where the emissions occur for modeling purposes (grouped with similar sources).
Basis of Calculation	Based on total miles traveled, average vehicle weight, and road silt content.	Same as baseline calculation basis.
Emission Factor	The emission factor in lb/mile is calculated in accordance with AP-42 Section 13.2.2, Unpaved Roads. The road silt content is consistent with the 2008 CEIR and the 2012 Reclamation Plan Amendment. Constants used in the calculation are from AP-42 Table 13.2.2-2 for Industrial Roads. Vehicle weight is based on vehicles used.	Same as baseline factor.
Control Efficiency	Controls include watering of unpaved roads and limiting speeds to below 15 mph. Values are from BAAQMD Permit Handbook Section 11.7 and Table 3-7 of the WRAP Fugitive Dust Handbook, respectively.	Same as baseline controls except watering is replaced with application of chemical dust suppressant. Value for chemical dust suppressant control is from AP-42 Section 13.2.2.

Table 4-10: Emission Calculation Methodology – Unpaved Road Dust Entrainment (Off Road Vehicles)

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	In the 10-year baseline period, off road vehicles traveled an average of 361,149 miles per year on unpaved roads based on historical records of operating times. Dust entrainment is abated by water spray. Unpaved road dust entrainment emissions are located on each road segment where the emissions occur for modeling purposes (grouped with similar sources).	For the proposed Project scenario, off road vehicles are assumed to travel 823,154 miles per year on unpaved roads based on projected mining operations and reclamation activities, including onsite transport of imported soil from point of delivery (near rock plant) to the North Quarry for placement as backfill. The increase in unpaved road miles travelled is primarily due to the increase in material movement from imported soil during the proposed Project. Dust entrainment is abated by chemical suppressant. Unpaved road dust entrainment emissions are located on each road segment where the emissions occur for modeling purposes (grouped with similar sources).
Basis of Calculation	Based on total miles traveled, average vehicle weight, and road silt content.	Same as baseline calculation basis.
Emission Factor	The emission factor in lb/mile is calculated in accordance with AP-42 Section 13.2.2, Unpaved Roads. The road silt content is consistent with the 2008 CEIR and the 2012 Reclamation Plan Amendment. Constants used in the calculation are from AP-42 Table 13.2.2-2 for Industrial Roads. Vehicle weight is based on vehicles used.	Same as baseline factor.
Control Efficiency	Controls include watering of unpaved roads and limiting speeds to below 15 mph. Values are from BAAQMD Permit Handbook Section 11.7 and Table 3-7 of the WRAP Fugitive Dust Handbook, respectively.	Same as baseline controls except watering is replaced with application of chemical dust suppressant. Value for chemical dust suppressant is from AP-42 Section 13.2.2.

Table 4-11: Emission Calculation Methodology – Paved Road Dust Entrainment

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	During the 10-year baseline period, a total of 761,334 miles/year were traveled on paved roads by on and off road vehicles within and outside of Lehigh's property boundary. The vehicles include passenger vehicles for employee commutes, delivery vehicles for fuel and rock plant products, and 45 ton haul trucks traveling on paved plant roads. In this AQIA, the paved road emissions are allocated to each road segment where the emissions occurred for modeling purposes (grouped with similar sources).	In the proposed Project scenario for the worst-case year, a total of 4,673,312 miles/year are assumed to be traveled on paved roads by on and off road vehicles within and outside of the facility. The vehicles include those in the baseline scenario as well as the travel of trucks delivering imported soil. In this AQIA, the paved road emissions are allocated to each road segment where the emissions occur for modeling purposes (grouped with similar sources).
Basis of Calculation	Based on VMT.	Same as baseline calculation basis.
Emission Factor	Emission factors are calculated in accordance with AP-42 Section 13.2.1, Paved Roads. Average vehicle weight is calculated as the distance weighted average of vehicle weights. Road silt loading and VMT fraction for various road types is from CARB Entrained Dust from Paved Road Travel: Emission Estimation Methodology Background Document, November 2016, Table 7 – silt loadings for Santa Clara County. Precipitation data is the average value from Lehigh's meteorological tower for the baseline period. The particle size multiplier for PM_{10} and $PM_{2.5}$ are from AP-42 Table 13.2.1-1.	Same as baseline factors.
Control Efficiency	No controls are provided for paved roads outside of the facility boundary. Though Lehigh is required to perform street sweeping on certain sections of public roads in its BAAQMD FDCP, it is conservatively assumed that these impacts are accounted for in the county wide silt loading data. For on-site paved roads, controls for limiting vehicle speed to 15 mph or less and sweeping are applied. Control values are from WRAP Fugitive Dust Handbook and MDAQMD Emission Inventory Guidance for Material Handling Industries, Section J.	Same as baseline control efficiency.

Table 4-12: Emission Calculation Methodology – Fuel Storage Operations

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	During the 10-year baseline period, the diesel and gasoline storage tanks saw an average of 2,607,930 gallons of diesel and 14,373 gallons of gasoline per year. These fuels are used to fill on-site haul trucks and medium duty vehicles (e.g. pickup trucks) for use on-site. Employee vehicles are not fueled on-site. For modeling purposes, the fuel storage emission are grouped with sources located in a similar area.	In the proposed Project scenario, the diesel and gasoline storage tanks saw an average of 3,157,672 gallons of diesel and 6,533 gallons of gasoline per year. These fuels are used to fill on-site haul trucks and medium duty vehicles (e.g. pickup trucks) for use on-site. Employee vehicles and soil import haul trucks are not fueled on-site. For modeling purposes, the fuel storage emission are grouped with sources located in a similar area.
Basis of Calculation	Based on tank throughput and tank parameters. Fuel throughput is calculated based on VMT and fuel efficiency for each type of vehicle. Calculations are performed using Trinity's Tank Emission Evaluation Tool which applies AP-42 Chapter 7 equations.	Same as baseline calculation basis.
Emission Factor	Emission factors and equations for tank components come from AP-42 Section 7.1, Organic Liquid Storage Tanks, and are applied within Trinity's Tank Emission Evaluation Tool.	Same as baseline factor.
Control Efficiency	No controls are applied for the tanks.	Same as baseline control efficiency.

Table 4-13: Emission Calculation Methodology – Fuel Dispensing Operations

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	During the 10-year baseline period, Lehigh dispensed an average of 2,607,930 gallons of diesel and 14,373 gallons of gasoline per year. These fuels are used to fill on-site haul trucks and medium duty vehicles (e.g. pickup trucks) for use on-site. Employee vehicles are not fueled on-site. For modeling purposes, the fuel dispensing emissions are grouped with sources located in a similar area.	In the proposed Project scenario, Lehigh dispenses an average of 3,157,672 gallons of diesel and 6,533 gallons of gasoline per year. These fuels are used to fill on-site haul trucks and medium duty vehicles (e.g. pickup trucks) for use on-site. Employee vehicles and soil import haul trucks are not fueled on-site. For modeling purposes, the fuel dispensing emissions are grouped with sources located in a similar area.
Basis of Calculation	Based on fuel throughput. Fuel throughput is calculated based on VMT and fuel efficiency for each type of vehicle.	Same as baseline calculation basis.
Emission Factor	The emission factor for diesel comes from SCQAMD "Supplemental Instructions of Liquid Organic Storage Tanks" (February 2017) which assumes VOC = ROG. The emission factor for gasoline comes from CARB's "Vapor Recovery Certification Procedure CP-201: Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities" (amended April 23, 2015) which assumes hydrocarbon (HC)= ROG.	Same as baseline factor.
Control Efficiency	No controls are applied for fuel dispensing.	Same as baseline control efficiency.

Table 4-14: Emission Calculation Methodology – Off Road Vehicle Fuel Combustion

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	During the 10-year baseline period, off road vehicles operated for an average of 87,981 hours per year in support of mining operations. Off road vehicles include, but are not limited to, haul trucks, bulldozers, excavators, graders, and water trucks. Off road vehicles operated primarily in the North Quarry and WMSA with secondary operations in the rock plant area. In this AQIA, the off road diesel combustion emissions are allocated to each road segment where the emissions occurred for modeling purposes (grouped with similar sources).	In the proposed Project scenario, off road vehicles are assumed to operate for an average of 132,328 hours per year in support of mining and reclamation operations. Off road vehicles include, but are not limited to, haul trucks, bulldozers, excavators, graders, and water trucks. Off road vehicles operated primarily in the North Quarry with secondary operations in the WMSA and rock plant area. In this AQIA, the off road diesel combustion emissions are allocated to each road segment where the emissions occurred for modeling purposes (grouped with similar sources).
Basis of Calculation	Based on engine horsepower, model year, hours of operation, and load factor. Load factors from ARB's OFFROAD2017 model.	Same as baseline calculation basis.
Emission Factor	Emission factors for criteria pollutants except SO_2 come from ARB's OFFROAD2017 model. The emission factor for SO_2 is based on fuel sulfur content and brake-specific fuel consumption from Table A2 of the EPA report on Exhaust and Crankcase Emission Factors for Non-road Engine Modeling – Compression-Ignition. All PM emissions are assumed to be PM_{10} emissions. Emission Factors for GHGs are based on the Climate Registry's 2018 default emission factors (May 2018), Tables 13.1 (US Default CO_2 Emission Factors for Transport Fuels) and 13.7 (US Default Factors for Calculating CH_4 and N_2O Emissions from Non-Highway Vehicles) for Construction/Mining Equipment. The calculation year is chosen as 2013 for equipment with model years of 2013 and prior, while equipment manufactured after 2013 has a calculation year equal to its model year. Cumulative hours used to calculate emission factor degradation are calculated based on the model and calculation years.	Same as baseline factor except calculation year is 2023 (representing Year 3 following approval of the proposed project) for all equipment; therefore, a newer fleet is reflected.
Control Efficiency	No add-on controls are used for vehicle fuel combustion of off road vehicles.	Same as baseline control efficiency.

Table 4-15: Emission Calculation Methodology – On Road Vehicle Fuel Combustion

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	During the 10-year baseline period, on road vehicles traveled an average of 973,844 miles per year. On road vehicles during the baseline period were medium duty plant vehicles, heavy duty fuel and rock plant delivery vehicles, and light duty passenger vehicles for employee commuting. In this AQIA, the on road vehicle fuel combustion emissions are allocated to each road segment where the emissions occurred for modeling purposes (grouped with similar sources).	In the proposed Project scenario, on road vehicles traveled an average of 4,690,978 miles per year. On road vehicles for the proposed project are inclusive of those in the baseline as well as imported soil delivery trucks. In this AQIA, the on road fuel combustion emissions are allocated to each road segment where the emissions occurred for modeling purposes (grouped with similar sources).
Basis of Calculation	Based on VMT.	Same as baseline calculation basis.
Emission Factor	Emission factors are calculated in ARB's EMFAC 2017 model as the average of each vehicle and fuel type for the baseline years of 2008 – 2017 for Santa Clara County.	Same as baseline factor except the average is for years 2021 – 2050, the proposed duration of the project.
Control Efficiency	No add-on controls are used for the combustion emissions of on road vehicles.	Same as baseline control efficiency.

Table 4-16: Emission Calculation Methodology – Dewatering System Operations

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	During the 10-year baseline period, a system of diesel engines totaling 328 bhp power dewatering pumps to move water out of the North Quarry. The pumps are located at the bottom of the North Quarry pit and on the North Quarry rim.	In the proposed Project scenario, the dewatering system consists of 1,193 bhp in diesel engine power. Two pumps are located in the North Quarry pit and one is located on the North Quarry rim. The ratio of electric to diesel power supply for dewatering pumps is dependent on the electricity availability at the location where the power is needed.
Basis of Calculation	Based on engine horsepower and operating hours. Engine bhp is estimated assuming a 70% pump engine efficiency where only a pump hp is available.	Same as baseline calculation basis.
Emission Factor	Emission factors are from AP-42 Section 3.3, Gasoline and Diesel Industrial Engines, Table 3.3-1. GHG emission factors are based on the Climate Registry's 2018 default emission factors (May 2018), Tables 13.1 (U.S. Default CO_2 Emission Factors for Transport Fuels) and 13.7 (US Default Factors for Calculating CH_4 and N_2O Emissions from Non-Highway Vehicles) for Construction/Mining Equipment.	Same as baseline factors, but includes emission factors for Tier 3 Engines (as two recently installed engines meet Tier 3 requirements) taken from the Tier 3 Exhaust Emission Standards in Table 1 of 40 CFR 89.112. Emissions from NO_X+NMHC are split 95% NO_x to 5% NMHC per BAAQMD Policy "CARB Emission Factors for CI Diesel Engines - Percent HC in Relation to NMHC + NO_X."
Control Efficiency	No add-on controls are used for the dewatering system diesel engines.	Same as baseline control efficiency.

Table 4-17: Emission Calculation Methodology – Rock Plant Operations

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	During the 10-year baseline period, the rock plant processed an average of 445,846 tons of material per year. The baseline average throughput includes years where the rock plant was idle. The rock plant received material from the North Quarry and processed it to various aggregate products which were sold to customers. In this AQIA, rock plant equipment emissions were represented in a central location within the rock plant (grouped with similar sources).	During the proposed Project scenario, the rock plant is assumed to process 495,443 tons of material per year. The rock plant is reconfigured in the proposed Project scenario based on the BAAQMD ATC Application #29811. Rock plant equipment emissions are not grouped for the proposed Project scenario for modeling purposes, and instead reflect model input parameters consistent with Application #29811.
Basis of Calculation	Based on material throughput.	Same as baseline calculation basis.
Emission Factor	Emission factors from AP-42 Section 11.9.2, Crushed Stone Processing and Pulverized Mineral Processing, Table 11.19.2-2 for aggregate and AP-42 Table 11.12-2 for sand. Grain loading rates and flow rates for dust collectors from facility records and permits. Where $PM_{2.5}$ emission factors are not available, it is assume $PM_{2.5}$ is 15% of PM_{10} in accordance with BAAQMD Permit Handbook Chapter 11.7.	Same as baseline factors, as applicable.
Control Efficiency	Controls include dust collectors for various emission points which are accounted for in the emission factors.	Controls include use of water spray.

Table 4-18: Emission Calculation Methodology – Electricity Use

Parameter	Baseline Scenario	Proposed Project Scenario
Activity Summary	During the 10-year baseline period, an average of 4,289,495 kWh of electricity was used per year to power the dewatering system electric pumps, electric rock plant equipment, and the quarry office.	During the proposed Project scenario, it is estimated that an average of 6,321,921 kWh of electricity will be used per year to power the dewatering system's electric pumps, the rock plant equipment, and the quarry office.
Basis of Calculation	Based on power consumption. The dewatering system electricity use is scaled the 2011 Reclamation Plan Amendment with the electric pump horsepower. The quarry office electricity conversion factor is based on the Electricity Energy Intensity (EEI) value of 15.8 kW-hr/ft^2-year from the 2012 Commercial Buildings Energy Consumption Survey (CBECS): 2012 Detailed Tables, US DOE, EIA, Table C19 on data for office buildings, Pacific Census Division. Electricity use for the rock plant is based on SAP records of electricity usage.	Same as baseline calculation basis except the rock plant electricity use is estimated based on proposed equipment power ratings.
Emission Factor	Emission factors for GHGs are taken from U.S. eGRID Summary Table 1: Subregion Output Emission Rates (eGRID2016), data for Western Electricity Coordinating Council (WECC) California, CAMX Subregion.	Same as baseline factor.
Control Efficiency	No controls are applied for electricity use.	Same as baseline control efficiency.

4.2.3. Project Operational Emissions

Table 4-19 summarizes estimated daily and annual for the worst-case, highest emission year operational emissions associated with the proposed Project. The detailed calculations are provided in Appendix A. It is important to note that the Project emissions shown here present the highest emissions year of future operations under the proposed Project, assuming the combined emissions of several various site activity components. In all other years of future operations under the proposed Project, emissions would be less than those presented here.

Table 4-19: Project Operational Emissions (Worst-case Year)

Activity	Pollutant									
	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_x	CO_2	CH_4	N_2O	CO_2e
Daily Emissions	**Pounds per Day**									
Drilling	3.23	3.23	0	0	0	0	For this analysis and comparison to thresholds, GHG emissions are calculated on an annual basis only.			
Blasting	0.11	0.11	568.8	144.3	0	0				
Bulldozing, Scraping & Grading	2.64	0.40	0	0	0	0				
Material Handling	15.71	2.36	0	0	0	0				
Wind Erosion	431.2	64.68	0	0	0	0				
Dust Entrainment (Unpaved Roads)	350.2	35.02	0	0	0	0				
Dust Entrainment (Paved Roads)	63.57	15.60	0	0	0	0				
Rock Plant Equipment	3.95	0.50	0	0	0	0				
Fuel Storage	0	0	0	0	0.26	0				
Fuel Dispensing	0	0	0	0	0.31	0				
Off Road Vehicle Fuel Combustion	5.44	5.02	203.8	64.05	28.13	0.86				
On Road Vehicle Fuel Combustion	0.002	0.001	0.0137	0.055	0.0012	0.0002				
Dewatering System	14.23	14.23	167.12	242.5	15.03	58.70				
Electricity Use	N/A – applicable to GHG analysis only									
Total Average Daily Emissions	**890.3**	**141.1**	**939.8**	**450.9**	**43.7**	**59.6**				
Annual Emissions	**Tons per Year**						**Metric Tons per Year**			
Drilling	0.21	0.21	0	0	0	0	0	0	0	0
Blasting	0.01	0.01	36.89	9.36	0	0	169.84	0	0	169.84
Bulldozing, Scraping & Grading	0.29	0.04	0	0	0	0	0	0	0	0
Material Handling	1.74	0.26	0	0	0	0	0	0	0	0
Wind Erosion	78.70	11.80	0	0	0	0	0	0	0	0
Dust Entrainment (Unpaved Roads)	38.70	3.87	0	0	0	0	0	0	0	0
Dust Entrainment (Paved Roads)	9.33	2.29	0	0	0	0	0	0	0	0
Rock Plant Equipment	0.70	0.09	0	0	0	0	0	0	0	0
Fuel Storage	0	0	0	0	0.03	0	0	0	0	0
Fuel Dispensing	0	0	0	0	0.03	0	0	0	0	0
Off Road Vehicle Fuel Combustion	0.60	0.56	22.52	7.08	3.11	0.10	9,430	0.57	0.25	9,518.7
On Road Vehicle Fuel Combustion	0.0003	0.0001	0.002	0.008	0.0002	0.00004	3.40	0.00001	0.001	3.56
Dewatering System	1.73	1.73	20.33	29.51	1.83	7.14	4,541	0.26	0.12	4,582
Electricity Use	N/A – applicable to GHG analysis only						1,514	0.09	0.01	1,520
Total Maximum Annual Emissions	**132.0**	**20.9**	**79.8**	**46.0**	**5.0**	**7.2**	**15,658**	**0.9**	**0.4**	**15,794**

Note: Total values may not sum precisely due to rounding.

4.2.4. Baseline Operational Emissions

Detailed emission calculations are included as Appendix B. Table 4-20 summarizes the resulting baseline operational emissions.

Table 4-20: Baseline Operational Emissions

Activity	Pollutant									
	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_x	CO_2	CH_4	N_2O	CO_2e
Daily Emissions	**Pounds per Day**									
Drilling	3.23	3.23	0	0	0	0	For this analysis and comparison to thresholds, GHG emissions are calculated on an annual basis only.			
Blasting	0.11	0.11	568.8	144.3	0	0				
Bulldozing, Scraping & Grading	0.78	0.12	0	0	0	0				
Material Handling	13.89	2.08	0	0	0	0				
Wind Erosion	410.2	61.53	0	0	0	0				
Dust Entrainment (Unpaved Roads)	352.9	35.29	0	0	0	0				
Dust Entrainment (Paved Roads)	7.50	1.84	0	0	0	0				
Rock Plant Equipment	57.78	8.05	0	0	0	0				
Fuel Storage	0	0	0	0	0.09	0				
Fuel Dispensing	0	0	0	0	0.34	0				
Off Road Vehicle Fuel Combustion	14.84	13.69	190.4	447.7	26.34	0.91				
On Road Vehicle Fuel Combustion	1.92	1.55	19.91	41.85	4.29	0.07				
Dewatering System	17.31	17.31	52.56	243.9	19.78	16.13				
Electricity Use	N/A – applicable to GHG analysis only									
Total Average Daily Emissions	**880.5**	**144.8**	**831.6**	**877.8**	**50.8**	**17.1**				
Annual Emissions	**Tons per Year**						**Metric Tons per Year**			
Drilling	0.13	0.13	0	0	0	0	0	0	0	0
Blasting & Explosive Detonation	0.005	0.005	22.60	5.73	0	0	104.0	0	0	104.0
Bulldozing, Scraping & Grading	0.09	0.01	0	0	0	0	0	0	0	0
Material Handling	1.28	0.19	0	0	0	0	0	0	0	0
Wind Erosion	74.86	11.23	0	0	0	0	0	0	0	0
Dust Entrainment (Unpaved Roads)	40.59	4.06	0	0	0	0	0	0	0	0
Dust Entrainment (Paved Roads)	1.15	0.28	0	0	0	0	0	0	0	0
Rock Plant Equipment	2.69	0.37	0	0	0	0	0	0	0	0
Fuel Storage	0	0	0	0	0.01	0	0	0	0	0
Fuel Dispensing	0	0	0	0	0.04	0	0	0	0	0
Off Road Vehicle Fuel Combustion	1.71	1.57	21.90	51.48	3.03	0.10	10,273	0.61	0.28	10,371
On Road Vehicle Fuel Combustion	0.33	0.27	2.91	7.50	0.70	0.01	1,125	0.04	0.16	1,175
Dewatering System	2.20	2.20	6.68	31.02	2.52	2.05	1,304	0.07	0.03	1,316
Electricity Use	N/A – applicable to GHG analysis only						1,027	0.06	0.01	1,031
Total Average Annual Emissions	**125.0**	**20.3**	**54.1**	**95.7**	**6.3**	**2.2**	**13,834**	**0.8**	**0.5**	**13,997**

Note: Total values may not sum precisely due to rounding.

4.2.5. Net Operational Emissions

Using the emissions estimates for the proposed Project and baseline conditions as discussed above, the "net" change in emissions resulting from the proposed Project were calculated. Table 4-21 provides the net change for each of the emissions categories and Table 4-22 summarizes the net operational emissions and compares the net change to thresholds of significance. As shown in Table 4-22, the net emissions increase due to the proposed Project would not exceed the significance thresholds for operational emissions of criteria air pollutant or GHG emissions.

Table 4-21: Net Operational Emissions by Activity

Activity	Pollutant									
	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_x	CO_2	CH_4	N_2O	CO_2e
Daily Emissions	**Pounds per Day**									
Drilling	0	0	0	0	0	0	For this analysis and comparison to thresholds, GHG emissions are calculated on an annual basis only.			
Blasting	0	0	0	0	0	0				
Bulldozing, Scraping & Grading	1.85	0.28	0	0	0	0				
Material Handling	1.82	0.27	0	0	0	0				
Wind Erosion	21.02	3.15	0	0	0	0				
Dust Entrainment (Unpaved Roads)	-2.71	-0.27	0	0	0	0				
Dust Entrainment (Paved Roads)	56.07	13.76	0	0	0	0				
Rock Plant Equipment	-53.83	-7.55	0	0	0	0				
Fuel Storage	0	0	0	0	0.17	0				
Fuel Dispensing	0	0	0	0	-0.03	0				
Off Road Vehicle Fuel Combustion	-9.39	-8.67	13.45	-383.6	1.79	-0.04				
On Road Vehicle Fuel Combustion	-1.92	-1.55	-19.89	-41.79	-4.28	-0.07				
Dewatering System	-3.09	-3.09	114.6	-1.41	-4.75	42.57				
Annual Emissions	**Tons per Year**						**Metric Tons per Year**			
Drilling	0.08	0.08	0	0	0	0	0	0	0	0
Blasting & Explosive Detonation	0.003	0.003	14.29	3.63	0	0	65.81	0	0	65.81
Bulldozing, Scraping & Grading	0.20	0.03	0	0	0	0	0	0	0	0
Material Handling	0.45	0.07	0	0	0	0	0	0	0	0
Wind Erosion	3.84	0.58	0	0	0	0	0	0	0	0
Dust Entrainment (Unpaved Roads)	-1.89	-0.19	0	0	0	0	0	0	0	0
Dust Entrainment (Paved Roads)	8.18	2.01	0	0	0	0	0	0	0	0
Rock Plant Equipment	-1.99	-0.29	0	0	0	0	0	0	0	0
Fuel Storage	0	0	0	0	0.02	0	0	0	0	0
Fuel Dispensing	0	0	0	0	0.00	0	0	0	0	0
Off Road Vehicle Fuel Combustion	-1.10	-1.02	0.63	-44.41	0.08	-0.01	-843.1	-0.05	-0.03	-852.2
On Road Vehicle Fuel Combustion	-0.33	-0.27	-2.91	-7.49	-0.70	-0.01	-1,122	-0.04	-0.16	-1,171
Dewatering System	-0.47	-0.47	13.65	-1.51	-0.69	5.09	3,237	0.18	0.08	3,266
Electricity Use	N/A – applicable to GHG analysis only						486.7	0.03	0.0004	488.5

Table 4-22: Net Operational Emissions Summary and Comparison to Significance Thresholds

Activity	Pollutant									
	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_x	CO_2	CH_4	N_2O	CO_2e
	Pounds per Day									
Baseline Average Daily Emissions	880.5	144.8	831.6	877.8	50.8	17.1	For this analysis and comparison to thresholds, GHG emissions are calculated on an annual basis only.			
Project Average Daily Emissions (worst-case year)	890.3	141.1	939.8	450.9	43.7	59.6				
Net Change in Average Daily Emissions	**9.8**	**-3.7**	**108.1**	**-426.8**	**-7.1**	**42.5**				
Significance Threshold	82	54	[see note a]	54	54	[see note b]				
Significant Impact?	**No**	**No**	**No**	**No**	**No**	**No**				
Activity	Tons per Year						Metric Tons per Year			
Baseline Annual Emissions	125.0	20.3	54.1	95.7	6.3	2.2	13,834	0.8	0.5	13,997
Project Annual Emissions (worst-case year)	132.0	20.9	79.8	46.0	5.0	7.2	15,658	0.9	0.4	15,794
Net Change in Annual Emissions	**7.0**	**0.5**	**25.7**	**-49.8**	**-1.3**	**5.1**	**1,824**	**0.1**	**-0.1**	**1,797**
Significance Thresholds	15	10	[see note a]	10	10	[see note b]	[see note c]	[see note c]	[see note c]	10,000
Significant Impact?	**No**	**No**	**No**	**No**	**No**	**No**	[see note c]	[see note c]	[see note c]	**No**

Notes:
a. CO is evaluated in this AQIA based on screening criteria identified in Table 4-1.
b. The Bay Area is in attainment of the state and national air quality standards for SO_2, so a CEQA threshold of significance has not been established by the BAAQMD.
c. Thresholds are not established for individual GHGs. See CO_2e column for total GHG emissions compared to CO_2e threshold.

4.3. PROJECT HEALTH RISK

This section presents the evaluation of potential health risks associated with TACs associated with the proposed Project. The primary air toxic sources associated with both existing operations and the proposed Project is the emission of on-site diesel equipment, diesel and gasoline vehicle trips, diesel and gasoline fuel storage and dispensing, fugitive dust from mining operations, material handling, unpaved and paved road vehicle travel and wind erosion. AERMOD dispersion modeling with Hot Spots Analysis and Reporting Program (HARP), was used in this AQIA to estimate carcinogenic, chronic, and acute health risk at residential and sensitive receptors as a result of this the net change in emissions associated with the Project. The analysis concludes that the health risk is below BAAQMD's HRA thresholds. The increased risk is evaluated on a per-receptor basis using the results from HRAs conducted for both the baseline and proposed Project emissions scenarios. The results support a less than significant air quality impact on air toxic pollutant emissions. The following sections detail the parameters relevant to the air dispersion model and HRA. It is important to note that the Project emissions used for the HRA presented here are based on the highest emissions year of future operations under the proposed Project, assuming the combined emissions of several various site activity components. In all other years of future operations under the Project, emissions would be less. Nevertheless, the health risk modeling input for the Project uses the worst case emissions year and applies that emission rate to the multi-year health risk modeling

exposure, therefore, overstating the actual health risk of the Project because the lower emissions that would occur in other years are not factored into the model.[14] Notwithstanding this very conservative (i.e., tending to overstate effects) approach, the health risk assessment concludes that the Project would not have a significant health risk effect and would actually lower health risk (i.e., result in healthier conditions) as compared to baseline conditions.

4.3.1. Air Dispersion Model

The air quality analysis was conducted according to U.S. EPA guidelines. The AERMOD model (version 18081) was used to calculate ground-level concentrations with the regulatory default parameters.

4.3.2. Coordinate System

The locations of emission sources and receptors are represented in the Universal Transverse Mercator (UTM) coordinate system using the North American Datum 1983 (NAD83) projection. The UTM grid divides the world into coordinates that are measured in north meters (measured from the equator) and east meters (measured from the central meridian of a particular zone, which is set at 500 km).

4.3.3. Terrain Elevations

The terrain elevation for each receptor and emission source is determined using the United States Geological Survey (USGS) 1/3 arc-second National Elevation Dataset (NED). The data, obtained from the USGS, have terrain elevations at 10-meter intervals. The terrain height for each individual modeled receptor and emission source is determined by assigning the interpolated height from the digital terrain elevations surrounding each modeled receptor or emission source.

In addition, the AERMOD terrain preprocessor, AERMAP (version 18081), was used to compute the hill height scales for each receptor. AERMAP searches all NED data points for the terrain height and location that has the greatest influence on each receptor to determine the hill height scale for that receptor. AERMOD then uses the hill height scale in order to select the correct critical dividing streamline and concentration algorithm for each receptor.

4.3.4. Meteorological Data

Meteorological data are provided by CARB for the calendar years 2009 through 2014.[15] Surface data are from the Mineta San Jose International Airport (Station ID 23293; elevation of 15.5 meters); upper air data are from the Oakland International Airport (Station ID 23230). The closest meteorological stations were selected for surface and upper air data.

[14] For residential and sensitive receptors, HARP equates "lifetime" exposure to 30 years of exposure. Operations and reclamation under the proposed Project will occur over approximately 40 years. As compared to the worst-case Year 3 analyzed, subsequent operational phases and reclamation components will have significantly less emissions than the worst case year quantified. Therefore, the HRA conservatively demonstrates lifetime risk by assuming 30 years of exposure to the worst-case year emissions.

[15] CARB meteorological data is accessible online here: https://www.arb.ca.gov/toxics/harp/metfiles2.htm

4.3.5. Building Downwash

Emission sources proximity to nearby structures creates potential for downwash of the emission plume and elevated ground-level concentrations. However, as there are no structures near the point sources, building downwash is not a factor in evaluating the health risk.

4.3.6. Receptors

According to U.S. EPA regulations, "ambient air" is defined as the portion of the atmosphere external to source, to which the public has access. The dispersion modeling concentrations are determined for ambient air locations (i.e., receptors). Lehigh's property boundary is the ambient air boundary for the modeling demonstrations. The following receptors are used to ensure ambient air is protected:

- Boundary receptors with 20-meter spacing;
- A variable density receptor grid ranging from 50-meter spacing in the closest populated areas to less dense spacing of 250-meter intervals, then 1,000-meter intervals extending 10,000 meters from the Project operations; and
- Additional 5-meter spacing dense grid covering specific surrounding residential areas.

Project risk is estimated for the residential or sensitive population maximum exposed individual (MEI), a person that may be located at the receptor location where the highest exposure to toxic air contaminants emitted from a given source or project is predicted. MEI locations are determined for maximum cancer risk, chronic hazard index, and acute hazard index based on exposure to residential and sensitive receptors, such as schools and hospitals where more sensitive populations are likely to be present. Section 3.2.4 provides details regarding the closest sensitive receptors.

4.3.7. Emission Sources

AERMOD allows for emission units to be represented as point, volume, area, or road sources. Emission sources included in the baseline and proposed Project emission calculations and which have the potential to emit TACs are modeled. Refer to Appendix C for a summary of emission unit modeling parameters. Grouped volume sources are created for equipment in the North Quarry, WMSA, rock plant, and the area between the rock plant and North Quarry. Roads are also modeled as road volume sources and grouped based on the vehicle paths. Figures 4-1 and 4-2 demonstrate the model set up. Lehigh's property boundary is indicated as a white line, volume sources are indicated as red and area sources are indicated as light blue.[16]

[16] Note that area and volume sources appear smaller in the model images as the initial lateral dimension is displayed as the side length. The initial lateral dimension is equivalent to the actual source side length divided by 2.15 or 4.3, depending on the source type.

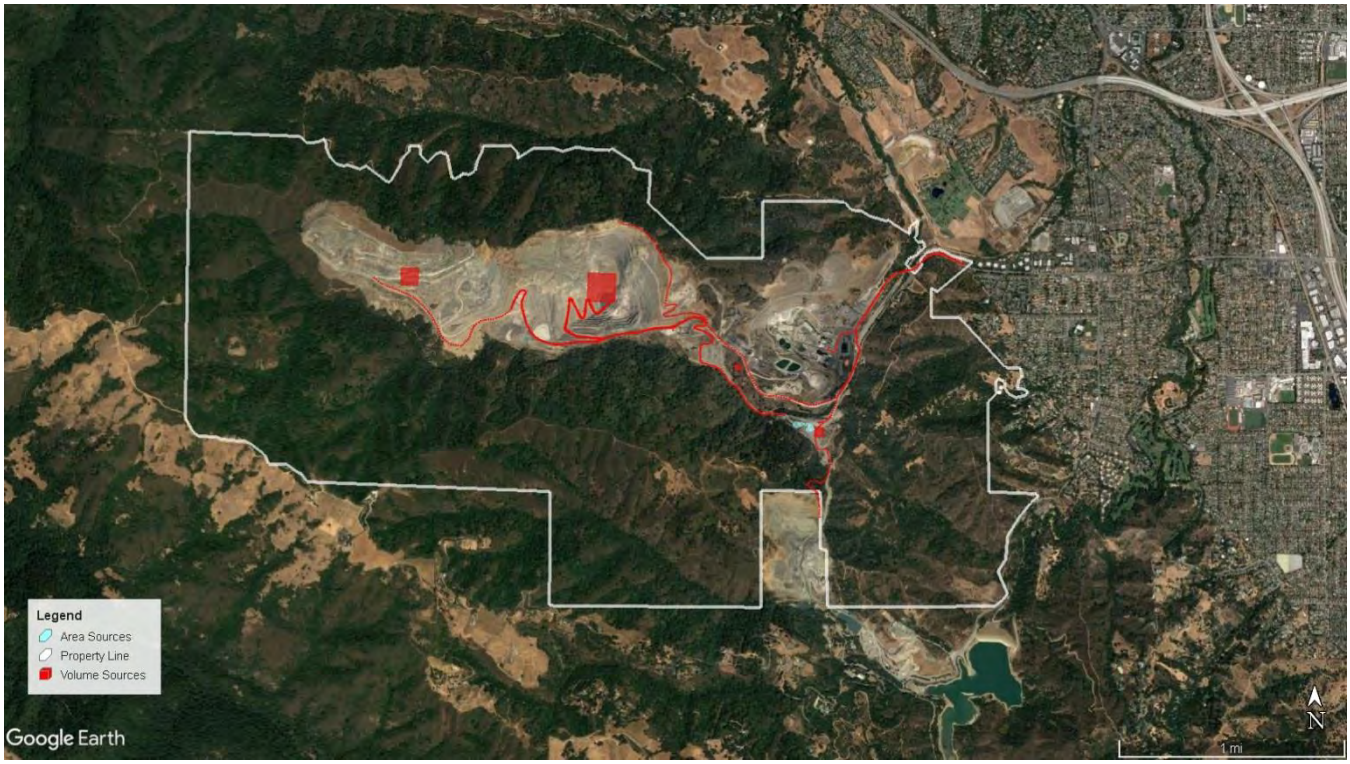

Figure 4-1: Modeled Emission Sources for the Proposed Project

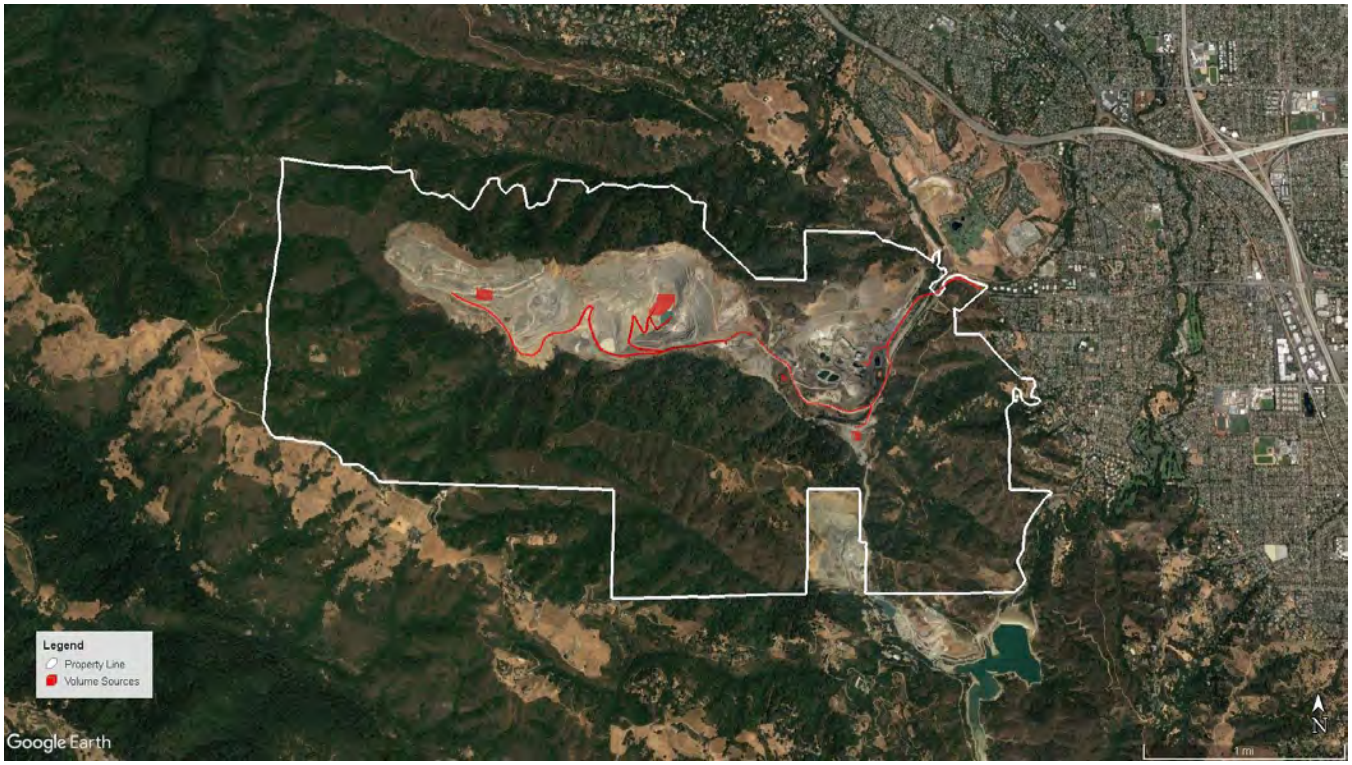

Figure 4-2: Modeled Emission Sources for the Baseline

4.3.8. Emission Rates

For the HRA, the AERMOD dispersion model was run with an equivalent unit emission rate of 1 g/s then scaled with the hourly and annual emission rate for input into the Hot Spots Analysis and Reporting Program, version 19044 (HARP), as reflected in the model inputs summary included in Appendix C. Point sources and individual volume sources are modeled with a unit emission rate of 1 g/s. For area sources, the emission rate was converted into g/s-m^2 based on the source area. For road volume sources, the emission rate was divided equally between the many volume sources making up each overall road source. Refer to Appendix D for a summary of modeled emission rates for each modeled emission source.

For the $PM_{2.5}$ ambient increase determination, AERMOD was run with the annual $PM_{2.5}$ emissions converted to g/s. Refer to Appendix C for a summary of modeled $PM_{2.5}$ emission rates for each modeled emission source.

Emissions from baseline and proposed Project-related sources occurring outside of the facility boundary are included if they occur within 1,000 feet of the boundary.[17]

4.3.9. Exposure Pathways

Results from the air dispersion modeling assessment are combined with applicable TAC emission rates in HARP to model risk and exposure. Exposure pathways are generally classified as primary pathways and secondary pathways. Inhalation is the primary exposure pathway for all modeled sources and substances. For multi-pathway substances, non-inhalation exposure pathways are also evaluated.

Based on the OEHHA guidelines and surrounding land uses, in addition to the inhalation pathway, residential cancer and chronic risk for multi-pathway substances are evaluated for the following exposure pathways: dermal absorption, soil ingestion (deposition rate = 0.05 m/s), and mother's milk.

4.3.10. Air Toxic Modeling Results

As the activities generating emissions in the baseline and proposed Project are not identical in location, separate modeling and risk evaluations are conducted for each scenario. To determine net increased risk, the baseline risk was subtracted from the proposed Project risk for each receptor and the net risk for each residential or sensitive receptor is evaluated against the BAAQMD significance thresholds. The calculated net risk per receptor is included in Appendix D. Figures 4-3, 4-4, and 4-5 show receptors where a net increase is predicted due to the proposed Project for resident cancer risk, chronic risk, and acute risk, respectively. In each figure, green dots show the very limited areas where the modeling of the worst case emissions year suggests that the Project would have a net increase in health risk. In all other modeled locations, including at all residences and sensitive receptors, the Project would result in a net decrease in health risk as compared to baseline conditions.

[17] As advised by Alison Kirk (BAAQMD) to John Harlow (Trinity) with regards to modeling vehicle emissions for CEQA per a December 19, 2018 phone discussion.

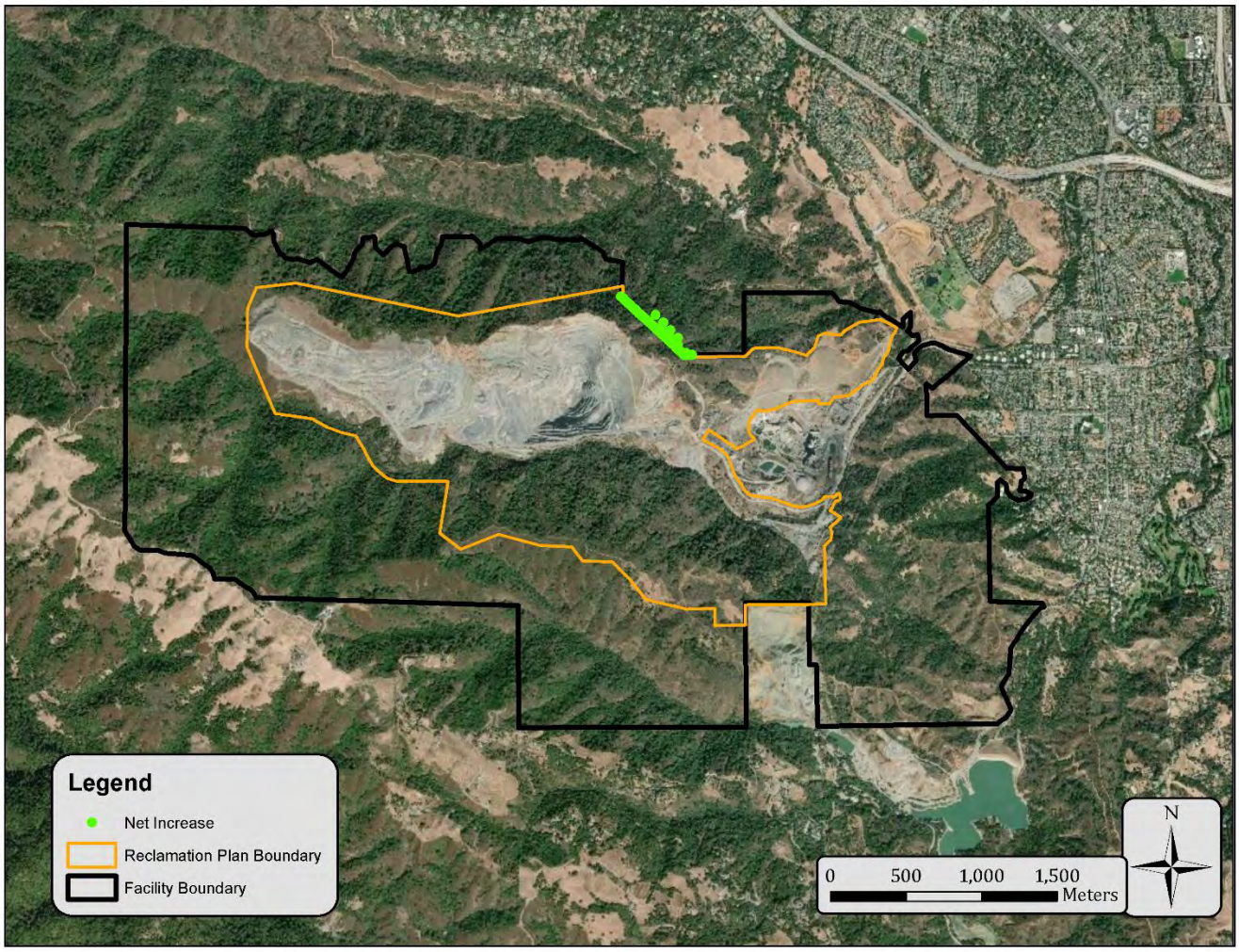

Figure 4-3: Net Residential Scenario Cancer Risk Impacts (All Receptor Types)

As demonstrated in Figure 4-3, the only net increases in carcinogenic health risk are projected to occur near the North Highwall Reserve- a location where activity did not occur during the baseline period. These locations with a net increase in carcinogenic risk are also far from residential and sensitive receptors. At all residential and sensitive receptors, the net carcinogenic health risk shows a decrease as a result of the proposed Project.

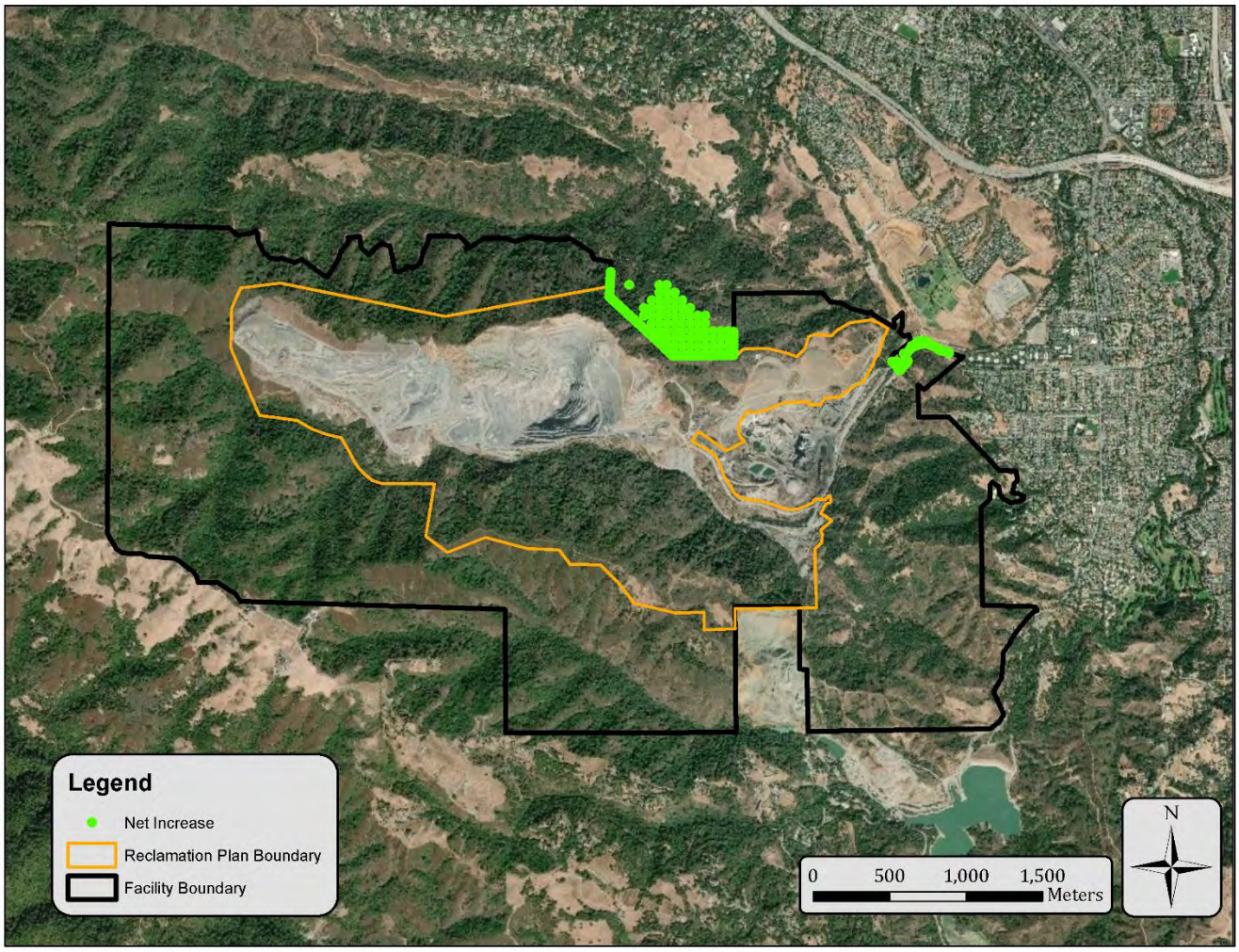

Figure 4-4: Net Residential Scenario Chronic Risk Impacts (All Receptor Types)

As demonstrated in Figure 4-4, the only net increases in chronic risk are projected to occur near the North Highwall Reserve— a location where activity did not occur during the baseline period- and near the site entrance. At all residential and sensitive receptors, the net chronic health risk shows a decrease as a result of the proposed Project.

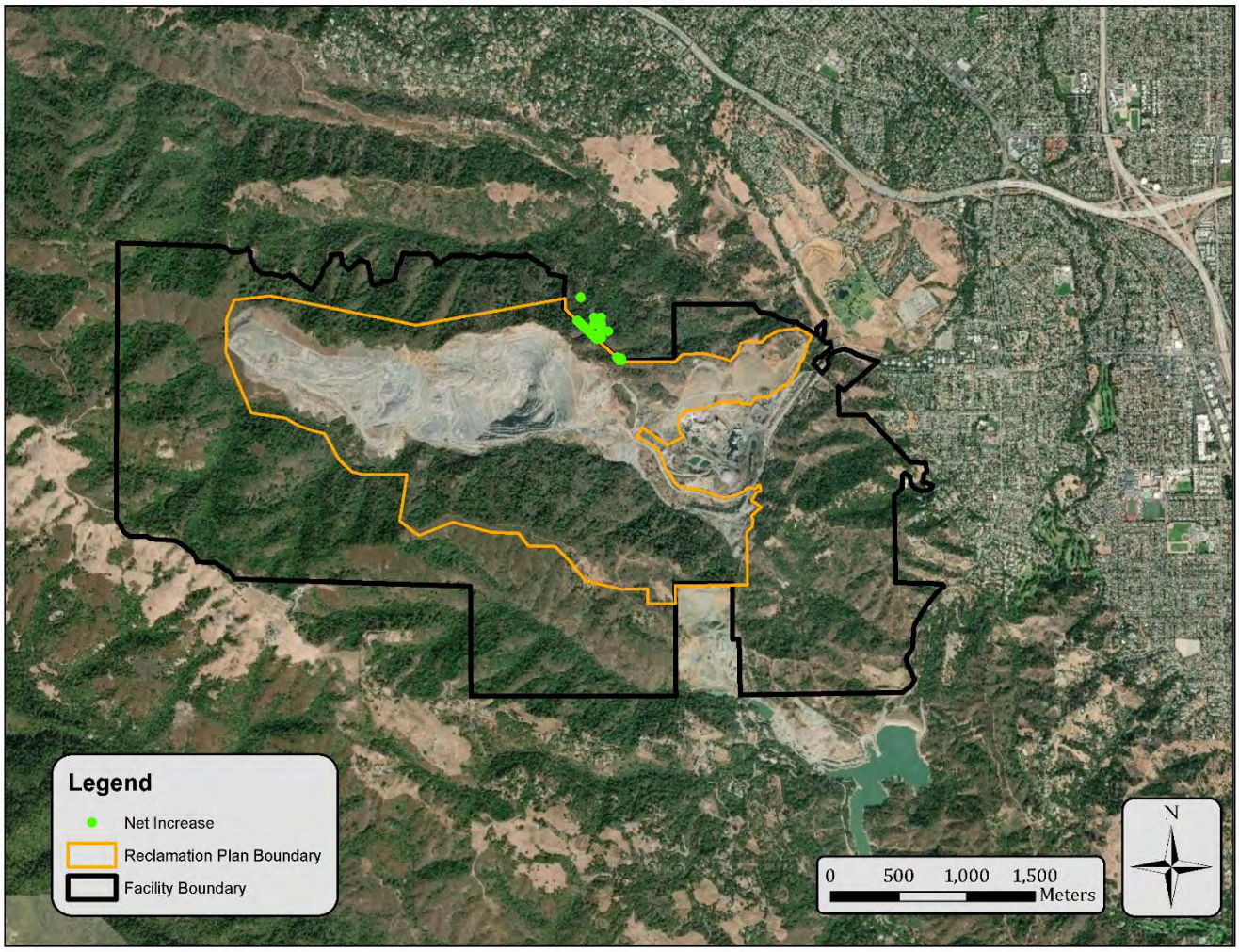

Figure 4-5: Net Residential Scenario Acute Risk Impacts (All Receptor Types)

As demonstrated in Figure 4-5, the only net increases in acute risk are projected to occur near the North Highwall Reserve— a location where activity did not occur during the baseline period. These locations with a net increase in acute risk are also far from residential and sensitive receptors. At all residential and sensitive receptors, the net acute health risk shows a decrease as a result of the proposed Project. To account for the potential short-term recreation exposure, the acute risk scenario also considers potential active recreational exposure in the open space area north of the site. The scenario assumes exposure for an active person (i.e., increased respiratory function) for 1 hour (the duration of acute impact). It should be noted that the limited locations where a net increase in acute risk is predicted are not along designated trails or other use areas of the open space and have limited potential for public exposure. However, the analysis conservatively accounts for potential access and exposure at these locations. The highest acute hazard index for this potential recreation exposure is 0.005421 and well below the significance threshold of 1.0.

All of the receptors for residential cancer, residential acute, and chronic risk scenarios are below the BAAQMD significance thresholds for health risk. The highest residential scenario cancer, chronic, and acute risks are listed in Table 4-23 and shown in Figure 4-6. As shown, the location is north of the North Quarry just outside of the property boundary where no residences or other sensitive receptor land uses are located. As discussed above,

potential 1 hour recreation use in this area is considered and determined to be well below the significance threshold.

The impacts listed in Table 4-23 are the highest impacts at any sensitive receptor. Carcinogenic and chronic risk scenarios are based on the annual emissions profile. As discussed, the Project emissions used for the health risk assessment presented here are based on the worst case (i.e., highest emissions year) of future operations under the proposed Project, assuming the combined emissions of several various site activity components. In all other years of future operations under the Project, emissions would be less. Notwithstanding this very conservative (i.e., tending to overstate effects) approach, the health risk assessment concludes that the Project would not have a significant health risk effect and would actually lower health risk (i.e., result in healthier conditions) as compared to baseline conditions.

Table 4-23: Highest Increase in Health Risk

Risk Type	Receptor ID	Location (UTM Zone 10)	Location Description	Maximum Net Increase in Health Risk
Cancer	All cancer risk values at residential and sensitive receptors decreased as a result of the Project as demonstrated in Figure 4-3.			
Chronic	All chronic hazard values at residential and sensitive receptors decreased as a result of the Project as demonstrated in Figure 4-4.			
Acute	4	579535 m E 4131343 m N (see Figure 4-6)	Assumes one hour of recreational exposure in open space area immediate north of the site boundary where no designated trails or other public use areas are located.	Acute hazard index of 0.005421, and below the significance threshold of 1.

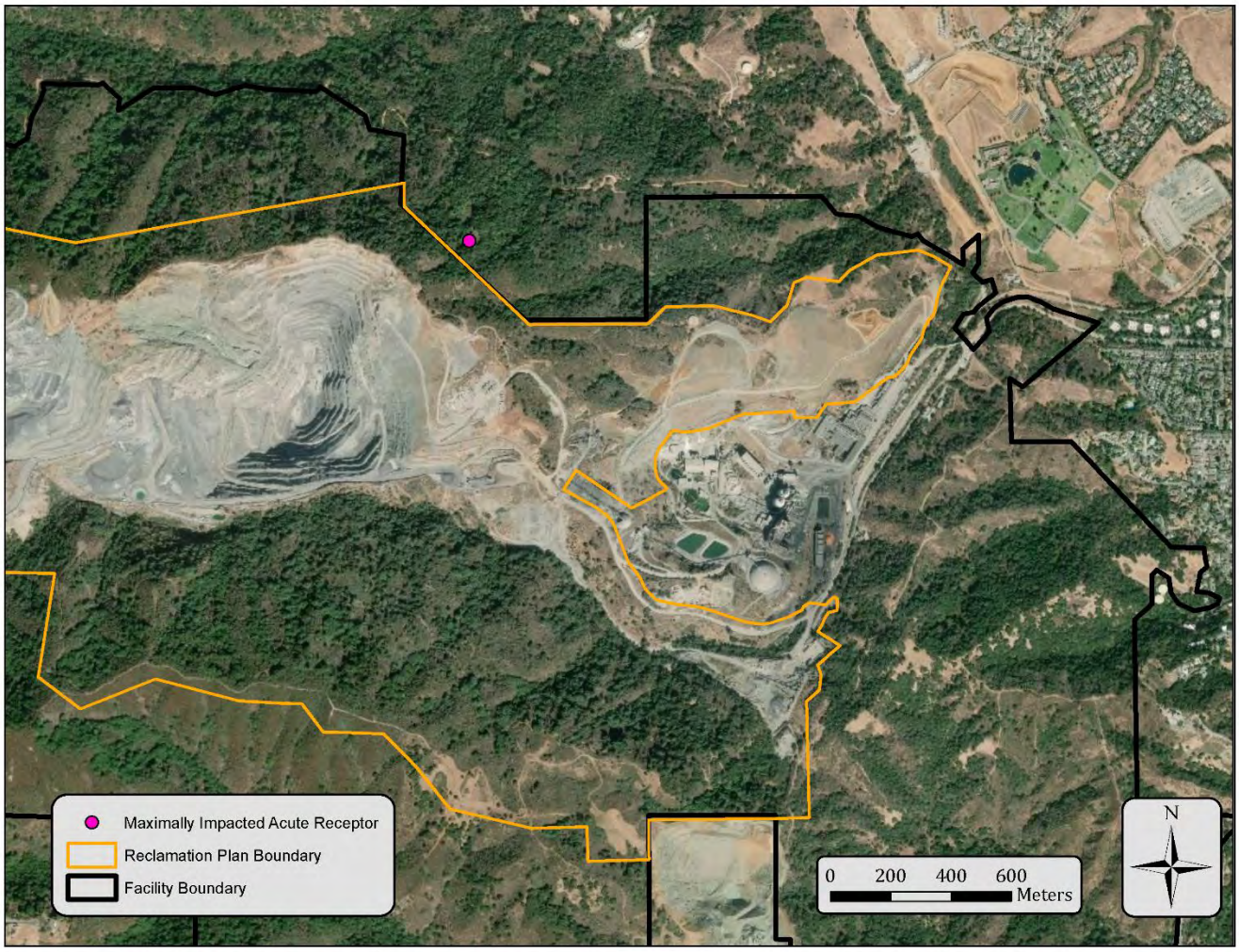

Figure 4-6: Sensitive Receptor with the Highest Increase in Residential Acute Health Risk

4.3.11. $PM_{2.5}$ Modeling Results

Potential increases in ambient $PM_{2.5}$ concentration associated with the proposed Project was determined using a similar method as was done for the HRA. To determine the net increase, the maximum annual $PM_{2.5}$ concentration modeled for the baseline was subtracted from the maximum annual $PM_{2.5}$ concentration modeled for the proposed Project per each residential and sensitive receptor. The calculated net ambient increase of $PM_{2.5}$ is 0.00579 µg/m^3 at the maximally impacted residence is well below the BAAQMD significance threshold of 0.3 µg/m^3.[18] This receptor (ID 9364, 581344.3 m E 4131202 m N UTM Zone 10) is located to the northeast of the property boundary near the entrance to the facility, as shown in Figure 4-7.

[18] Note that consistent with conditions of approval adopted for the 2012 Reclamation Plan, legally binding restrictions have been established for this property precluding its occupancy as a residence. Thus, it is conservatively selected as the maximally impacted residence.



Figure 4-7: Residence with the Highest Increase in Ambient $PM_{2.5}$

4.4. IMPACTS AND MITIGATION RECOMMENDATIONS

The evaluation was prepared in accordance with the standards, procedures, and methodologies established in the BAAQMD CEQA Air Quality Guidelines (BAAQMD 2017b).

4.4.1. Types of Impacts

Direct Impacts. Direct impacts are the result of the project itself (from its operation) in the form of emissions generated at the Project location. For example, exhaust emissions from vehicles and fugitive dust are direct impacts.

Indirect Impacts. Indirect impacts are those that may occur at locations other than the Project location, or on a regional basis. For example, an increase in electricity usage could affect regional air quality.

Cumulative Impacts. Cumulative impacts are the combination of a project's direct and/or indirect impacts along with other existing, proposed, and reasonably foreseeable projects that may be related to the project. For example, the cumulative impact of all operational activity in an air basin may affect regional air quality.

Consistency with Plans and Programs. A project may be considered to have a significant impact if it conflicts with or delays implementation of any applicable air quality attainment or maintenance plan. A project is conforming if it complies with the applicable rules and regulations, complies with all proposed control measures that are not yet adopted from the applicable plan(s), and is consistent with the growth forecasts in the applicable plan(s) (or is directly included in the applicable plan).

4.4.2. Impact: Air Quality Criteria A and D

All impact categories are first screened to determine if they would have no impacts or would clearly be below any applicable significance threshold. The impact criteria described below meet this screening review and do not require further assessment.

- **Potential to conflict with or obstruct implementation of the applicable air quality plan (Criterion A) (No Impact)**.

As shown in Table 4-22, net emissions associated with the proposed Project as compared to baseline conditions would not exceed any applicable significance thresholds and would result in less than significant operational impacts. Thus, the proposed Project would not conflict with or have any adverse impact on implementation of the 2017 Bay Area Clean Air Plan nor would the proposed Project disrupt or hinder implementation of any plan control measures.

- **Potential to result in other emissions (such as those leading to odors) adversely affecting a substantial number of people (Criterion D) (No Impact).**

The proposed Project would not involve the development of the types of land uses that would result in other emissions specifically those that are typically associated with odor issues, such as wastewater (sewage) treatment plants, landfills, composting facilities, refineries, or chemical plants. Nor would the Project locate sensitive receptors within proximity of these types of odor-producing sources. Therefore, the proposed Project would not result in impacts associated with odor.

4.4.3. Impact: Air Quality Criteria B and C

The following discuss the Project's potential to result in a significant air quality impact based on air quality significance Criteria B and C.

- **Potential to result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (Criterion B) (Less than Significant, No Mitigation Required).**

BAAQMD's guidance for assessing cumulative impacts indicates that a Project's contribution to cumulative impacts to regional air quality would be considered potentially significant if the project-specific impact would be individually significant (i.e., exceed BAAQMD's quantitative thresholds). For a project that would not individually cause a significant impact, the project's contribution to any cumulative impact may be considered less than significant, provided that the Project is consistent with all applicable regional air quality plans. As shown in Tables 4-20, the proposed Project would result in a net emissions increase for PM_{10}, $PM_{2.5}$, CO, and SO_X and a net emissions decrease for NO_X and ROG on a daily and annual basis. All net emissions increases are below the BAAQMD significance thresholds. Therefore, the proposed Project's operations emissions will be less than significant. Because the proposed Project does not result in any significant air quality impacts individually and

does not conflict with any applicable air quality plans, the proposed Project would also not contribute to cumulatively considerable air quality impacts.

Further, the only incremental Project-related vehicle trips off-site would be associated with transport of surplus construction soil from regional construction projects for use at the Project site for reclamation. Surplus construction soil has and will continue to be generated within the region and will continue to be transported to other disposal or reuse locations if not transported to Permanente Quarry. Studies conducted for the proposed Project conclude that the use of surplus construction soil for reclamation at Permanente Quarry will provide a local reuse option for this soil that would otherwise be transported farther distances and that the proposed Project would therefore reduce the vehicle miles traveled by soil haul trucks (Pinnacle Consulting, 2019). Additionally, as evaluated in the Project's traffic impact study, the total number of increased vehicle trips would not increase traffic volumes at affected intersections to more than the BAAQMD's threshold of 44,000 vehicles per hour (Fehr & Peers, 2019). Therefore, local CO emissions are determined to be less than significant.

- **Potential to expose sensitive receptors to substantial pollutant concentrations (Criterion C) (Less than Significant, No Mitigation Required).**

The primary air toxic sources associated with the proposed Project are the emissions from on-site diesel off road equipment, diesel and gasoline vehicle trips on paved and unpaved roads, fugitive dust from mining and reclamation operations, material handling, and wind erosion. Health risk to local receptors is analyzed using dispersion modeling as presented above in Section 4.3. The results of the health risk modeling shown in Table 4-23 demonstrate the highest cancer, chronic, and acute risks for residential and sensitive receptors as a result of this Project are below BAAQMD's HRA significance thresholds. Therefore, no significant health risks are expected to occur from the operations of the proposed Project and no mitigation is required.

Further, as discussed in Section 4.3.11., the Project would result in an ambient $PM_{2.5}$ increase of 0.00579 $\mu g/m^3$ at the maximally impacted residence which is well below the significance threshold of 0.3 $\mu g/m^3$ and is therefore considered to be a less than significant impact.

4.4.4. Impact: Greenhouse Gases Criteria A and B

The following discuss the Project's potential to result in a significant impact based on GHG significance Criteria A and B.

- **Potential to generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment (Criterion A) (Less than Significant, No Mitigation Required).**

The proposed Project's net operational emissions are presented in Table 4-22, above, and are compared to the BAAQMD threshold of significance applicable to the GHG emissions from stationary sources. GHG emissions associated with the proposed Project would have a slight increase over existing operations but the net increase would be well below the 10,000 MT CO_2e per year significance threshold. The proposed Project's operational emissions are therefore considered to have less than significant GHG impacts and no mitigation is required.

- **Potential to conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. (Criterion B) (Less than Significant, No Mitigation Required).**

None of the proposed Project elements, nor the Project as a whole, conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. The proposed Project does not conflict with the goals of AB 32, will not hinder the implementation of any of the measures specified in the updated AB 32

Scoping Plan, and will comply with all applicable GHG measures already adopted under AB 32 and other authorities. Nor would the proposed Project conflict with the South Bay Cities Council of Governments Climate Action Plan. For these reasons, the proposed Project's GHG emissions are considered to have less than significant impact associated with potential conflicts with a plan, policy or regulation adopted for the purpose of reducing GHG emissions and no mitigation is required.

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APPENDIX A: PROJECT EMISSION CALCULATIONS

Table 1-1. Project: Emission Summary

Process Description	Criteria Pollutant Daily Emissions (lb/day)								Criteria Pollutant Annual Emissions (tpy)								Greenhouse Gas Annual Emissions (MT/yr)			
	Fugitive Dust PM_{10}	Fugitive Dust $PM_{2.5}$	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	Fugitive Dust PM_{10}	Fugitive Dust $PM_{2.5}$	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	CO_2	CH_4	N_2O	CO_2e
Mining and Reclamation Operations																				
Drilling	3.23	3.23	0	0	0	0	0	0	0.21	0.21	0	0	0	0	0	0	0	0	0	0
Blasting & Explosive Detonation	0.11	0.11	0	0	568.78	144.32	0	0	0.01	0.01	0	0	36.89	9.36	0	0	169.84	0	0	169.84
Bulldozing, Scraping & Grading	2.64	0.40	0	0	0	0	0	0	0.29	0.04	0	0	0	0	0	0	0	0	0	0
Material Handling	15.71	2.36	0	0	0	0	0	0	1.74	0.26	0	0	0	0	0	0	0	0	0	0
Wind Erosion (Disturbed Areas & Unpaved Roads)	431.21	64.68	0	0	0	0	0	0	78.70	11.80	0	0	0	0	0	0	0	0	0	0
Unpaved Road Dust Entrainment	350.21	35.02	0	0	0	0	0	0	38.70	3.87	0	0	0	0	0	0	0	0	0	0
Paved Roads Dust Entrainment	63.57	15.60	0	0	0	0	0	0	9.33	2.29	0	0	0	0	0	0	0	0	0	0
Rock Plant Equipment	0	0	3.95	0.50	0	0	0	0	0	0	0.70	0.09	0	0	0	0	0	0	0	0
Fuel Storage and Dispensing																				
Fuel Storage	0	0	0	0	0	0	0.26	0	0	0	0	0	0	0	0.03	0	0	0	0	0
Fuel Dispensing	0	0	0	0	0	0	0.31	0	0	0	0	0	0	0	0.03	0	0	0	0	0
Combustion Sources																				
Off Road Vehicles (Combustion)	0	0	5.44	5.02	203.84	64.05	28.13	0.86	0	0	0.60	0.56	22.52	7.08	3.11	0.10	9,430.36	0.57	0.25	9,518.74
On Road Vehicles (Combustion)	0	0	2.01E-03	9.78E-04	1.37E-02	5.54E-02	1.16E-03	2.31E-04	0	0	3.07E-04	1.49E-04	2.04E-03	8.34E-03	1.66E-04	3.54E-05	3.40	0.00001	0.001	3.56
Dewatering System	0	0	14.23	14.23	167.12	242.51	15.03	58.70	0	0	1.73	1.73	20.33	29.51	1.83	7.14	4,541.06	0.26	0.12	4,581.97
Other																				
Electricity Use	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,513.78	0.09	0.01	1,519.57
Total	**866.7**	**121.4**	**23.6**	**19.8**	**939.8**	**450.9**	**43.7**	**59.6**	**129.0**	**18.5**	**3.0**	**2.4**	**79.8**	**46.0**	**5.0**	**7.2**	**15,658.4**	**0.9**	**0.4**	**15,793.7**
Soil Import Emission Reduction [1]																				
Imported Soil Delivery Vehicles (Combustion) - Alternative Destinations	0	0	4.86E-03	2.36E-03	3.17E-02	1.37E-01	2.54E-03	5.68E-04	0	0	7.28E-04	3.54E-04	4.68E-03	2.02E-02	3.68E-04	8.51E-05	8.17	0.00002	0.001	8.55
Imported Soil Delivery Vehicle Paved Roads Dust Entrainment - Alternative Destinations	108.49	26.63	0	0	0	0	0	0	16.86	4.14	0	0	0	0	0	0	0	0	0	0
Total (with reduction)	**758.2**	**94.8**	**23.6**	**19.7**	**939.7**	**450.8**	**43.7**	**59.6**	**112.1**	**14.3**	**3.0**	**2.4**	**79.7**	**45.9**	**5.0**	**7.2**	**15,650.3**	**0.9**	**0.4**	**15,785.1**

1. Estimated emissions associated with transfer of surplus construction soil to alternative destinations under the "no-Project" scenario is presented here for informational purposes only and is not used for the analysis of Project impacts.

Table 1-2. Project: Inputs

Category	Value	Basis
Year	Year 3	Representative worst-case emissions year
Operating Schedule		
North Quarry, WMSA, and Rock Plant Reserve		
Operating Hours per Day	20	Based on anticipated operating schedule provided by Lehigh
Operating Days per Week	4	Based on anticipated operating schedule provided by Lehigh
Operating Weeks per Year	52	Based on anticipated operating schedule provided by Lehigh
Operating Days per Year	221	Calculated based on anticipated operating schedule provided by Lehigh
Rock Plant		
Operating Hours per Day	16	Application #29811 in process of approval from the Bay Area Air Quality Management District (BAAQMD)
Operating Days per Year	354	Calculated based on anticipated operating schedule provided by Lehigh
Material Properties		
Imported Soil Density (ton/cubic yard)	1.291	Imported soil material properties provided by Lehigh
Topsoil Density (g/cm^3)	1.5	Topsoil properties from EPA's Soil Screening Guidance: Technical background Document (May 1996) (EPA/540/R95/128)
Material Handling - North Quarry		
Total Material Extracted		
Hourly Throughput (ton/hour)	1,452	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	29,050	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	6,419,949	Anticipated throughput provided by Lehigh
Topsoil Removal to Onsite Storage		
Hourly Throughput (ton/hour)	0	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	0	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	0	Anticipated throughput provided by Lehigh
High Grade Limestone to Cement Plant		
Hourly Throughput (ton/hour)	387	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	7,739	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	1,710,384	Anticipated throughput provided by Lehigh
Low Grade Limestone to Rock Plant		
Hourly Throughput (ton/hour)	112	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	2,242	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	495,443	Anticipated throughput provided by Lehigh
Low Grade Limestone to Stockpile		
Hourly Throughput (ton/hour)	449	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	8,978	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	1,984,158	Anticipated throughput provided by Lehigh
Low Grade Limestone from Stockpile to Rock Plant		
Hourly Throughput (ton/hour)	0	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	0	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	0	Anticipated throughput provided by Lehigh
Greenstone to WMSA		
Hourly Throughput (ton/hour)	0	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	0	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	0	Anticipated throughput provided by Lehigh
Greenstone to Backfill		
Hourly Throughput (ton/hour)	505	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	10,090	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	2,229,964	Anticipated throughput provided by Lehigh
Imported Soil		
Hourly Throughput (ton/hour)	292	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	5,843	Calculated based on anticipated operating schedule provided by Lehigh
Throughput (ton/year)	1,291,301	Anticipated throughput provided by Lehigh
Load Size (cubic yards/load)	10	Provided by Lehigh

Category	Value	Basis
Year	Year 3	Representative worst-case emissions year
Material Handling - Rock Plant Reserve		
Total Material Extracted		
Hourly Throughput (ton/hour)	0	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	0	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	0	Anticipated throughput provided by Lehigh
Limestone		
Hourly Throughput (ton/hour)	0	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	0	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	0	Anticipated throughput provided by Lehigh
Rock		
Hourly Throughput (ton/hour)	0	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	0	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	0	Anticipated throughput provided by Lehigh
Topsoil Removal to Onsite Storage		
Hourly Throughput (ton/hour)	0	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	0	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	0	Anticipated throughput provided by Lehigh
Topsoil Placed at Rock Plant Reserve during Reclamation		
Hourly Throughput (ton/hour)	0	Calculated based on anticipated operating schedule provided by Lehigh
Daily Throughput (ton/day)	0	Calculated based on anticipated operating schedule provided by Lehigh
Annual Throughput (ton/year)	0	Anticipated throughput provided by Lehigh
Bulldozing, Scraping, Grading		
North Quarry - Topsoil Removal		
Hours per Day	0	Calculated based on anticipated operating schedule provided by Lehigh, represents the combined total operating hours of the equipment
Hours per Year	0	Calculated based on anticipated operations and representative baseline ratio of operating hours per ton of material throughput
North Quarry - Mining		
Hours per Day	49	Calculated based on anticipated operating schedule provided by Lehigh, represents the combined total operating hours of the equipment
Hours per Year	10,811	Calculated based on anticipated operations and baseline ratio of operating hours per ton of material throughput
North Quarry - Reclamation		
Hours per Day	16	Calculated based on anticipated operating schedule provided by Lehigh, represents the combined total operating hours of the equipment
Hours per Year	3,638	Calculated based on anticipated operations and baseline ratio of operating hours per ton of material throughput
Rock Plant Reserve - Topsoil Removal		
Hours per Day	0	Calculated based on anticipated operating schedule provided by Lehigh, represents the combined total operating hours of the equipment
Hours per Year	0	Calculated based on anticipated operations and representative baseline ratio of operating hours per ton of material throughput
Rock Plant Reserve - Mining		
Hours per Day	0	Calculated based on anticipated operating schedule provided by Lehigh, represents the combined total operating hours of the equipment
Hours per Year	0	Calculated based on anticipated operations and representative baseline ratio of operating hours per ton of material throughput
Rock Plant Reserve - Reclamation		
Hours per Day	0	Calculated based on anticipated operating schedule provided by Lehigh, represents the combined total operating hours of the equipment
Hours per Year	0	Calculated based on anticipated operations and representative baseline ratio of operating hours per ton of material throughput
WMSA - Reclamation		
Hours per Day	9	Calculated based on anticipated operating schedule provided by Lehigh, represents the combined total operating hours of the equipment
Hours per Year	2,080	Calculated based on anticipated operations and representative baseline ratio of operating hours per ton of material throughput

Category	Value	Basis
Year	Year 3	Representative worst-case emissions year
Unpaved Roads		
On Road Vehicle Miles Traveled		
Miles per Hour	22	Calculated based on anticipated annual miles traveled and operating schedule
Miles per Day	443	Calculated based on anticipated annual miles traveled and operating schedule
Miles per Year	98,000	Calculated based on anticipated maximum number of trips per year per vehicle type
Off Road Vehicle Miles Traveled		
Miles per Hour	132	Calculated based on anticipated annual miles traveled and operating schedule
Miles per Day	2,645	Calculated based on anticipated annual miles traveled and operating schedule
Miles per Year	584,526	Calculated based on anticipated operating hours and average vehicle speed
Paved Roads		
On Road Vehicles		
Miles per Year	4,628,583	Calculated based on anticipated maximum number of trips per year for each vehicle type and trip distance
45 Ton Dump Trucks		
Miles per Year	37,852	Calculated based on anticipated maximum number of trips per year for each vehicle type and trip distance
Wind Erosion		
Total Disturbed Area		
Acres per Year	466.7	Acres provided by Lehigh
North Quarry		
Acres per Year Unpaved Roads	25	Calculated based on ratio of disturbed area to unpaved road area for the baseline period in the 2011 Reclamation Plan Amendment
Acres per Year Non-Road	240	Acres provided by Lehigh
WMSA		
Acres per Year Unpaved Roads	21	Calculated based on ratio of disturbed area to unpaved road area for the baseline period in the 2011 Reclamation Plan Amendment
Acres per Year Non-Road	152	Acres provided by Lehigh
Rock Plant		
Acres per Year Stockpiles	1.75	Application #29811 in process of approval from BAAQMD
Rock Plant Reserve		
Acres per Year Unpaved Roads	0	Calculated based on ratio of total disturbed area to unpaved road area used for the North Quarry
Acres per Year Non-Road	0	Acres provided by Lehigh
Electricity Use		
Dewatering System (hours per year)	5,840	Operating data from Lehigh for 2018 assumed to be representative
Quarry Office (square feet)	1,800	The quarry office measures 30 feet by 60 feet.
Rock Plant (hours per year)	5,660	Calculated based on anticipated operating schedule provided by Lehigh
Fuel Dispensing and Storage		
Gasoline		
Gallons per Hour	1	Estimated based on in-plant vehicle use, mileage accruals, and fuel economy: miles traveled for passenger and medium duty vehicles assuming all are gasoline fueled with an average fuel efficiency of 15 mpg
Gallons per Day	30	Estimated based on in-plant vehicle use, mileage accruals, and fuel economy: miles traveled for passenger and medium duty vehicles assuming all are gasoline fueled with an average fuel efficiency of 15 mpg
Gallons per Year	6,533	Estimated based on in-plant vehicle use, mileage accruals, and fuel economy: miles traveled for passenger and medium duty vehicles assuming all are gasoline fueled with an average fuel efficiency of 15 mpg
Diesel		
Gallons per Hour	535	Estimated based on off road equipment use, diesel fuel consumption associated with equipment horsepower, and operating schedule
Gallons per Day	10,709	Estimated based on off road equipment use, diesel fuel consumption associated with equipment horsepower, and operating schedule
Gallons per Year	2,366,604	Estimated based on off road equipment use, diesel fuel consumption associated with equipment horsepower, and operating schedule
Blasting and Drilling		
Holes per Blast	95	Assumed consistent with 2018 quarry records provided by Lehigh
Tons of Quarry Material per Blast	49,488	Assumed consistent with 2018 quarry records provided by Lehigh
Tons of Explosives per Blast	8.5	Assumed consistent with 2018 quarry records provided by Lehigh
Area per Blast (ft^2/blast)	783	Area shifted per blast calculated based on maximum production, blasting, explosives, blast pattern, and related data provided by Lehigh.

Table 1-3. Project: Drilling & Blasting

Description	Parameters [1]						Emission Factor [2]							Hourly Emissions (lb/hr) [3]				Daily Emissions (lb/day) [4]				Annual Emissions (lb/yr) [5]				Annual Emissions (MT/yr) [6]	
	Area per Blast (ft^2)	Number of Holes Drilled per Year	Quantity of Explosives Used per Year (tons)	Maximum Number of Blasts per Hour	Maximum Number of Blasts per Day	Number of Blasts Per Year	PM Control Efficiency (%)	PM_{10}	$PM_{2.5}$	NO_X	CO	CO_2	Units	PM_{10}	$PM_{2.5}$	NO_X	CO	PM_{10}	$PM_{2.5}$	NO_X	CO	PM_{10}	$PM_{2.5}$	NO_X	CO	CO_2	CO_2e
Drilling (Particulate)		12,311					95	0.68	0.68	0	0	0	lb/hole	3.23	3.23	0	0	3.23	3.23	0	0	419	419	0	0	0	0
Blasting (Particulate)	783			1	1	130	98	0.52	0.52	0	0	0	size factor	0.11	0.11	0	0	0.11	0.11	0	0	15	15	0	0	0	0
Explosive Detonation			1,101				0	0	0	17	67	340	lb/ton	0	0	144	569	0	0	144	569	0	0	18,722	73,786	170	170

1. Based on 2018 quarry records and scaled by annual blasted material throughput. Assumes maximum of 1 blast per hour and 1 blast per day.
2. Emission Factor and units from Mojave Desert Air Quality Management District (MDAQMD) Emission Inventory Guidance: Mineral Handling and Processing Industries, Sections A-C.
   Emission Factor of Explosive Detonation for Ammonium Nitrate (ANFO), used as a conservative estimate for emulsion.
   Emission Factor for CO_2 from National Greenhouse Accounts (NGA) Factors, Australian Government Department of Climate Change, January 2008, Section 1.3 (Explosives).
   Drilling PM Control Efficiency based on Western Governors' Association Western Regional Air Partnership (WRAP) Fugitive Dust Handbook (Section 11.3) as the conservative value for fabric filtration (95-99%). In addition, drilling is controlled by water spray and occurs primarily below grade.
   Blasting PM Control Efficiency based on WRAP Fugitive Dust Handbook (Table 3-7) for prohibition of demolition blasting when wind speed exceeds 25 mph as mandated in Lehigh's BAAQMD Fugitive Dust Control Plan. In addition, blasting occurs primarily below grade.
3. Drilling PM Hourly Emissions (lb/hr) = Number of Holes Drilled per Year / Number of Blasts per Year x Maximum Number of Blasts per Hour x Emission Factor (lb/hole) x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.A
   Blasting PM Hourly Emissions (lb/hr) = Size Factor x Number of Blasts per Hour x 0.0005 x (Area per Blast (ft^2))$^{1.5}$ x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.B
   Explosive Detonation Hourly Emissions (lb/hr) = Quantity Explosives Used per Year (ton) / Number of Blasts per Year x Maximum Number of Blasts per Hour x Emission Factor (lb/ton) per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.C
4. Drilling PM Daily Emissions (lb/day) = Number of Holes Drilled per Year / Number of Blasts per Year x Maximum Number of Blasts per Day x Emission Factor (lb/hole) x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.A
   Blasting PM Daily Emissions (lb/day) = Size Factor x Number of Blasts per Day x 0.0005 x (Area per Blast (ft^2))$^{1.5}$ x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.B
   Explosive Detonation Daily Emissions (lb/day) = Quantity Explosives Used per Year (ton) / Number of Blasts per Year x Maximum Number of Blasts per Day x Emission Factor (lb/ton) per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.C
5. Drilling PM Annual Emissions (lb/yr) = Number of Holes Drilled per Year x Emission Factor (lb/hole) x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.A
   Blasting PM Annual Emissions (lb/yr) = Size Factor x Number of Blasts per Year x 0.0005 x (Area per Blast (ft^2))$^{1.5}$ x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.B
   Explosive Detonation Annual Emissions (lb/yr) = Quantity Explosives Used per Year (ton) x Emission Factor (lb/ton) per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.C
6. Explosive Detonation Annual Emissions (MT/yr) for CO_2 = Emission Factor (lb/ton) x Annual Explosive Used (ton/yr) / 2,204.62 lb/MT
   Explosive Detonation Annual Emissions (MT/yr) for CO_2e = [Annual Emissions (MT/yr) x GWP]CO_2
   Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)

Table 1-4. Project: Bulldozing, Scraping & Grading

Activity Type	Description	Parameters [1]			Total Operating Hours [2]		Particle Aerodynamic Factor [3]		Material Movement Emission Factor (lb/hr) [4]		Hourly Emissions (lb/hr) [5]		Daily Emissions (lb/day) [6]		Annual Emissions (lb/yr) [7]	
		Material Moisture Content (%)	Control Efficiency (%)	Silt Content (%)	Hours per day	Hours per year	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Mining	North Quarry	2.1	76	0.5	49	10,811	0.36	0.054	0.12	0.02	0.03	0.004	1.46	0.22	324	49
Reclamation	North Quarry	2.1	76	0.5	16	3,638	0.36	0.054	0.12	0.02	0.03	0.004	0.49	0.07	109	16
Mining	Rock Plant Reserve	2.1	76	0.5	0	0	0.36	0.054	0.12	0.02	0	0	0	0	0	0
Reclamation	Rock Plant Reserve	2.1	76	0.5	0	0	0.36	0.054	0.12	0.02	0	0	0	0	0	0
Reclamation	WMSA	2.1	42	0.5	9	2,080	0.36	0.054	0.12	0.02	0.07	0.01	1	0	150	22

1. Moisture Content from the United States Environmental Protection Agency (EPA) AP-42 Table 13.2.4-1 for various limestone products.
   Control Efficiency of 58.5% is applied for active area in the quarries which is conservatively assumed as the mean value for cross-wind ridges from the WRAP Dust Handbook (Page 3) as the pit is well below surface level.
   Control Efficiency of 42% is applied for active area in the WMSA and quarries (additional) which is conservatively assumed as mean value for watering of unpaved surfaces from the WRAP Dust Handbook (Page 3).
   Silt Content from MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries Section G, Stockpile Table 2 for Limestone.
2. Operating Hours calculated by scaling the hours provided in the 2011 Reclamation Plan Amendment by the proposed throughpu
3. Particulate Aerodynamic Factor for PM_{10} from MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.D.
   Particulate Aerodynamic Factors for $PM_{2.5}$ calculated as 0.15 x PM_{10} Particulate Aerodynamic Factor in accordance with Background Document for Revisions to Fine Fraction Ratios used as a basis for AP-42 Fugitive Dust Emission Factors (prepared for Western Governors' Association Western Regional Air Partnership (WRAP)), Midwest Research Institute, November 1, 2006, Table 1 (Proposed Particle Size Ratios for AP-42 for Rock Handling & Storage Piles (transfer))
4. Material Movement Emission Factor (lb/hr) = 2.76 x Particulate Aerodynamic Factor x [Silt Content (%)]$^{1.5}$ / [Material Moisture Content (%)]$^{1.4}$ from MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.E
5. Hourly Emissions (lb/hr) = Emission Factor (lb/hr) x [100 - Control Efficiency (%)] / 10
6. Daily Emissions (lb/day) = Hourly Emissions (lb/hr) x Operating Schedule (hr/day)
7. Annual Emissions (lb/yr) = Hourly Emissions (lb/hr) x Operating Schedule (hr/yr)

Table 1-5. Project: Material Handling

Activity Type	Description	Parameters [1]					Throughputs [2]			Particle Aerodynamic Factor [3]		Material Handling Emission Factor (lb/ton) [4]		Hourly Emissions (lb/hr) [5]		Daily Emissions (lb/day) [6]		Annual Emissions (lb/yr) [7]	
		Mean Wind Speed (mph)	Representative Material	Material Moisture Content (%)	Control Efficiency (%)	Number of Transfer Points	Hourly Throughput (tons/hr)	Daily Throughput (tons/day)	Annual Throughput (tons/yr)	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Mining	North Quarry - Material from Loader to Truck (not topsoil)	5.32	Limestone	2.1	75	1	1,452	29,050	6,419,949	0.36	0.054	1.17E-03	1.75E-04	0.42	0.06	8.47	1.27	1,871	281
Mining	North Quarry - Topsoil Removal to Onsite Storage	5.32	Topsoil	14	75	1	0	0	0	0.36	0.054	8.19E-05	1.23E-05	0	0	0	0	0	0
Mining	North Quarry - High Grade Limestone to Cement Plant	5.32	Limestone	2.1	93	1	387	7,739	1,710,384	0.36	0.054	1.17E-03	1.75E-04	0.03	0.01	0.68	0.10	150	22
Mining	North Quarry - Low Grade Limestone to Rock Plant	5.32	Limestone	2.1	75	1	112	2,242	495,443	0.36	0.054	1.17E-03	1.75E-04	0.03	0.005	0.65	0.10	144	22
Mining	North Quarry - Low Grade Limestone to Stockpile	5.32	Limestone	2.1	75	1	449	8,978	1,984,158	0.36	0.054	1.17E-03	1.75E-04	0.1308279	0.0196242	2.6165582	0.3924837	578	87
Mining	North Quarry - Low Grade Limestone from Stockpile to Rock Plant	5.32	Limestone	2.1	75	2	0	0	0	0.36	0.054	1.17E-03	1.75E-04	0	0	0	0	0	0
Reclamation	North Quarry - Greenstone to Backfill North Quarry	5.32	Limestone	2.1	75	1	505	10,090	2,229,964	0.36	0.054	1.17E-03	1.75E-04	0.15	0.02	2.94	0.44	650	97
Reclamation	North Quarry - Imported Soil	5.32	Topsoil	14	75	3	292	5,843	1,291,301	0.36	0.054	8.19E-05	1.23E-05	0.02	0.003	0.36	0.05	79	12
Mining	Rock Plant Reserve - Material from Loader to Truck (not topsoil)	5.32	Limestone	2.1	75	1	0	0	0	0.36	0.054	1.17E-03	1.75E-04	0	0	0	0	0	0
Mining	Rock Plant Reserve - Topsoil Removal to Onsite Storage	5.32	Topsoil	14	75	1	0	0	0	0.36	0.054	8.19E-05	1.23E-05	0	0	0	0	0	0
Mining	Rock Plant Reserve - Limestone	5.32	Limestone	2.1	75	1	0	0	0	0.36	0.054	1.17E-03	1.75E-04	0	0	0	0	0	0
Mining	Rock Plant Reserve - Rock	5.32	Limestone	2.1	75	1	0	0	0	0.36	0.054	1.17E-03	1.75E-04	0	0	0	0	0	0
Reclamation	Rock Plant Reserve - Topsoil Placed during Reclamation	5.32	Topsoil	14	75	1	0	0	0	0.36	0.054	8.19E-05	1.23E-05	0	0	0	0	0	0
Mining	Rock Plant - Surge Feed Pile to Jaw Crusher	5.32	Limestone	2.1	75	1	112	2,242	495,443	0.36	0.054	1.17E-03	1.75E-04	0.03	0.005	0.65	0.10	144	22
Mining	Rock Plant - Conveyor to Product Storage Pile	5.32	Limestone	2.1	75	1	112	2,242	495,443	0.36	0.054	1.17E-03	1.75E-04	0.03	0.005	0.65	0.10	144	22
Mining	Rock Plant - Loader from Product Storage Pile to Truck	5.32	Limestone	2.1	75	1	112	2,242	495,443	0.36	0.054	1.17E-03	1.75E-04	0.03	0.005	0.65	0.10	144	22

1.Mean Wind Speed (mph) = 5.32 mph based on the average annual mean wind speed measured by Lehigh's meteorological tower from 2008 through 2017.
Moisture Content is from EPA AP-42 Table 13.2.4-1 for various limestone products and clay/dirt mix.
Control Efficiency of 75% reflects water spay (application point) and additional 70% control for three sided enclosure of the primary crusher drop point per MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries Section E, Table 5.
Number of Transfer Points based on process description

2. Material Throughputs projected by Lehigh for emissions year: Year 3

3. Particulate Aerodynamic Factor for PM_{10} comes from MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.D.
Particulate Aerodynamic Factor for $PM_{2.5}$ is calculated as 0.15 x PM10 Particulate Aerodynamic Factor in accordance with Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors (prepared for Western Governors' Association WRAP), Midwest Research Institute, November 1, 2006, Table 1 (Proposed Particle Size Ratios for AP-42 for Rock Handling & Storage Piles (transfer))

4. Material Handling Emission Factor (lb/ton) = Particle Aerodynamic Factor x 0.0032 x [Mean Wind Speed (mph) / 5]$^{1.3}$ / [Material Moisture Content (%) / 2]$^{1.4}$ in accordance with MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.E.

5. Hourly Emissions (lb/hr) = Emission Factor (lb/ton) x Hourly Throughput (tons/hr) x [100 - Control Efficiency (%)] / 100 x Number of Transfer Points

6. Daily Emissions (lb/day) = Emission Factor (lb/ton) x Daily Throughput (tons/day) x [100 - Control Efficiency (%)] / 100 x Number of Transfer Points

7. Annual Emissions (lb/yr) = Emission Factor (lb/ton) x Annual Throughput (tons/yr) x [100 - Control Efficiency (%)] / 100 x Number of Transfer Points

Table 1-6. Project: Wind Erosion

Activity Type	Description	Particle Size Multiplier [1]		Active Disturbed Area Emission Factor (ton/acre-yr) [2]		Inactive Disturbed Area Emission Factor (ton/acre-yr) [2]		Area Disturbed (acre) [3]	Active Area Disturbed (acre) [3]	Inactive Area Disturbed (acre) [3]	Active Area Control Efficiency (%) [4]	Inactive Area Control Efficiency (%) [4]	Hourly Emissions (lb/hr) [5]		Daily Emissions (lb/day) [6]		Annual Emissions (lb/yr) [7]	
		PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$						PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Mining	North Quarry - Non-road	0.5	0.075	1.02	0.15	1.02	0.153	270	81	189	58.5	93	10.76	1.61	258	38.7	94,227	14,134
Mining	Rock Plant Reserve - Non-road	0.5	0.075	1.02	0.15	1.02	0.153	0	0	0	58.5	93	0	0.00	0	0.0	0	0
Mining	WMSA - Non-road	0.5	0.075	1.02	0.15	1.02	0.153	152	15	136	42	84	7.15	1.07	172	25.7	62,615	9,392
Mining/Reclamation	North Quarry - Unpaved Roads	0.5	0.075	0.02	0.003	0.02	0.003	25	25	0	91.7	91.7	0.01	0.001	0	0.0	73	11
Mining/Reclamation	Rock Plant Reserve - Unpaved Roads	0.5	0.075	0.02	0.003	0.02	0.003	0	0	0	91.7	91.7	0	0	0	0.0	0	0
Mining/Reclamation	WMSA - Unpaved Roads	0.5	0.075	0.02	0.003	0.02	0.003	21	21	0	80	80	0.02	0.003	0	0.1	150	23
Mining	Rock Plant - Stockpiles	0.5	0.075	0.31	0.05	0.31	0.047	1.75	2	0	70	70	0.04	0.01	1	0.1	326	49
Mining	Rock Plant - Unpaved Roads	0.5	0.075	0.02	0.003	0.02	0.003	2	2	0	80	80	0.001	0.0002	0	0.0	12	2

1. Particle Size Multiplier from EPA AP-42 Section 13.2.5, Table "Aerodynamic Particle Size multipliers for Equation 2'
2. Emission Factor (ton/acre-yr) = Emission Factor (g/m^2-yr) / 907,185 (g/ton) x 4,046.86 (m^2/acre), where

Emission Factor Quarry Material = 458.36 g/m^2-yr

Emission Factor Topsoil = 51.24 g/m^2-yr

Emission Factor for Unpaved Roads = 8.01 g/m^2-yr

as calculated pursuant to EPA AP-42 Section 13.2.5 based on meteorological data acquired from Lehigh's meteorological tower for the baseline years of 2008 through 2017. Average values from the baseline period are represented. Factor conservatively assumes area is disturbed once per da

Stockpile PM_{10} emission factor obtained from BAAQMD Permit Handbook Section 11.7, Crushing and Grinding. $PM_{2.5}$ stockpile emissions are calculated with the 15% conversion factor from PM_{10} to $PM_{2.5}$ in BAAQMD Permit Handbook in Section 11.5.

3. Applicable disturbed area provided by Lehigh, consistent with SMARA reports. Road and non-road ratio consistent with the 2011 Reclamation Plan Amendment. MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries Section L, Wind Erosion from Unpaved Operational Areas and Roads, notes that actively disturbed areas are disturbed at least once per day. It is conservatively estimated that 30% of the quarries and 10% of the WMSA acreage could be considered actively disturbed.
4. Control Efficiency of 84% is applied for inactive disturbed area as the terrain is similar to gravel cover consistent with Chapter 8, Open Area Wind Erosion, of the WRAP Fugitive Dust Handbook

Control Efficiency of 58.5% is applied for active and inactive disturbed area in the quarries which is conservatively assumed as the mean value for cross-wind ridges from the WRAP Dust Handbook (Page 3) as the pit is well below surface level.

Control Efficiency of 42% is applied for active disturbed area in the WMSA which is conservatively assumed as one half the application of gravel per WRAP as the WMSA material is mostly large rocks similar to gravel.

Control Efficiency for chemical suppression of 80% utilized for unpaved roads consistent with AP-42 Section 13.2.2 and the BAAQMD Permit Handbook.

Control Efficiency for storage piles based on BAAQMD Permit Handbook for water spray.

5. Hourly Emissions (lb/hr) = Daily Emissions (lb/day) / 24 (hr/day)
6. Daily Emissions (lb/day) = Annual Emissions (lb/yr) / 365 (day/yr)
7. Annual Emissions (lb/yr) = Emission Factor (ton/acre-yr) x Area Disturbed (acre) x [100 - Control Efficiency (%)] / 10(

Table 1-7. Project: Unpaved Road Dust Entrainment

Description	Parameters [1]							Total Miles Traveled [2]			Emission Factor (lb/mile) [3]		Hourly Emissions (lb/hr) [4]		Daily Emissions (lb/day) [5]		Annual Emissions (lb/yr) [6]	
	Vehicle Weight (tons)	Control Efficiency (%)	Road Silt Content (%)	k		a	b	miles/hr	miles/day	miles/yr								
				PM_{10}	$PM_{2.5}$						PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Off Road Vehicles	57.0	91.4	2.7	1.5	0.15	0.9	0.45	132	2,645	584,526	1.47	0.15	16.76	1.68	335.26	33.53	74,093	7,409
On Road Vehicles	3	91.4	2.7	1.5	0.15	0.9	0.45	22	443	98,000	0.39	0.04	0.75	0.07	14.94	1.49	3,302	330

1. Inputs needed for the equations in AP-42 Section 13.2.2, as follows:
   Vehicle Weight calculated as an annual miles weighted vehicle weight based on vehicle information provided by Lehigh
   Control Efficiency assumed to be 80% for chemical control of unpaved roads based on AP-42 Section 13.2.2 plus an additional 57% for limiting maximum speeds below 15 miles per hour per Table 3-7 of the WRAP Fugitive Dust Handbook.
   Silt Content (%) from 2008 CEIR as used in the 2012 Reclamation Plan Amendment.
   Constants k, a, and b from AP-42 Table 13.2.2-2 for Industrial Roads.
2. Off road Miles Traveled calculated based on annual operating hours and average speed of off-road equipment.
   On road Miles Traveled calculated based on number of vehicles and average annual miles traveled.
3. Emission Factor (lb/mile) = k x [Road Silt Content (%) / 12]^{a} x [Vehicle Weight (tons) / 3]^{b} Per Equation 1a of AP-42 Section 13.2.2
4. Hourly Emissions (lb/hr) = Emission Factor (lb/mile) x Miles Traveled (miles/hr)
5. Daily Emissions (lb/day) = Emission Factor (lb/mile) x Miles Traveled (miles/day)
6. Annual Emissions (lb/yr) = Emission Factor (lb/mile) x Miles Traveled (miles/yr)

Table 1-8. Project: Paved Road Dust Entrainment

Road Type	Parameters [1]										Total Miles Traveled [2]			Hourly Emission Factor (lb/VMT) [3]		Daily Emission Factor (lb/VMT) [3]		Annual Emission Factor (lb/VMT) [3]		Hourly Emissions (lb/hr) [4]		Daily Emissions (lb/day) [5]		Annual Emissions (lb/yr) [6]	
	Vehicle Weight (tons)	Control Efficiency (%)	Road Silt Loading (g/m^2)	k (lb/VMT)		P		N		VMT Fraction	miles/hr	miles/day	miles/yr												
				PM_{10}	$PM_{2.5}$	Hourly	Daily	Hourly	Daily					PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
On road vehicles - Freeway	24.9	0	0.015	0.0022	0.0005	328	51	8760	365	0.434	432	6,538	2,008,805	1.22E-03	3.00E-04	1.23E-03	3.03E-04	1.28E-03	3.14E-04	0.53	0.13	8.06	1.98	2,567	630
On road vehicles - Major	24.9	0	0.032	0.0022	0.0005	328	51	8760	365	0.449	447	6,764	2,078,234	2.43E-03	5.97E-04	2.46E-03	6.03E-04	2.55E-03	6.25E-04	1.09	0.27	16.62	4.08	5,292	1,299
On road vehicles - Collector	24.9	0	0.032	0.0022	0.0005	328	51	8760	365	0.054	54	813	249,944	2.43E-03	5.97E-04	2.46E-03	6.03E-04	2.55E-03	6.25E-04	0.13	0.03	2.00	0.49	637	156
On road vehicles - Local	24.9	0	0.32	0.0022	0.0005	328	51	8760	365	0.064	64	964	296,229	1.98E-02	4.85E-03	2.00E-02	4.90E-03	2.07E-02	5.08E-03	1.26	0.31	19.26	4.73	6,132	1,505
45 ton Haul Trucks - Paved Plant Roads	58.6	65.6	2.4	0.0022	0.0005	328	51	8760	365	1	9	171	37,852	2.96E-01	7.27E-02	2.99E-01	7.34E-02	3.10E-01	7.61E-02	0.87	0.21	17.63	4.33	4,037	991
Imported Soil Alternative Destinations [7]																									
Imported Soil Vehicles - Freeway	24.5	0	0.015	0.0022	0.0005	328	51	8760	365	0.434	786	15,715	4,714,629	1.20E-03	2.94E-04	1.21E-03	2.97E-04	1.26E-03	3.08E-04	0.94	0.23	19.04	4.67	5,919	1,453
Imported Soil Vehicles - Major	24.5	0	0.032	0.0022	0.0005	328	51	8760	365	0.449	813	16,259	4,877,577	2.39E-03	5.87E-04	2.41E-03	5.93E-04	2.50E-03	6.14E-04	1.94	0.48	39.25	9.63	12,203	2,995
Imported Soil Vehicles - Collector	24.5	0	0.032	0.0022	0.0005	328	51	8760	365	0.054	98	1,955	586,613	2.39E-03	5.87E-04	2.41E-03	5.93E-04	2.50E-03	6.14E-04	0.23	0.06	4.72	1.16	1,468	360
Imported Soil Vehicles - Local	24.5	0	0.32	0.0022	0.0005	328	51	8760	365	0.064	116	2,317	695,245	1.94E-02	4.77E-03	1.96E-02	4.82E-03	2.03E-02	4.99E-03	2.25	0.55	45.48	11.16	14,139	3,470

1. Inputs needed for the equations in AP-42 Section 13.2.1, as follows:
   Vehicle Weight is calculated as the weighted average of vehicle weights with respect to total annual miles traveled for on road vehicles. On road vehicles on paved roads include employee vehicles, fuel transport vehicles, infill delivery vehicles, and rock plant delivery vehicles. 45 ton haul truck average weight (loaded and unloaded) used for 45 ton haul trucks on paved plant roads.
   Control Efficiency assumed to be 0% reflecting no controls and 65.6% reflecting sweeping and a speed limit of 15 mph on-site, pursuant to the Fugitive Dust Control Plan (revised June 2018), MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries Section J, Dust Entrainment from Paved Roads, and Table 3-7 of the WRAP Fugitive Dust Handbook.
   Silt Loading (g/m^2) for on road vehicles from California Air Resources Board (CARB), Entrained Dust from Paved Road Travel: Emission Estimation Methodology Background Document, November 2016, Table 7 (2008 Silt Loadings and PM_{10} Emission Factors for California Entrained Paved Road Dust Estimates) - silt loadings for Santa Clara County.
   Paved plant road silt loading (g/m^2) for 45 ton dump trucks from AP-42 Table 13.2.1-3 for Paved Roads at Industrial Facilities - Quarry.
   k (particle size multiplier) value for $PM_{2.5}$ and PM_{10} from AP-42 Table 13.2.1-1
   P (number of precipitation days or hours per year with at least 0.01 in) calculated as the average annual value from the baseline period of 2008 through 2017 from meteorology data provided by Lehigh for Lehigh's meteorology tower
   N (number of days or hours in the averaging period) = 365 days per year and 8760 hours per year
   VMT Fraction from CARB, Emissions Inventory Methodology Section 7.9: Entrained Paved Road Dust-Paved Road Travel, November 2016, Table 6 (2008 Roadway Travel Fractions and VMT Estimates for California Entrained Paved Road Dust)
2. Miles Traveled calculated based on number of vehicles, trip distance, and maximum operating schedule.
3. Hourly Emission Factor (lb/VMT) = k x [Road Silt Loading (g/m^2)]$^{0.91}$ x [Vehicle Weight (tons)]$^{1.02}$ x (1-1.2P/N) according to Equation 3 of AP-42 Section 13.2.1.
   Daily Emission Factor (lb/VMT) = k x [Road Silt Loading (g/m^2)]$^{0.91}$ x [Vehicle Weight (tons)]$^{1.02}$ x (1-P/4N) according to Equation 2 of AP-42 Section 13.2.1.
   Annual Emission Factor (lb/VMT) = k x [Road Silt Loading (g/m^2)]$^{0.91}$ x [Vehicle Weight (tons)]$^{1.02}$ according to Equation 1 of AP-42 Section 13.2.1.
4. Hourly Emissions (lb/hr) = Emission Factor (lb/VMT) x Miles Traveled (miles/hr) x [100 - Control Efficiency (%)] / 100
5. Daily Emissions (lb/day) = Emission Factor (lb/VMT) x Miles Traveled (miles/day) x [100 - Control Efficiency (%)] / 100
6. Annual Emissions (lb/day) = Emission Factor (lb/VMT) x Miles Traveled (miles/yr) x [100 - Control Efficiency (%)] / 100
7. Estimated emissions associated with transport of surplus construction soil to alternative destinations under the "no-Project" scenario is presented here for informational purposes only and is not used in the analysis of Project impacts.

Table 1-9. Project: Fuel Storage

Description	Hourly Emissions (lb/hr)[1]	Daily Emissions (lb/day)[2]	Annual Emissions (lb/yr)[3]
	ROG	ROG	ROG
Diesel Storage Tank, 15,000 gal	7.50E-02	7.50E-02	1.66E+01
Diesel Storage Tank, 4,000 gal	1.81E-02	1.81E-02	4.00E+00
Gasoline Storage Tank, 10,000 gal	1.65E-01	1.65E-01	3.65E+01

1. Hourly Emissions (lb/hr) for fuel storage are conservatively set equal to daily emissions
2. Daily Emissions (lb/day) for fuel storage are calculated based on the annual emissions and operating schedule.
3. Annual Emissions (lb/yr) for fuel storage are calculated based on tank parameters and annual fuel throughput using the formulas in EPA AP-42 Chapter 7.1.

Table 1-10. Project: Fuel Dispensing

Description	ROG Emission Factor (lb/gal) [1]	Fuel Throughput [2]			Hourly Emissions (lb/hr) [3]	Daily Emissions (lb/day) [4]	Annual Emissions (lb/yr) [5]
		gal/hr	gal/day	gal/yr	ROG	ROG	ROG
Diesel Fuel Dispensing	0.000028	535	10,709	2,366,604	1.50E-02	3.00E-01	6.63E+01
Gasoline Fuel Dispensing	0.00038	1	30	6,533	5.62E-04	1.12E-02	2.48E+00

1. ROG Emission Factor (lb/gal) for diesel comes from the South Coast Air Quality Management District's "Supplemental Instructions of Liquid Organic Storage Tanks " (February 2017). Assumes VOC = ROG.
   ROG Emission Factor (lb/gal) for gasoline from the California Air Resources Board's "Vapor Recovery Certification Procedure CP-201: Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities" (amended April 23, 2015). Assumes HC= ROG.
2. Diesel fuel throughput calculated based on off road equipment use, diesel fuel consumption associated with equipment horsepower, and operating schedule.
   Gasoline fuel throughput calculated based on in-plant vehicle use, mileage accruals, and fuel economy.
3. Hourly Emissions (lb/hr) for fuel dispensing = ROG Emission Factor (lb/gal) x Fuel
4. Daily Emissions (lb/day) for fuel dispensing = ROG Emission Factor (lb/gal) x Fuel
5. Annual Emissions (lb/yr) for fuel dispensing = ROG Emission Factor (lb/gal) x Fuel

Table 1-11. Project: Off Road Vehicle Diesel Combustion

Equipment Type	Parameters [1]							Emission Factor (g/bhp-hr) [2]											Hourly Emissions (lb/hr) [3]											Daily Emissions (lb/day) [4]											Annual Emissions (lb/year) [5]								Annual Emissions (metric tons/year) [6]			
	Model	Number	Model Year	Vehicle Weight (tons)	Horse-power (bhp)	Hours per Year	Hours per Day	Load Factor	THC	ROG	CO	NO_x	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	THC	ROG	CO	NO_x	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	THC	ROG	CO	NO_x	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	THC	ROG	CO	NO_x	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Bore/Drill Rigs	Ingersoll Rand DM45	1	2009	41	600	4,420	20	0.5	0.36	0.30	1.14	2.96	0.14	0.14	0.13	0.005	530	0.03	0.01	0.24	0.20	0.75	1.95	0.09	0.09	0.08	3.22E-03	350	0.02	0.01	4.76	3.99	15.06	39.09	1.80	1.80	1.66	0.06	7,009	0.42	0.19	1,052	882	3,328	8,639	398	398	367	14	703	0.04	0.02	709
Crawler Dozer	John Deere 850K	1	2018	21.3	205	3,837	17	0.43	0.17	0.14	1.21	0.13	0.01	0.01	0.01	0.005	530	0.03	0.01	0.03	0.03	0.24	0.03	0.002	0.002	0.002	9.48E-04	103	0.01	0.003	0.58	0.48	4.09	0.45	0.04	0.04	0.04	0.02	1,790	0.11	0.05	127.77	107.09	903.38	99.07	9.03	9.03	8.34	3.64	179	0.01	0.00	181
Crawler Dozer	John Deere 1050K	1	2018	47.5	350	3,837	17	0.43	0.17	0.14	1.14	0.15	0.02	0.02	0.02	0.005	530	0.03	0.01	0.06	0.05	0.38	0.05	0.01	0.01	0.01	1.62E-03	176	0.01	0.005	0.99	0.83	6.56	0.84	0.13	0.13	0.12	0.03	3,056	0.18	0.08	218.14	182.84	1,449.17	185.81	28.12	28.12	25.96	6.21	306	0.02	0.01	309
Graders	John Deere 872GP	1	2018	27.5	300	2,649	12	0.41	0.17	0.14	1.14	0.15	0.02	0.02	0.02	0.005	530	0.03	0.01	0.05	0.04	0.31	0.04	0.01	0.01	0.01	1.32E-03	144	0.01	0.004	0.56	0.47	3.70	0.47	0.07	0.07	0.07	0.02	1,724	0.10	0.05	123.08	103.16	817.63	104.84	15.87	15.87	14.64	3.50	173	0.01	0.005	174
Off-Highway 45 Ton Dump Truck	John Deere 460E	16	2018	58.6	481	69,858	316	0.38	0.17	0.14	1.14	0.15	0.02	0.02	0.02	0.005	530	0.03	0.01	0.07	0.06	0.46	0.06	0.01	0.01	0.01	1.97E-03	214	0.01	0.01	21.83	18.30	145.00	18.59	2.81	2.81	2.60	0.62	67,572	4.08	1.78	4,824	4,043	32,046	4,109	622	622	574	137	6,774	0.41	0.18	6,837
Rubber Tired Loaders	John Deere 944K	2	2018	62.3	536	7,571	34	0.36	0.17	0.14	1.14	0.15	0.02	0.02	0.02	0.005	530	0.03	0.01	0.07	0.06	0.48	0.06	0.01	0.01	0.01	2.07E-03	226	0.01	0.01	2.50	2.09	16.59	2.13	0.32	0.32	0.30	0.07	7,731	0.47	0.20	551.87	462.58	3,666.26	470.08	71.15	71.15	65.67	15.71	775	0.05	0.02	782
Water Trucks	John Deere 410E	1	2018	55.7	443	5,689	26	0.38	0.17	0.14	1.14	0.15	0.02	0.02	0.02	0.005	530	0.03	0.01	0.06	0.05	0.42	0.05	0.01	0.01	0.01	1.81E-03	197	0.01	0.01	1.64	1.37	10.88	1.39	0.21	0.21	0.19	0.05	5,068	0.31	0.13	361.78	303.24	2,403.43	308.17	46.64	46.64	43.05	10.30	508	0.03	0.01	513
Portable Light Tower	Allmand ML 695	1	2002	2.3	11	2,652	12	0.74	3.30	2.77	9.14	5.04	0.26	0.26	0.24	0.005	580	0.03	0.01	0.06	0.05	0.16	0.09	0.005	0.005	0.004	9.56E-05	10	0.001	0.000	0.71	0.60	1.97	1.09	0.06	0.06	0.05	0.00	125	0.01	0.003	157.20	131.76	434.99	239.99	12.57	12.57	11.61	0.25	13	0.001	0.0003	13

1. Model year assumed to be 2018 except for the drill and light towers which is consistent with the 2011 Reclamation Plan Amendment.
   Vehicle Weight provided by manufacturer specifications.
   Horsepower provided by Lehigh except for the drill which is consistent with the 2011 Reclamation Plan Amendment.
   Hours per Year calculated based on the maximum ratio of equipment operating hours to quarry production for baseline years 2008 through 2017 and the proposed production. Drills are calculated using the facility's proposed operating schedule.
   Hours per Day calculated based Hours per Year and the facility's proposed operating schedule.
   Load factor from ARB's OFFROAD2017 model found here: https://www.arb.ca.gov/msei/ordiesel/ordas_ef_fcf_2017_v7.xlsx. Load Factor for Portable Light Tower is consistent with the 2011 Reclamation Plan Amendment.
   Calculation year is Year 3.
   Cumulative Hours are conservatively set at 12,000 for each vehicle. Per the document, Staff Report: Initial Statement of Reasons for Proposed Rulemaking – Proposed Amendments to the Regulation for In-use Off-road Diesel-fueled Fleets and the Off-road Large Spark-ignition Fleet Requirements, California Air Resources Board, October 2010, Appendix D (OSM and Summary of Off-road Emissions Inventory Update), pages D-27 to D-28, CARB staff now assumes emission factors deteriorate only up to a maximum of 12,000 hours.
2. Emission Factors (g/hp-hr) for criteria pollutants except SO_2 are from ARB's OFFROAD2017 Model
   Emission Factor for SO_2 is based on fuel sulfur content and brake-specific fuel consumption. Per Title 13 California Code of Regulations sec. 2281 (Sulfur Content of Fuel), diesel sulfur content in diesel fuel is limited to 15 parts per million. Per the October 2010 CARB Staff Report (op cit.), CARB staff used BSFC values from EPA's NONROAD emissions model, as documented in the report, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition (EPA Report No. EPA420-P-04-009/NR-009C), U.S. Environmental Protection Agency, April 2004. Table A2 of the EPA report (pages A5-A8) documents that for diesel engines up to 100 hp, a brake specific fuel consumption (BSFC) value of 0.408 lb/hp-hr is used. For diesel engines larger than 100 hp, a BSFC value of 0.367 lb/hp-hr is used.
   ROG = 83.82% THC, PM_{10} = 100% PM, and $PM_{2.5}$ = 92.29% PM per the 2008 Estimated Annual Average Emissions – Statewide, California Air Resources Board, data for Off-Road Equipment, sorted for diesel-fueled vehicles.
   Diesel PM Emissions = PM_{10} Emissions
   Emission Factors for CO_2, CH_4, and N_2O are based on the Climate Registry's 2018 default emission factors (May 2018), Tables 13.1 (US Default CO2 Emission Factors for Transport Fuels) and 13.7 (US Default Factors for Calculating CH4 and N2O Emissions from Non-Highway Vehicles) for Construction/Mining Equipment.
3. Hourly Emissions (lb/hour) = Emission Factor (g/hp-hr) / 453.59 (g/lb) x Horsepower (hp) x Load Factor
4. Daily Emissions (lb/day) = Emission Factor (g/bhp-hr) / 453.59 (g/lb) x Horsepower (bhp) x Hours per Day x Load Factor
5. Annual Emissions (lb/year) = Emission Factor (g/bhp-hr) / 453.59 (g/lb) x Horsepower (bhp) x Hours per Year x Load Factor
6. Annual Emissions (MT/yr) for CO_2, CH_4, and N_2O = Emission Factor (g/bhp-hr) / 1,000,000 (g/MT) x Horsepower (bhp) x Hours per Year x Load Factor
   Annual Emissions (MT/yr) for CO_2e = [Annual Emissions (MT/yr) x GWP]CO_2 + [Annual Emissions (MT/yr) x GWP]CH_4 + [Annual Emissions (MT/yr) x GWP]N_2O
   Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)

Table 1-12. Project: On Road Vehicle Diesel Combustion

Vehicle Type [1]	Time Period	Total Miles Traveled [2]	Emission Factor (lb/mile) [3]										Hourly Emissions (lb/hr) [4]										Daily Emissions (lb/day) [5]										Annual Emissions (lb/yr) [6]							Annual Emissions (MT/yr) [7]			
			PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	Diesel PM	CO_2	CH_4	N_2O	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	Diesel PM	CO_2	CH_4	N_2O	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	Diesel PM	CO_2	CH_4	N_2O	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	Diesel PM	CO_2	CH_4	N_2O	CO_2e
On Site																																											
Medium Duty Vehicles (MDVs)	Annual	98,000	5.12E-08	2.13E-08	1.50E-06	1.49E-07	2.01E-07	4.31E-09	0.00E+00	4.36E-04	1.74E-08	1.33E-08																							5.02E-03	2.09E-03	1.47E-01	1.46E-02	1.97E-02	4.23E-04	0.00E+00	1.94E-02	7.75E-07	5.90E-07	1.96E-02
	Daily	443	5.12E-08	2.13E-08	1.58E-06	1.62E-07	2.15E-07	4.53E-09	0.00E+00	4.58E-04	1.88E-08	1.41E-08											2.27E-05	9.46E-06	7.00E-04	7.18E-05	9.54E-05	2.01E-06	0.00E+00	2.03E-01	8.33E-06	6.25E-06												
	Hourly	22	5.12E-08	2.13E-08	1.58E-06	1.62E-07	2.15E-07	4.53E-09	0.00E+00	4.58E-04	1.88E-08	1.41E-08	1.14E-06	4.73E-07	3.50E-05	3.59E-06	4.77E-06	1.00E-07	0.00E+00	1.01E-02	4.17E-07	3.13E-07																						
Off Site																																											
Fuel Transport (HHDT-DSL)	Annual	6,740	1.34E-07	6.51E-08	8.62E-07	3.71E-06	6.77E-08	1.57E-08	1.34E-07	1.66E-03	3.14E-09	2.61E-07																							9.03E-04	4.39E-04	5.81E-03	2.50E-02	4.56E-04	1.06E-04	9.03E-04	5.07E-03	9.61E-09	7.97E-07	5.31E-03
	Daily	20	1.34E-07	6.52E-08	8.74E-07	3.79E-06	7.01E-08	1.57E-08	1.34E-07	1.66E-03	3.26E-09	2.61E-07											2.68E-06	1.30E-06	1.75E-05	7.58E-05	1.40E-06	3.14E-07	2.68E-06	3.32E-02	6.51E-08	5.22E-06												
	Hourly	20	1.34E-07	6.52E-08	8.74E-07	3.79E-06	7.01E-08	1.57E-08	1.34E-07	1.66E-03	3.26E-09	2.61E-07	2.68E-06	1.30E-06	1.75E-05	7.58E-05	1.40E-06	3.14E-07	2.68E-06	3.32E-02	6.51E-08	5.22E-06																						
Imported Soil Vehicles (HHDT-DSL)	Annual	3,751,200	1.34E-07	6.51E-08	8.62E-07	3.71E-06	6.77E-08	1.57E-08	1.34E-07	1.66E-03	3.14E-09	2.61E-07																							5.03E-01	2.44E-01	3.24E+00	1.39E+01	2.54E-01	5.87E-02	5.03E-01	2.82E+00	5.35E-06	4.43E-04	2.95E+00
	Daily	12,504	1.34E-07	6.52E-08	8.74E-07	3.79E-06	7.01E-08	1.57E-08	1.34E-07	1.66E-03	3.26E-09	2.61E-07											1.68E-03	8.15E-04	1.09E-02	4.74E-02	8.76E-04	1.96E-04	1.68E-03	2.07E+01	4.07E-05	3.26E-03												
	Hourly	625	1.34E-07	6.52E-08	8.74E-07	3.79E-06	7.01E-08	1.57E-08	1.34E-07	1.66E-03	3.26E-09	2.61E-07	8.38E-05	4.07E-05	5.47E-04	2.37E-03	4.38E-05	9.80E-06	8.38E-05	1.04E+00	2.04E-06	1.63E-04																						
Imported Soil Vehicles (HHDT-DSL) Alternative Destinations [8]	Annual	10,863,200	1.34E-07	6.51E-08	8.62E-07	3.71E-06	6.77E-08	1.57E-08	1.34E-07	1.66E-03	3.14E-09	2.61E-07																							1.46E+00	7.07E-01	9.37E+00	4.03E+01	7.35E-01	1.70E-01	1.46E+00	8.17E+00	1.55E-05	1.28E-03	8.55E+00
	Daily	36,211	1.34E-07	6.52E-08	8.74E-07	3.79E-06	7.01E-08	1.57E-08	1.34E-07	1.66E-03	3.26E-09	2.61E-07											4.86E-03	2.36E-03	3.17E-02	1.37E-01	2.54E-03	5.68E-04	4.86E-03	6.01E+01	1.18E-04	9.44E-03												
	Hourly	1,811	1.34E-07	6.52E-08	8.74E-07	3.79E-06	7.01E-08	1.57E-08	1.34E-07	1.66E-03	3.26E-09	2.61E-07	2.43E-04	1.18E-04	1.58E-03	6.87E-03	1.27E-04	2.84E-05	2.43E-04	3.00E+00	5.89E-06	4.72E-04																						
Rock Product Vehicles (HHDT-DSL)	Annual	722,922	1.34E-07	6.51E-08	8.62E-07	3.71E-06	6.77E-08	1.57E-08	1.34E-07	1.66E-03	3.14E-09	2.61E-07																							9.69E-02	4.71E-02	6.23E-01	2.69E+00	4.89E-02	1.13E-02	9.69E-02	5.44E-01	1.03E-06	8.54E-05	5.69E-01
	Daily	2,044	1.34E-07	6.52E-08	8.74E-07	3.79E-06	7.01E-08	1.57E-08	1.34E-07	1.66E-03	3.26E-09	2.61E-07											2.74E-04	1.33E-04	1.79E-03	7.75E-03	1.43E-04	3.20E-05	2.74E-04	3.39E+00	6.65E-06	5.33E-04												
	Hourly	102	1.34E-07	6.52E-08	8.74E-07	3.79E-06	7.01E-08	1.57E-08	1.34E-07	1.66E-03	3.26E-09	2.61E-07	1.37E-05	6.66E-06	8.93E-05	3.87E-04	7.16E-06	1.60E-06	1.37E-05	1.70E-01	3.33E-07	2.66E-05																						
Employee Commute (Passenger)	Annual	109,870	7.00E-08	3.93E-08	5.85E-07	1.80E-07	7.96E-08	2.08E-09	3.65E-08	2.15E-04	5.50E-09	2.01E-08																							7.69E-03	4.32E-03	6.42E-02	1.98E-02	8.74E-03	2.28E-04	4.01E-03	1.07E-02	2.74E-07	1.00E-06	1.10E-02
	Daily	497	7.00E-08	3.93E-08	6.07E-07	1.86E-07	8.42E-08	2.15E-09	3.65E-08	2.22E-04	5.82E-09	2.03E-08											3.48E-05	1.96E-05	3.02E-04	9.23E-05	4.19E-05	1.07E-06	1.81E-05	1.10E-01	2.90E-06	1.01E-05												
	Hourly	249	7.00E-08	3.93E-08	6.07E-07	1.86E-07	8.42E-08	2.15E-09	3.65E-08	2.22E-04	5.82E-09	2.03E-08	1.74E-05	9.78E-06	1.51E-04	4.61E-05	2.09E-05	5.34E-07	9.07E-06	5.51E-02	1.45E-06	5.06E-06																						

1. HHDT-DSL = Heavy-Heavy Duty Diesel Trucks
2. Miles Traveled from Lehigh
3. Emission Factor (lb/mile) from EMFAC2017 for Santa Clara County for each vehicle type
   Emission Factor for MDVs is the average of MDV vehicles for the baseline years of 2008 through 2017 in EMFAC 2017 for Santa Clara County, gasoline fuel type, and aggregated model years.
   Emission Factor for Imported Soil Vehicles is the average of HHDT vehicles for the baseline years of 2008 through 2017 in EMFAC 2017 for Santa Clara County, diesel fuel type, and aggregated model years.
   Emission Factor for Fuel Transport vehicles is the average of HHDT vehicles for the baseline years of 2008 through 2017 in EMFAC 2017 for Santa Clara County, diesel fuel type, and aggregated model years.
   Emission Factor for Employee Vehicles is the average of LDA, LDT1, and LDT2 vehicles for the baseline years of 2008 through 2017 in EMFAC 2017 for Santa Clara County, all fuel types, and aggregated model years.
   Emission Factor for Rock Product Vehicles is the average of HHDT vehicles for the baseline years of 2008 through 2017 in EMFAC 2017 for Santa Clara County, diesel fuel type, and aggregated model years.
4. Hourly Emissions (lb/hr) = Emission Factor (lb/mile) x Miles Traveled (hourly)
5. Daily Emissions (lb/day) = Emission Factor (lb/mile) x Miles Traveled (daily)
6. Annual Emissions (lb/yr) = Emission Factor (lb/mile) x Miles Traveled (annual)
7. Annual Emissions (MT/yr) for CO_2, CH_4, and N_2O = Emission Factor (lb/mile) x Miles Traveled (annual) / 2000 (lb/ton) / 1.10231 (ton/MT)
   Annual Emissions (MT/yr) for CO_2e = [Annual Emissions (MT/yr) x GWP]CO_2 + [Annual Emissions (MT/yr) x GWP]CH_4 + [Annual Emissions (MT/yr) x GWP]N_2O
   Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)
8. Estimated emissions associated with transport of surplus construction soil to alternative destinations under the "no-Project" scenario is presented here for informational purposes only and is not used in the analysis of Project impacts.

Table 1-13. Project: Dewatering System Diesel Pumps

Equipment	Parameters [1]			Emission Factor (lb/hp-hr) [2]									Hourly Emissions (lb/hr) [3]									Daily Emissions (lb/day) [4]									Annual Emissions (lb/yr) [5]						Annual Emissions (MT/yr) [6]			
	Total Engine Horsepower	Daily Operating Hours	Annual Operating Hours	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	CO_2	CH_4	N_2O	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	CO_2	CH_4	N_2O	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	CO_2	CH_4	N_2O	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	CO_2	CH_4	N_2O	CO_2e
Dewatering System Pumps (non-Tier 3)	107	24	5,840	2.20E-03	2.20E-03	6.68E-03	3.10E-02	2.51E-03	2.05E-03	1.44E+00	8.16E-05	3.66E-05	0.24	0.24	0.72	3.32	0.27	0.22	154	0.01	0.004	5.66	5.66	17.18	79.71	6.46	5.27	3,695	0.21	0.09	1,377	1,377	4,180	19,397	1,573	1,283	408	0.02	0.01	411
Dewatering System Pumps (Tier 3)	1,086	24	5,840	3.29E-04	3.29E-04	5.75E-03	6.25E-03	3.29E-04	2.05E-03	1.44E+00	8.16E-05	3.66E-05	0.36	0.36	6.25	6.78	0.36	2.23	1,560	0.09	0.04	8.57	8.57	149.95	162.80	8.57	53.43	37,448	2.13	0.95	2,085	2,085	36,487	39,615	2,085	13,002	4,133	0.23	0.11	4,171

1. Total diesel engine horsepower and operating hours based on facility records for 2018 as pump power demand is expected to remain relatively constant. Where not available, engine horsepower estimated from pump horsepower based on an efficiency of 70[
2. Criteria pollutant emission factors (lb/hp-hr) for non-Tier 3 engines from AP-42 Table 3.3-1. Assumes TOC = ROG.
   Criteria pollutant emission factors (lb/hp-hr) for Tier 3 engines based on the Tier 3 Exhaust Emission Standards (g/kW-hr) in Table 1 of 40 CFR 89.112. Assumes NMHC = ROG. NQ+NMHC emission factor is split as 95% NO_X and 5% NMHC per BAAQMD Policy "CARB Emission Factors for CI Diesel Engines - Percent HC in Relation to NMHC + NO_X."
   SO_2 emission factor (lb/hp-hr) from AP-42 Table 3.3-1.
   GHG emission factors based on the Climate Registry's 2018 default emission factors (May 2018), Tables 13.1 (US Default CO_2 Emission Factors for Transport Fuels) and 13.7 (US Default Factors for Calculating CH_4 and N_2O Emissions from Non-Highway Vehicles) for Construction/Mining Equipment.
3. Hourly Emissions (lb/hr) = Emission Factor (lb/hp-hr) x Total Diesel HP
4. Daily Emissions (lb/day) = Hourly Emissions (lb/hr) x Daily Operating Hours
5. Annual Emissions (lb/yr) = Hourly Emissions (lb/hr) x Annual Operating Hours
6. Annual Emissions (MT/yr) for CO_2, CH_4, and N_2O = Hourly Emissions (lb/hr) x Annual Operating Hours / 2,000 lb/ton / 1.10231 ton/MT
   Annual Emissions (MT/yr) for CO_2e = [Annual Emissions (MT/yr) x GWP]CO_2 + [Annual Emissions (MT/yr) x GWP]CH_4 + [Annual Emissions (MT/yr) x GWP]N_2O
   Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)

Table 1-14. Planned: Rock Plant Equipment

Source	Parameters [1]				Emission Factor (lb/ton) [2]		Hourly Emissions (lb/hr) [3]		Daily Emissions (lb/day) [4]		Annual Emissions (lb/yr) [5]	
	Percent of Input Processed (%)	Annual Throughput (tpy)	Daily Operating Hours	Annual Operating Hours	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
CRJ3042 Jaw Crusher	80	396,354	16	5,660	0.00054	0.0001	0.0378	0.0070	0.61	0.11	214.03	39.64
CRC380X Cone Crusher	73.75	365,389	16	5,660	0.00054	0.0001	0.0349	0.0065	0.56	0.10	197.31	36.54
CRS620H Screen Plant #1	100	495,443	16	5,660	0.00074	0.00005	0.0648	0.0044	1.04	0.07	366.63	24.77
CRS620H Screen Plant #2	73.75	365,389	16	5,660	0.00074	0.00005	0.0478	0.0032	0.76	0.05	270.39	18.27
CRS820H Screen Plant #3	51.5	255,153	16	5,660	0.00074	0.00005	0.0334	0.0023	0.53	0.04	188.81	12.76
Conveyor Transfer Point Jaw to Screen #1 Feed	80	396,354	16	5,660	0.000046	0.000013	0.0032	0.0009	0.05	0.01	18.23	5.15
Conveyor Transfer Point Screen #1 to Base Stacker	48.5	240,290	16	5,660	0.000046	0.000013	0.0020	0.0006	0.03	0.01	11.05	3.12
Conveyor Transfer Point Feed to Screen #1	100	495,443	16	5,660	0.000046	0.000013	0.0040	0.0011	0.06	0.02	22.79	6.44
Conveyor Transfer Point Screen #1 to Cone Crusher	51.5	255,153	16	5,660	0.000046	0.000013	0.0021	0.0006	0.03	0.01	11.74	3.32
Conveyor Transfer Point Recycle Oversize to Cone	22.25	110,236	16	5,660	0.000046	0.000013	0.0009	0.0003	0.01	0.004	5.07	1.43
Conveyor Transfer Point Cone Crusher Feed	73.75	365,389	16	5,660	0.000046	0.000013	0.0030	0.0008	0.05	0.01	16.81	4.75
Conveyor Transfer Point Cone Crusher Discharge	73.75	365,389	16	5,660	0.000046	0.000013	0.0030	0.0008	0.05	0.01	16.81	4.75
Conveyor Transfer Point Cone Crusher to Screen #2	73.75	365,389	16	5,660	0.000046	0.000013	0.0030	0.0008	0.05	0.01	16.81	4.75
Conveyor Transfer Point Screen #2 to Cone Crusher	22.25	110,236	16	5,660	0.000046	0.000013	0.0009	0.0003	0.01	0.004	5.07	1.43
Conveyor Transfer Point Screen #2 to Screen #3	51.5	255,153	16	5,660	0.000046	0.000013	0.0021	0.0006	0.03	0.01	11.74	3.32
Conveyor Transfer Point Feed to Screen #3	51.5	255,153	16	5,660	0.000046	0.000013	0.0021	0.0006	0.03	0.01	11.74	3.32
Conveyor Transfer Point Screen #3 to Sand Stacker	12.5	61,930	16	5,660	0.000046	0.000013	0.0005	0.0001	0.01	0.002	2.85	0.81
Conveyor Transfer Point Screen #3 to 1/4" Stacker	8.75	43,351	16	5,660	0.000046	0.000013	0.0004	0.0001	0.01	0.002	1.99	0.56
Conveyor Transfer Point Screen #3 to 1/2" Stacker	10.5	52,021	16	5,660	0.000046	0.000013	0.0004	0.0001	0.01	0.002	2.39	0.68
Conveyor Transfer Point Screen #3 to 3/4" Stacker	19.5	96,611	16	5,660	0.000046	0.000013	0.0008	0.0002	0.01	0.004	4.44	1.26

1. Based on records of production data provided by Lehigh for the baseline period.
   Material throughputs projected by Lehigh for emissions year: Year 3
2. Emission factors obtained from BAAQMD Permit Handbook Chapter 11.7 and EPA AP-42 11.19.2, Crushed Stone Processing and Pulverized Mineral Processing, Table 11.19.2-2 for controlled tertiary crushing, screening, and conveyor transfer points.
3. Hourly Emissions (lb/hr) = Annual Emissions (lb/yr) / Annual Operating Hours (hrs/yr)
4. Daily emissions (lb/day) = Hourly Emissions (lb/hr) x Daily Operating Hours (hrs/day)
5. Annual Emissions (lb/yr) = Emission Factor (lb/ton) x Annual Throughput (tons/yr)

Table 1-15. Project: Electricity Use

Source	Parameters [1]		Electricity Emission Factor [2]		Annual Electricity Use (kWh/yr) [3]	Emission Factor (lb/MWh) [4]			Global Warming Potential [5]			Annual Emissions (MT/yr) [6]			
	Value	Units	Value	Units		CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2e
Dewatering System	5,840	hours/year	547	kW	3,193,499	527.90	0.033	0.004	1	25	298	765	0.0478	0.0058	768
Quarry Office	1,800	ft^2	15.8	kWh/ft^2 - year	28,440	527.90	0.033	0.004	1	25	298	7	0.0004	0.0001	7
Rock Plant	5,660	hours/year	547.7	kW	3,099,982	527.90	0.033	0.004	1	25	298	742	0.0464	0.0056	745

1. Input parameters based on facility records.
2. The dewatering system electricity conversion factor is calculated using the electric power usage of the 2011 Reclamation Plan Amendment and scaling by electric pump horsepowe
   The quarry office electricity conversion factor is based on the Electricity Energy Intensity (EEI) value of 15.8 kW-hr/sqft-year from the 2012 Commercial Buildings Energy Consumption Survey (CBECS): 2012 Detailed Tables , US Department of Energy - Energy Information Agency, Table C19 (Electricity Consumption and Conditional Energy Intensity by Census Division for Non-Mall Buildings, Part 3), data for office buildings, Pacific Census Division.
3. Annual Electricity Use (kWh/yr) = Usage x Electricity Emission Factor
4. Emission factors from the US Department of Energy, Emissions & Generation Resource Integrated Database (eGRID), Summary Table: 1. Subregion Output Emission Rates (eGRID2016), data for Western Electricity Coordinating Council (WECC) Californi (CAMX) Subregion.
5. Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)
6. Annual Emissions (MT/yr) = Emission Factor (lb/MWh) x 0.45359 (kg/lb) / 1,000 (kg/MT) / 1,000 kWh/MWh * Annual Electricity Use (kWh/yr)
   Annual Emissions (MT/yr) for CO_2e = [Annual Emissions (MT/yr) x GWP]CO_2 + [Annual Emissions (MT/yr) x GWP]CH_4 + [Annual Emissions (MT/yr) x GWP]N_2O
   Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)

Table 1-16. Project: Summary of Air Toxic Emissions

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
DRILL	Drilling (Particulate)	Medium Grade Limestone	Antimony	4.19E-04	3.23E-06
DRILL	Drilling (Particulate)	Medium Grade Limestone	Arsenic	1.59E-03	1.23E-05
DRILL	Drilling (Particulate)	Medium Grade Limestone	Barium	5.44E-01	4.19E-03
DRILL	Drilling (Particulate)	Medium Grade Limestone	Beryllium	2.07E-05	1.60E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Cadmium	2.80E-04	2.16E-06
DRILL	Drilling (Particulate)	Medium Grade Limestone	Chromium	8.37E-03	6.45E-05
DRILL	Drilling (Particulate)	Medium Grade Limestone	Cobalt	1.38E-03	1.06E-05
DRILL	Drilling (Particulate)	Medium Grade Limestone	Copper	1.97E-02	1.52E-04
DRILL	Drilling (Particulate)	Medium Grade Limestone	Lead	1.05E-04	8.07E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Mercury	3.39E-05	2.61E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Nickel	8.37E-03	6.45E-05
DRILL	Drilling (Particulate)	Medium Grade Limestone	Selenium	4.19E-04	3.23E-06
DRILL	Drilling (Particulate)	Medium Grade Limestone	Silver	5.23E-05	4.03E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Thallium	1.05E-04	8.07E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Vanadium	1.42E-02	1.10E-04
DRILL	Drilling (Particulate)	Medium Grade Limestone	Zinc	1.17E-02	9.03E-05
DRILL	Drilling (Particulate)	Medium Grade Limestone	Hexavalent Chromium	8.16E-05	6.29E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Crystalline Silica	1.76E+01	1.36E-01
BLAST	Blasting (Particulate)	Medium Grade Limestone	Antimony	1.48E-05	1.14E-07
BLAST	Blasting (Particulate)	Medium Grade Limestone	Arsenic	5.62E-05	4.33E-07
BLAST	Blasting (Particulate)	Medium Grade Limestone	Barium	1.92E-02	1.48E-04
BLAST	Blasting (Particulate)	Medium Grade Limestone	Beryllium	7.32E-07	5.64E-09
BLAST	Blasting (Particulate)	Medium Grade Limestone	Cadmium	9.90E-06	7.63E-08
BLAST	Blasting (Particulate)	Medium Grade Limestone	Chromium	2.96E-04	2.28E-06
BLAST	Blasting (Particulate)	Medium Grade Limestone	Cobalt	4.88E-05	3.76E-07
BLAST	Blasting (Particulate)	Medium Grade Limestone	Copper	6.95E-04	5.35E-06
BLAST	Blasting (Particulate)	Medium Grade Limestone	Lead	3.70E-06	2.85E-08
BLAST	Blasting (Particulate)	Medium Grade Limestone	Mercury	1.20E-06	9.23E-09
BLAST	Blasting (Particulate)	Medium Grade Limestone	Nickel	2.96E-04	2.28E-06
BLAST	Blasting (Particulate)	Medium Grade Limestone	Selenium	1.48E-05	1.14E-07
BLAST	Blasting (Particulate)	Medium Grade Limestone	Silver	1.85E-06	1.42E-08
BLAST	Blasting (Particulate)	Medium Grade Limestone	Thallium	3.70E-06	2.85E-08
BLAST	Blasting (Particulate)	Medium Grade Limestone	Vanadium	5.03E-04	3.87E-06
BLAST	Blasting (Particulate)	Medium Grade Limestone	Zinc	4.14E-04	3.19E-06
BLAST	Blasting (Particulate)	Medium Grade Limestone	Hexavalent Chromium	2.88E-06	2.22E-08
BLAST	Blasting (Particulate)	Medium Grade Limestone	Crystalline Silica	6.21E-01	4.79E-03
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Antimony	3.24E-04	2.99E-08
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Arsenic	1.23E-03	1.14E-07
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Barium	4.21E-01	3.89E-05
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Beryllium	1.60E-05	1.48E-09
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Cadmium	2.17E-04	2.00E-08
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Chromium	6.47E-03	5.99E-07
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Cobalt	1.07E-03	9.88E-08
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Copper	1.52E-02	1.41E-06
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Lead	8.09E-05	7.48E-09
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Mercury	2.62E-05	2.42E-09
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Nickel	6.47E-03	5.99E-07
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Selenium	3.24E-04	2.99E-08
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Silver	4.04E-05	3.74E-09
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Thallium	8.09E-05	7.48E-09
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Vanadium	1.10E-02	1.02E-06
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Zinc	9.06E-03	8.38E-07
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Hexavalent Chromium	6.31E-05	5.84E-09
BSGNQM	Bulldozing, Scraping, and Grading: North Quarry (Mining)	Medium Grade Limestone	Crystalline Silica	1.36E+01	1.26E-03

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Antimony	1.09E-04	2.99E-08
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Arsenic	4.14E-04	1.14E-07
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Barium	1.42E-01	3.89E-05
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Beryllium	5.39E-06	1.48E-09
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Cadmium	7.29E-05	2.00E-08
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Chromium	2.18E-03	5.99E-07
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Cobalt	3.59E-04	9.88E-08
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Copper	5.12E-03	1.41E-06
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Lead	2.72E-05	7.48E-09
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Mercury	8.82E-06	2.42E-09
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Nickel	2.18E-03	5.99E-07
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Selenium	1.09E-04	2.99E-08
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Silver	1.36E-05	3.74E-09
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Thallium	2.72E-05	7.48E-09
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Vanadium	3.70E-03	1.02E-06
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Zinc	3.05E-03	8.38E-07
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Hexavalent Chromium	2.12E-05	5.84E-09
BSGNQR	Bulldozing, Scraping, and Grading: North Quarry (Reclamation)	Medium Grade Limestone	Crystalline Silica	4.57E+00	1.26E-03
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Antimony	1.50E-04	7.21E-08
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Arsenic	5.70E-04	2.74E-07
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Barium	1.95E-01	9.37E-05
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Beryllium	7.42E-06	3.57E-09
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Cadmium	1.00E-04	4.83E-08
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Chromium	3.00E-03	1.44E-06
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Cobalt	4.95E-04	2.38E-07
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Copper	7.05E-03	3.39E-06
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Lead	3.75E-05	1.80E-08
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Mercury	1.21E-05	5.84E-09
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Nickel	3.00E-03	1.44E-06
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Selenium	1.50E-04	7.21E-08
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Silver	1.87E-05	9.01E-09
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Thallium	3.75E-05	1.80E-08
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Vanadium	5.10E-03	2.45E-06
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Zinc	4.20E-03	2.02E-06
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Hexavalent Chromium	2.92E-05	1.41E-08
BSGW	Bulldozing, Scraping, and Grading: WMSA (Reclamation)	Medium Grade Limestone	Crystalline Silica	6.30E+00	3.03E-03
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Antimony	1.87E-03	4.23E-07
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Arsenic	7.11E-03	1.61E-06
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Barium	2.43E+00	5.50E-04
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Beryllium	9.26E-05	2.10E-08
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Cadmium	1.25E-03	2.84E-07
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Chromium	3.74E-02	8.47E-06
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Cobalt	6.17E-03	1.40E-06
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Copper	8.79E-02	1.99E-05
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Lead	4.68E-04	1.06E-07
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Mercury	1.52E-04	3.43E-08
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Nickel	3.74E-02	8.47E-06
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Selenium	1.87E-03	4.23E-07
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Silver	2.34E-04	5.29E-08
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Thallium	4.68E-04	1.06E-07
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Vanadium	6.36E-02	1.44E-05
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Zinc	5.24E-02	1.19E-05
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Hexavalent Chromium	3.65E-04	8.25E-08
NQMLT	Material Handling: North Quarry - Material from Loader to Truck (not topsoil) (Mining)	Medium Grade Limestone	Crystalline Silica	7.86E+01	1.78E-02
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Antimony	3.61E-04	8.17E-08

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Arsenic	1.80E-04	4.08E-08
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Barium	1.13E-01	2.55E-05
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Beryllium	1.08E-04	2.45E-08
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Cadmium	1.80E-04	4.08E-08
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Chromium	3.47E-03	7.84E-07
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Cobalt	9.24E-04	2.09E-07
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Copper	2.02E-03	4.57E-07
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Lead	1.80E-04	4.08E-08
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Mercury	2.89E-05	6.53E-09
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Nickel	3.32E-03	7.51E-07
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Selenium	3.61E-04	8.17E-08
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Silver	1.80E-04	4.08E-08
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Thallium	1.80E-04	4.08E-08
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Vanadium	2.74E-03	6.21E-07
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Zinc	3.61E-03	8.17E-07
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Hexavalent Chromium	1.42E-05	3.21E-09
NQLGRP	Material Handling: North Quarry - Low Grade Limestone to Rock Plant (Mining)	Low Grade Limestone	Crystalline Silica	6.06E+00	1.37E-03
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Antimony	1.45E-03	3.27E-07
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Arsenic	7.23E-04	1.64E-07
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Barium	4.51E-01	1.02E-04
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Beryllium	4.34E-04	9.81E-08
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Cadmium	7.23E-04	1.64E-07
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Chromium	1.39E-02	3.14E-06
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Cobalt	3.70E-03	8.37E-07
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Copper	8.10E-03	1.83E-06
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Lead	7.23E-04	1.64E-07
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Mercury	1.16E-04	2.62E-08
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Nickel	1.33E-02	3.01E-06
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Selenium	1.45E-03	3.27E-07
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Silver	7.23E-04	1.64E-07
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Thallium	7.23E-04	1.64E-07
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Vanadium	1.10E-02	2.49E-06
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Zinc	1.45E-02	3.27E-06
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Hexavalent Chromium	5.69E-05	1.29E-08
NQLGSP	Material Handling: North Quarry - Low Grade Limestone to Stockpile (Mining)	Low Grade Limestone	Crystalline Silica	2.43E+01	5.49E-03
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Antimony	1.62E-03	3.68E-07
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Arsenic	8.12E-04	1.84E-07
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Barium	5.07E-01	1.15E-04
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Beryllium	4.87E-04	1.10E-07
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Cadmium	8.12E-04	1.84E-07
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Chromium	1.56E-02	3.53E-06
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Cobalt	4.16E-03	9.41E-07
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Copper	9.10E-03	2.06E-06
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Lead	8.12E-04	1.84E-07
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Mercury	1.30E-04	2.94E-08
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Nickel	1.49E-02	3.38E-06
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Selenium	1.62E-03	3.68E-07
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Silver	8.12E-04	1.84E-07
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Thallium	8.12E-04	1.84E-07
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Vanadium	1.23E-02	2.79E-06
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Zinc	1.62E-02	3.68E-06
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Hexavalent Chromium	6.39E-05	1.45E-08
NQGSR	Material Handling: North Quarry - Greenstone to Backfill North Quarry (Reclamation)	Low Grade Limestone	Crystalline Silica	2.73E+01	6.18E-03
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Antimony	7.93E-05	1.79E-08
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Arsenic	1.98E-04	4.48E-08

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Barium	3.65E-02	8.25E-06
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Beryllium	5.00E-05	1.13E-08
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Cadmium	4.68E-05	1.06E-08
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Chromium	4.12E-03	9.33E-07
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Cobalt	1.11E-03	2.51E-07
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Copper	3.81E-03	8.61E-07
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Lead	9.51E-05	2.15E-08
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Mercury	7.37E-06	1.67E-09
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Nickel	4.68E-03	1.06E-06
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Selenium	7.93E-05	1.79E-08
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Silver	9.91E-06	2.24E-09
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Thallium	2.02E-05	4.57E-09
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Vanadium	6.58E-03	1.49E-06
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Zinc	3.81E-03	8.61E-07
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Hexavalent Chromium	2.46E-04	5.56E-08
NQFI	Material Handling: North Quarry - Imported Soil (Reclamation)	Road Dust	Crystalline Silica	1.67E-01	3.77E-05
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Antimony	3.61E-04	8.17E-08
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Arsenic	1.80E-04	4.08E-08
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Barium	1.13E-01	2.55E-05
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Beryllium	1.08E-04	2.45E-08
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Cadmium	1.80E-04	4.08E-08
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Chromium	3.47E-03	7.84E-07
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Cobalt	9.24E-04	2.09E-07
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Copper	2.02E-03	4.57E-07
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Lead	1.80E-04	4.08E-08
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Mercury	2.89E-05	6.53E-09
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Nickel	3.32E-03	7.51E-07
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Selenium	3.61E-04	8.17E-08
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Silver	1.80E-04	4.08E-08
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Thallium	1.80E-04	4.08E-08
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Vanadium	2.74E-03	6.21E-07
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Zinc	3.61E-03	8.17E-07
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Hexavalent Chromium	1.42E-05	3.21E-09
RPSJC	Material Handling: Rock Plant - Surge Feed Pile to Jaw Crusher (Mining)	Low Grade Limestone	Crystalline Silica	6.06E+00	1.37E-03
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Antimony	3.61E-04	8.17E-08
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Arsenic	1.80E-04	4.08E-08
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Barium	1.13E-01	2.55E-05
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Beryllium	1.08E-04	2.45E-08
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Cadmium	1.80E-04	4.08E-08
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Chromium	3.47E-03	7.84E-07
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Cobalt	9.24E-04	2.09E-07
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Copper	2.02E-03	4.57E-07
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Lead	1.80E-04	4.08E-08
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Mercury	2.89E-05	6.53E-09
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Nickel	3.32E-03	7.51E-07
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Selenium	3.61E-04	8.17E-08
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Silver	1.80E-04	4.08E-08
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Thallium	1.80E-04	4.08E-08
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Vanadium	2.74E-03	6.21E-07
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Zinc	3.61E-03	8.17E-07
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Hexavalent Chromium	1.42E-05	3.21E-09
RPCSP	Material Handling: Rock Plant - Conveyor to Product Storage Pile (Mining)	Low Grade Limestone	Crystalline Silica	6.06E+00	1.37E-03
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Antimony	3.61E-04	8.17E-08
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Arsenic	1.80E-04	4.08E-08
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Barium	1.13E-01	2.55E-05

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Beryllium	1.08E-04	2.45E-08
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Cadmium	1.80E-04	4.08E-08
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Chromium	3.47E-03	7.84E-07
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Cobalt	9.24E-04	2.09E-07
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Copper	2.02E-03	4.57E-07
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Lead	1.80E-04	4.08E-08
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Mercury	2.89E-05	6.53E-09
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Nickel	3.32E-03	7.51E-07
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Selenium	3.61E-04	8.17E-08
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Silver	1.80E-04	4.08E-08
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Thallium	1.80E-04	4.08E-08
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Vanadium	2.74E-03	6.21E-07
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Zinc	3.61E-03	8.17E-07
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Hexavalent Chromium	1.42E-05	3.21E-09
RPSPT	Material Handling: Rock Plant - Loader from Product Storage Pile to Truck (Mining)	Low Grade Limestone	Crystalline Silica	6.06E+00	1.37E-03
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Antimony	1.65E-01	1.88E-05
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Arsenic	1.77E-01	2.02E-05
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Barium	5.84E+01	6.67E-03
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Beryllium	6.50E-02	7.42E-06
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Cadmium	8.67E-02	9.90E-06
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Chromium	3.58E+00	4.09E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Cobalt	9.61E-01	1.10E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Copper	2.92E+00	3.33E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Lead	1.15E-01	1.32E-05
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Mercury	1.38E-02	1.58E-06
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Nickel	3.86E+00	4.41E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Selenium	1.65E-01	1.88E-05
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Silver	6.48E-02	7.40E-06
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Thallium	7.09E-02	8.09E-06
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Vanadium	4.81E+00	5.49E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Zinc	3.44E+00	3.93E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Hexavalent Chromium	1.51E-01	1.72E-05
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Crystalline Silica	2.08E+03	2.37E-01
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Antimony	1.57E-01	1.79E-05
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Arsenic	7.83E-02	8.93E-06
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Barium	4.88E+01	5.58E-03
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Beryllium	4.70E-02	5.36E-06
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Cadmium	7.83E-02	8.93E-06
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Chromium	1.50E+00	1.72E-04
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Cobalt	4.01E-01	4.57E-05
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Copper	8.77E-01	1.00E-04
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Lead	7.83E-02	8.93E-06
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Mercury	1.25E-02	1.43E-06
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Nickel	1.44E+00	1.64E-04
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Selenium	1.57E-01	1.79E-05
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Silver	7.83E-02	8.93E-06
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Thallium	7.83E-02	8.93E-06
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Vanadium	1.19E+00	1.36E-04
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Zinc	1.57E+00	1.79E-04
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Hexavalent Chromium	6.16E-03	7.03E-07
WEWMNR	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Crystalline Silica	2.63E+03	3.00E-01
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Antimony	7.28E-05	8.32E-09
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Arsenic	1.82E-04	2.08E-08
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Barium	3.35E-02	3.82E-06
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Beryllium	4.59E-05	5.24E-09

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Cadmium	4.30E-05	4.91E-09
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Chromium	3.79E-03	4.32E-07
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Cobalt	1.02E-03	1.16E-07
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Copper	3.50E-03	3.99E-07
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Lead	8.74E-05	9.98E-09
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Mercury	6.77E-06	7.73E-10
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Nickel	4.30E-03	4.91E-07
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Selenium	7.28E-05	8.32E-09
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Silver	9.11E-06	1.04E-09
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Thallium	1.86E-05	2.12E-09
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Vanadium	6.05E-03	6.90E-07
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Zinc	3.50E-03	3.99E-07
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Hexavalent Chromium	2.26E-04	2.58E-08
WENRUR	Wind Erosion: North Quarry - Unpaved Roads (Mining/Reclamation)	Road Dust	Crystalline Silica	1.53E-01	1.75E-05
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Antimony	1.50E-04	1.71E-08
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Arsenic	3.75E-04	4.28E-08
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Barium	6.90E-02	7.88E-06
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Beryllium	9.45E-05	1.08E-08
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Cadmium	8.85E-05	1.01E-08
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Chromium	7.80E-03	8.90E-07
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Cobalt	2.10E-03	2.40E-07
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Copper	7.20E-03	8.22E-07
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Lead	1.80E-04	2.05E-08
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Mercury	1.40E-05	1.59E-09
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Nickel	8.85E-03	1.01E-06
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Selenium	1.50E-04	1.71E-08
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Silver	1.88E-05	2.14E-09
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Thallium	3.83E-05	4.37E-09
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Vanadium	1.25E-02	1.42E-06
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Zinc	7.20E-03	8.22E-07
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Hexavalent Chromium	4.65E-04	5.31E-08
WEWMUR	Wind Erosion: WMSA - Unpaved Roads (Mining/Reclamation)	Road Dust	Crystalline Silica	3.15E-01	3.60E-05
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Antimony	8.14E-04	9.30E-08
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Arsenic	4.07E-04	4.65E-08
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Barium	2.54E-01	2.90E-05
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Beryllium	2.44E-04	2.79E-08
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Cadmium	4.07E-04	4.65E-08
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Chromium	7.82E-03	8.93E-07
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Cobalt	2.08E-03	2.38E-07
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Copper	4.56E-03	5.21E-07
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Lead	4.07E-04	4.65E-08
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Mercury	6.52E-05	7.44E-09
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Nickel	7.49E-03	8.55E-07
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Selenium	8.14E-04	9.30E-08
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Silver	4.07E-04	4.65E-08
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Thallium	4.07E-04	4.65E-08
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Vanadium	6.19E-03	7.07E-07
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Zinc	8.14E-03	9.30E-07
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Hexavalent Chromium	3.20E-05	3.66E-09
WERPSP	Wind Erosion: Rock Plant - Stockpiles (Mining)	Low Grade Limestone	Crystalline Silica	1.37E+01	1.56E-03
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Antimony	1.16E-05	1.33E-09
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Arsenic	2.90E-05	3.31E-09
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Barium	5.34E-03	6.10E-07
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Beryllium	7.32E-06	8.35E-10
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Cadmium	6.85E-06	7.82E-10

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Chromium	6.04E-04	6.89E-08
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Cobalt	1.63E-04	1.86E-08
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Copper	5.57E-04	6.36E-08
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Lead	1.39E-05	1.59E-09
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Mercury	1.08E-06	1.23E-10
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Nickel	6.85E-04	7.82E-08
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Selenium	1.16E-05	1.33E-09
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Silver	1.45E-06	1.66E-10
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Thallium	2.96E-06	3.38E-10
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Vanadium	9.64E-04	1.10E-07
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Zinc	5.57E-04	6.36E-08
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Hexavalent Chromium	3.60E-05	4.11E-09
WERPUR	Wind Erosion: Rock Plant - Unpaved Roads (Mining)	Road Dust	Crystalline Silica	2.44E-02	2.78E-06
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Antimony	7.41E-02	1.68E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Arsenic	1.85E-01	4.19E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Barium	3.41E+01	7.71E-03
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Beryllium	4.67E-02	1.06E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Cadmium	4.37E-02	9.89E-06
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Chromium	3.85E+00	8.72E-04
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Cobalt	1.04E+00	2.35E-04
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Copper	3.56E+00	8.05E-04
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Lead	8.89E-02	2.01E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Mercury	6.89E-03	1.56E-06
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Nickel	4.37E+00	9.89E-04
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Selenium	7.41E-02	1.68E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Silver	9.26E-03	2.10E-06
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Thallium	1.89E-02	4.27E-06
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Vanadium	6.15E+00	1.39E-03
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Zinc	3.56E+00	8.05E-04
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Hexavalent Chromium	2.30E-01	5.20E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Crystalline Silica	1.56E+02	3.52E-02
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Antimony	3.30E-03	7.47E-07
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Arsenic	8.26E-03	1.87E-06
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Barium	1.52E+00	3.44E-04
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Beryllium	2.08E-03	4.71E-07
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Cadmium	1.95E-03	4.41E-07
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Chromium	1.72E-01	3.88E-05
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Cobalt	4.62E-02	1.05E-05
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Copper	1.58E-01	3.59E-05
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Lead	3.96E-03	8.96E-07
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Mercury	3.07E-04	6.95E-08
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Nickel	1.95E-01	4.41E-05
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Selenium	3.30E-03	7.47E-07
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Silver	4.13E-04	9.34E-08
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Thallium	8.42E-04	1.91E-07
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Vanadium	2.74E-01	6.20E-05
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Zinc	1.58E-01	3.59E-05
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Hexavalent Chromium	1.02E-02	2.32E-06
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Crystalline Silica	6.93E+00	1.57E-03
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Antimony	2.57E-03	5.28E-07
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Arsenic	6.42E-03	1.32E-06
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Barium	1.18E+00	2.43E-04
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Beryllium	1.62E-03	3.32E-07
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Cadmium	1.51E-03	3.11E-07
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Chromium	1.33E-01	2.74E-05

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Cobalt	3.59E-02	7.39E-06
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Copper	1.23E-01	2.53E-05
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Lead	3.08E-03	6.33E-07
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Mercury	2.39E-04	4.91E-08
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Nickel	1.51E-01	3.11E-05
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Selenium	2.57E-03	5.28E-07
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Silver	3.21E-04	6.59E-08
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Thallium	6.55E-04	1.35E-07
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Vanadium	2.13E-01	4.38E-05
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Zinc	1.23E-01	2.53E-05
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Hexavalent Chromium	7.96E-03	1.64E-06
PROFWY	Paved Road Dust Entrainment: On road vehicles - Freeway	Road Dust	Crystalline Silica	5.39E+00	1.11E-03
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Antimony	5.29E-03	1.09E-06
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Arsenic	1.32E-02	2.72E-06
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Barium	2.43E+00	5.00E-04
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Beryllium	3.33E-03	6.85E-07
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Cadmium	3.12E-03	6.42E-07
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Chromium	2.75E-01	5.66E-05
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Cobalt	7.41E-02	1.52E-05
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Copper	2.54E-01	5.22E-05
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Lead	6.35E-03	1.31E-06
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Mercury	4.92E-04	1.01E-07
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Nickel	3.12E-01	6.42E-05
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Selenium	5.29E-03	1.09E-06
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Silver	6.62E-04	1.36E-07
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Thallium	1.35E-03	2.77E-07
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Vanadium	4.39E-01	9.03E-05
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Zinc	2.54E-01	5.22E-05
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Hexavalent Chromium	1.64E-02	3.37E-06
PROMAJ	Paved Road Dust Entrainment: On road vehicles - Major	Road Dust	Crystalline Silica	1.11E+01	2.28E-03
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Antimony	6.37E-04	1.31E-07
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Arsenic	1.59E-03	3.27E-07
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Barium	2.93E-01	6.02E-05
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Beryllium	4.01E-04	8.24E-08
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Cadmium	3.76E-04	7.72E-08
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Chromium	3.31E-02	6.80E-06
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Cobalt	8.91E-03	1.83E-06
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Copper	3.06E-02	6.28E-06
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Lead	7.64E-04	1.57E-07
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Mercury	5.92E-05	1.22E-08
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Nickel	3.76E-02	7.72E-06
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Selenium	6.37E-04	1.31E-07
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Silver	7.96E-05	1.64E-08
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Thallium	1.62E-04	3.34E-08
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Vanadium	5.28E-02	1.09E-05
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Zinc	3.06E-02	6.28E-06
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Hexavalent Chromium	1.97E-03	4.06E-07
PROCOL	Paved Road Dust Entrainment: On road vehicles - Collector	Road Dust	Crystalline Silica	1.34E+00	2.75E-04
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Antimony	6.13E-03	1.26E-06
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Arsenic	1.53E-02	3.15E-06
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Barium	2.82E+00	5.80E-04
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Beryllium	3.86E-03	7.94E-07
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Cadmium	3.62E-03	7.43E-07
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Chromium	3.19E-01	6.55E-05
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Cobalt	8.58E-02	1.76E-05

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Copper	2.94E-01	6.05E-05
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Lead	7.36E-03	1.51E-06
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Mercury	5.70E-04	1.17E-07
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Nickel	3.62E-01	7.43E-05
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Selenium	6.13E-03	1.26E-06
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Silver	7.66E-04	1.58E-07
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Thallium	1.56E-03	3.21E-07
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Vanadium	5.09E-01	1.05E-04
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Zinc	2.94E-01	6.05E-05
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Hexavalent Chromium	1.90E-02	3.91E-06
PROLOC	Paved Road Dust Entrainment: On road vehicles - Local	Road Dust	Crystalline Silica	1.29E+01	2.65E-03
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Antimony	4.04E-03	8.72E-07
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Arsenic	1.01E-02	2.18E-06
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Barium	1.86E+00	4.01E-04
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Beryllium	2.54E-03	5.50E-07
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Cadmium	2.38E-03	5.15E-07
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Chromium	2.10E-01	4.54E-05
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Cobalt	5.65E-02	1.22E-05
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Copper	1.94E-01	4.19E-05
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Lead	4.84E-03	1.05E-06
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Mercury	3.75E-04	8.11E-08
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Nickel	2.38E-01	5.15E-05
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Selenium	4.04E-03	8.72E-07
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Silver	5.05E-04	1.09E-07
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Thallium	1.03E-03	2.22E-07
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Vanadium	3.35E-01	7.24E-05
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Zinc	1.94E-01	4.19E-05
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Hexavalent Chromium	1.25E-02	2.70E-06
PRORP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Crystalline Silica	8.48E+00	1.83E-03
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Antimony	5.92E-03	9.42E-07
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Arsenic	1.48E-02	2.36E-06
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Barium	2.72E+00	4.33E-04
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Beryllium	3.73E-03	5.94E-07
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Cadmium	3.49E-03	5.56E-07
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Chromium	3.08E-01	4.90E-05
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Cobalt	8.29E-02	1.32E-05
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Copper	2.84E-01	4.52E-05
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Lead	7.10E-03	1.13E-06
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Mercury	5.51E-04	8.76E-08
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Nickel	3.49E-01	5.56E-05
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Selenium	5.92E-03	9.42E-07
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Silver	7.40E-04	1.18E-07
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Thallium	1.51E-03	2.40E-07
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Vanadium	4.91E-01	7.82E-05
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Zinc	2.84E-01	4.52E-05
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Hexavalent Chromium	1.84E-02	2.92E-06
PRIFWY	Paved Road Dust Entrainment: Imported Soil Vehicles - Freeway Alternative Destinations	Road Dust	Crystalline Silica	1.24E+01	1.98E-03
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Antimony	1.22E-02	1.94E-06
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Arsenic	3.05E-02	4.86E-06
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Barium	5.61E+00	8.94E-04
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Beryllium	7.69E-03	1.22E-06
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Cadmium	7.20E-03	1.15E-06
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Chromium	6.35E-01	1.01E-04
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Cobalt	1.71E-01	2.72E-05
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Copper	5.86E-01	9.32E-05

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Lead	1.46E-02	2.33E-06
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Mercury	1.13E-03	1.81E-07
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Nickel	7.20E-01	1.15E-04
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Selenium	1.22E-02	1.94E-06
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Silver	1.53E-03	2.43E-07
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Thallium	3.11E-03	4.95E-07
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Vanadium	1.01E+00	1.61E-04
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Zinc	5.86E-01	9.32E-05
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Hexavalent Chromium	3.78E-02	6.02E-06
PRIMAJ	Paved Road Dust Entrainment: Imported Soil Vehicles - Major Alternative Destinations	Road Dust	Crystalline Silica	2.56E+01	4.08E-03
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Antimony	1.47E-03	2.34E-07
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Arsenic	3.67E-03	5.84E-07
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Barium	6.75E-01	1.07E-04
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Beryllium	9.25E-04	1.47E-07
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Cadmium	8.66E-04	1.38E-07
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Chromium	7.63E-02	1.21E-05
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Cobalt	2.05E-02	3.27E-06
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Copper	7.04E-02	1.12E-05
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Lead	1.76E-03	2.80E-07
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Mercury	1.36E-04	2.17E-08
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Nickel	8.66E-02	1.38E-05
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Selenium	1.47E-03	2.34E-07
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Silver	1.83E-04	2.92E-08
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Thallium	3.74E-04	5.96E-08
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Vanadium	1.22E-01	1.94E-05
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Zinc	7.04E-02	1.12E-05
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Hexavalent Chromium	4.55E-03	7.24E-07
PRICOL	Paved Road Dust Entrainment: Imported Soil Vehicles - Collector Alternative Destinations	Road Dust	Crystalline Silica	3.08E+00	4.91E-04
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Antimony	1.41E-02	2.25E-06
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Arsenic	3.53E-02	5.63E-06
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Barium	6.50E+00	1.04E-03
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Beryllium	8.91E-03	1.42E-06
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Cadmium	8.34E-03	1.33E-06
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Chromium	7.35E-01	1.17E-04
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Cobalt	1.98E-01	3.15E-05
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Copper	6.79E-01	1.08E-04
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Lead	1.70E-02	2.70E-06
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Mercury	1.31E-03	2.09E-07
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Nickel	8.34E-01	1.33E-04
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Selenium	1.41E-02	2.25E-06
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Silver	1.77E-03	2.81E-07
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Thallium	3.61E-03	5.74E-07
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Vanadium	1.17E+00	1.87E-04
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Zinc	6.79E-01	1.08E-04
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Hexavalent Chromium	4.38E-02	6.98E-06
PRILOC	Paved Road Dust Entrainment: Imported Soil Vehicles - Local Alternative Destinations	Road Dust	Crystalline Silica	2.97E+01	4.73E-03
D15K	Fuel Storage: Diesel Storage Tank, 15,000 gal	Diesel Storage	Benzene	1.46E-02	6.60E-05
D15K	Fuel Storage: Diesel Storage Tank, 15,000 gal	Diesel Storage	Toluene	7.99E-02	3.61E-04
D15K	Fuel Storage: Diesel Storage Tank, 15,000 gal	Diesel Storage	Xylenes (mixed)	6.96E-02	3.15E-04
D4K	Fuel Storage: Diesel Storage Tank, 4,000 gal	Diesel Storage	Benzene	3.52E-03	1.59E-05
D4K	Fuel Storage: Diesel Storage Tank, 4,000 gal	Diesel Storage	Toluene	1.93E-02	8.72E-05
D4K	Fuel Storage: Diesel Storage Tank, 4,000 gal	Diesel Storage	Xylenes (mixed)	1.68E-02	7.60E-05
G10K	Fuel Storage: Gasoline Storage Tank, 10,000 gal	Gasoline Storage	Benzene	2.55E-01	1.16E-03
G10K	Fuel Storage: Gasoline Storage Tank, 10,000 gal	Gasoline Storage	Toluene	3.65E-01	1.65E-03
G10K	Fuel Storage: Gasoline Storage Tank, 10,000 gal	Gasoline Storage	Xylenes (mixed)	3.65E-01	1.65E-03

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
DDISP	Diesel Fuel Dispensing	Diesel Storage	Benzene	5.83E-02	1.32E-05
DDISP	Diesel Fuel Dispensing	Diesel Storage	Toluene	3.19E-01	7.23E-05
DDISP	Diesel Fuel Dispensing	Diesel Storage	Xylenes (mixed)	2.78E-01	6.30E-05
GDISP	Gasoline Fuel Dispensing	Gasoline Storage	Benzene	1.74E-02	3.93E-06
GDISP	Gasoline Fuel Dispensing	Gasoline Storage	Toluene	2.48E-02	5.62E-06
GDISP	Gasoline Fuel Dispensing	Gasoline Storage	Xylenes (mixed)	2.48E-02	5.62E-06
ORD45	Off Road Vehicle Diesel Combustion: Bore/Drill Rigs	DPM	Diesel PM	3.98E+02	9.00E-02
ORD850	Off Road Vehicle Diesel Combustion: Crawler Dozer	DPM	Diesel PM	9.03E+00	2.35E-03
ORD872	Off Road Vehicle Diesel Combustion: Graders	DPM	Diesel PM	1.59E+01	5.99E-03
ORD460	Off Road Vehicle Diesel Combustion: Off-Highway 45 Ton Dump Truck	DPM	Diesel PM	6.22E+02	8.90E-03
ORD944	Off Road Vehicle Diesel Combustion: Rubber Tired Loaders	DPM	Diesel PM	7.12E+01	9.40E-03
ORD410	Off Road Vehicle Diesel Combustion: Water Trucks	DPM	Diesel PM	4.66E+01	8.20E-03
ORD695	Off Road Vehicle Diesel Combustion: Portable Light Tower	DPM	Diesel PM	1.26E+01	4.74E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Copper	2.16E-02	4.88E-06
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Nickel	2.16E-02	4.88E-06
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	1,2,4-Trimethylbenzene	9.08E+00	2.05E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	1,3-Butadiene	6.00E+00	1.36E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Acetaldehyde	5.42E+00	1.23E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Acrolein	1.30E+00	2.94E-04
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Benzene	2.49E+01	5.63E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Chlorine	2.97E+00	6.73E-04
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Ethyl benzene	1.08E+01	2.45E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Formaldehyde	2.25E+01	5.10E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Hexane	9.47E+00	2.14E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Manganese	2.16E-02	4.88E-06
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Methanol	5.06E+00	1.15E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Methyl ethyl ketone {2-Butanone}	4.34E-01	9.81E-05
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Methyl tert-butyl ether	1.35E+01	3.04E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	m-Xylene	3.21E+01	7.27E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Naphthalene	9.41E-01	2.13E-04
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	o-Xylene	1.12E+01	2.53E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Styrene	9.41E-01	2.13E-04
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Toluene	4.91E+01	1.11E-02
HDTFT	On Road Vehicle Diesel Combustion: Fuel Transport (HHDT-DSL)	DPM	Diesel PM	9.03E-04	2.68E-06
HDTIF	On Road Vehicle Diesel Combustion: Imported Soil Vehicles (HHDT-DSL)	DPM	Diesel PM	5.03E-01	8.38E-05
HDTIFA	On Road Vehicle Diesel Combustion: Imported Soil Vehicles (HHDT-DSL) Alternative Destinations 8	DPM	Diesel PM	1.46E+00	2.43E-04
HDTRP	On Road Vehicle Diesel Combustion: Rock Product Vehicles (HHDT-DSL)	DPM	Diesel PM	9.69E-02	1.37E-05
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Copper	2.42E-02	5.47E-05
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Nickel	2.42E-02	5.47E-05
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	1,2,4-Trimethylbenzene	1.02E+01	2.30E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	1,3-Butadiene	6.72E+00	1.52E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Acetaldehyde	6.08E+00	1.38E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Acrolein	1.46E+00	3.30E-03
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Benzene	2.79E+01	6.31E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Chlorine	3.33E+00	7.54E-03
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Ethyl benzene	1.22E+01	2.75E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Formaldehyde	2.53E+01	5.72E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Hexane	1.06E+01	2.40E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Manganese	2.42E-02	5.47E-05
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Methanol	5.68E+00	1.28E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Methyl ethyl ketone {2-Butanone}	4.86E-01	1.10E-03
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Methyl tert-butyl ether	1.51E+01	3.41E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	m-Xylene	3.60E+01	8.15E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Naphthalene	1.05E+00	2.39E-03
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	o-Xylene	1.25E+01	2.83E-02

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Styrene	1.05E+00	2.39E-03
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Toluene	5.50E+01	1.24E-01
DEWNT3	Dewatering System Pumps (non-Tier 3)	DPM	Diesel PM	1.38E+03	2.36E-01
DEWT3	Dewatering System Pumps (Tier 3)	DPM	Diesel PM	2.08E+03	3.57E-01
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Antimony	5.35E-04	9.45E-08
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Arsenic	2.68E-04	4.73E-08
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Barium	1.67E-01	2.95E-05
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Beryllium	1.61E-04	2.84E-08
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Cadmium	2.68E-04	4.73E-08
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Chromium	5.14E-03	9.08E-07
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Cobalt	1.37E-03	2.42E-07
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Copper	3.00E-03	5.29E-07
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Lead	2.68E-04	4.73E-08
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Mercury	4.28E-05	7.56E-09
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Nickel	4.92E-03	8.70E-07
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Selenium	5.35E-04	9.45E-08
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Silver	2.68E-04	4.73E-08
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Thallium	2.68E-04	4.73E-08
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Vanadium	4.07E-03	7.18E-07
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Zinc	5.35E-03	9.45E-07
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Hexavalent Chromium	2.10E-05	3.72E-09
RPJAW	Rock Plant: CRJ3042 Jaw Crusher	Low Grade Limestone	Crystalline Silica	8.99E+00	1.59E-03
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Antimony	4.93E-04	8.72E-08
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Arsenic	2.47E-04	4.36E-08
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Barium	1.54E-01	2.72E-05
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Beryllium	1.48E-04	2.61E-08
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Cadmium	2.47E-04	4.36E-08
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Chromium	4.74E-03	8.37E-07
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Cobalt	1.26E-03	2.23E-07
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Copper	2.76E-03	4.88E-07
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Lead	2.47E-04	4.36E-08
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Mercury	3.95E-05	6.97E-09
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Nickel	4.54E-03	8.02E-07
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Selenium	4.93E-04	8.72E-08
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Silver	2.47E-04	4.36E-08
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Thallium	2.47E-04	4.36E-08
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Vanadium	3.75E-03	6.62E-07
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Zinc	4.93E-03	8.72E-07
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Hexavalent Chromium	1.94E-05	3.43E-09
RPCONE	Rock Plant: CRC380X Cone Crusher	Low Grade Limestone	Crystalline Silica	8.29E+00	1.46E-03
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Antimony	9.17E-04	1.62E-07
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Arsenic	4.58E-04	8.10E-08
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Barium	2.86E-01	5.05E-05
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Beryllium	2.75E-04	4.86E-08
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Cadmium	4.58E-04	8.10E-08
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Chromium	8.80E-03	1.55E-06
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Cobalt	2.35E-03	4.15E-07
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Copper	5.13E-03	9.07E-07
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Lead	4.58E-04	8.10E-08
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Mercury	7.33E-05	1.30E-08
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Nickel	8.43E-03	1.49E-06
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Selenium	9.17E-04	1.62E-07
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Silver	4.58E-04	8.10E-08
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Thallium	4.58E-04	8.10E-08
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Vanadium	6.97E-03	1.23E-06

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Zinc	9.17E-03	1.62E-06
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Hexavalent Chromium	3.61E-05	6.37E-09
RPS1	Rock Plant: CRS620H Screen Plant #1	Low Grade Limestone	Crystalline Silica	1.54E+01	2.72E-03
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Antimony	6.76E-04	1.19E-07
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Arsenic	3.38E-04	5.97E-08
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Barium	2.11E-01	3.73E-05
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Beryllium	2.03E-04	3.58E-08
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Cadmium	3.38E-04	5.97E-08
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Chromium	6.49E-03	1.15E-06
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Cobalt	1.73E-03	3.06E-07
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Copper	3.79E-03	6.69E-07
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Lead	3.38E-04	5.97E-08
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Mercury	5.41E-05	9.55E-09
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Nickel	6.22E-03	1.10E-06
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Selenium	6.76E-04	1.19E-07
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Silver	3.38E-04	5.97E-08
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Thallium	3.38E-04	5.97E-08
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Vanadium	5.14E-03	9.08E-07
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Zinc	6.76E-03	1.19E-06
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Hexavalent Chromium	2.66E-05	4.70E-09
RPS2	Rock Plant: CRS620H Screen Plant #2	Low Grade Limestone	Crystalline Silica	1.14E+01	2.01E-03
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Antimony	4.72E-04	8.34E-08
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Arsenic	2.36E-04	4.17E-08
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Barium	1.47E-01	2.60E-05
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Beryllium	1.42E-04	2.50E-08
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Cadmium	2.36E-04	4.17E-08
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Chromium	4.53E-03	8.01E-07
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Cobalt	1.21E-03	2.13E-07
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Copper	2.64E-03	4.67E-07
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Lead	2.36E-04	4.17E-08
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Mercury	3.78E-05	6.67E-09
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Nickel	4.34E-03	7.67E-07
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Selenium	4.72E-04	8.34E-08
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Silver	2.36E-04	4.17E-08
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Thallium	2.36E-04	4.17E-08
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Vanadium	3.59E-03	6.34E-07
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Zinc	4.72E-03	8.34E-07
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Hexavalent Chromium	1.86E-05	3.28E-09
RPS3	Rock Plant: CRS820H Screen Plant #3	Low Grade Limestone	Crystalline Silica	7.93E+00	1.40E-03
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Antimony	4.56E-05	8.05E-09
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Arsenic	2.28E-05	4.03E-09
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Barium	1.42E-02	2.51E-06
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Beryllium	1.37E-05	2.42E-09
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Cadmium	2.28E-05	4.03E-09
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Chromium	4.38E-04	7.73E-08
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Cobalt	1.17E-04	2.06E-08
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Copper	2.55E-04	4.51E-08
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Lead	2.28E-05	4.03E-09
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Mercury	3.65E-06	6.44E-10
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Nickel	4.19E-04	7.41E-08
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Selenium	4.56E-05	8.05E-09
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Silver	2.28E-05	4.03E-09
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Thallium	2.28E-05	4.03E-09
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Vanadium	3.46E-04	6.12E-08
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Zinc	4.56E-04	8.05E-08

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Hexavalent Chromium	1.79E-06	3.17E-10
RPT1	Rock Plant: Conveyor Transfer Point Jaw to Screen #1 Feed	Low Grade Limestone	Crystalline Silica	7.66E-01	1.35E-04
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Antimony	2.76E-05	4.88E-09
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Arsenic	1.38E-05	2.44E-09
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Barium	8.62E-03	1.52E-06
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Beryllium	8.29E-06	1.46E-09
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Cadmium	1.38E-05	2.44E-09
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Chromium	2.65E-04	4.69E-08
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Cobalt	7.07E-05	1.25E-08
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Copper	1.55E-04	2.73E-08
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Lead	1.38E-05	2.44E-09
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Mercury	2.21E-06	3.91E-10
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Nickel	2.54E-04	4.49E-08
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Selenium	2.76E-05	4.88E-09
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Silver	1.38E-05	2.44E-09
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Thallium	1.38E-05	2.44E-09
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Vanadium	2.10E-04	3.71E-08
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Zinc	2.76E-04	4.88E-08
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Hexavalent Chromium	1.09E-06	1.92E-10
RPT2	Rock Plant: Conveyor Transfer Point Screen #1 to Base Stacker	Low Grade Limestone	Crystalline Silica	4.64E-01	8.20E-05
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Antimony	5.70E-05	1.01E-08
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Arsenic	2.85E-05	5.03E-09
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Barium	1.78E-02	3.14E-06
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Beryllium	1.71E-05	3.02E-09
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Cadmium	2.85E-05	5.03E-09
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Chromium	5.47E-04	9.66E-08
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Cobalt	1.46E-04	2.58E-08
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Copper	3.19E-04	5.64E-08
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Lead	2.85E-05	5.03E-09
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Mercury	4.56E-06	8.05E-10
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Nickel	5.24E-04	9.26E-08
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Selenium	5.70E-05	1.01E-08
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Silver	2.85E-05	5.03E-09
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Thallium	2.85E-05	5.03E-09
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Vanadium	4.33E-04	7.65E-08
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Zinc	5.70E-04	1.01E-07
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Hexavalent Chromium	2.24E-06	3.96E-10
RPT3	Rock Plant: Conveyor Transfer Point Feed to Screen #1	Low Grade Limestone	Crystalline Silica	9.57E-01	1.69E-04
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Antimony	2.93E-05	5.18E-09
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Arsenic	1.47E-05	2.59E-09
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Barium	9.15E-03	1.62E-06
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Beryllium	8.80E-06	1.56E-09
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Cadmium	1.47E-05	2.59E-09
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Chromium	2.82E-04	4.98E-08
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Cobalt	7.51E-05	1.33E-08
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Copper	1.64E-04	2.90E-08
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Lead	1.47E-05	2.59E-09
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Mercury	2.35E-06	4.15E-10
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Nickel	2.70E-04	4.77E-08
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Selenium	2.93E-05	5.18E-09
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Silver	1.47E-05	2.59E-09
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Thallium	1.47E-05	2.59E-09
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Vanadium	2.23E-04	3.94E-08
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Zinc	2.93E-04	5.18E-08
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Hexavalent Chromium	1.15E-06	2.04E-10

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
RPT4	Rock Plant: Conveyor Transfer Point Screen #1 to Cone Crusher	Low Grade Limestone	Crystalline Silica	4.93E-01	8.71E-05
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Antimony	1.27E-05	2.24E-09
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Arsenic	6.34E-06	1.12E-09
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Barium	3.96E-03	6.99E-07
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Beryllium	3.80E-06	6.72E-10
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Cadmium	6.34E-06	1.12E-09
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Chromium	1.22E-04	2.15E-08
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Cobalt	3.25E-05	5.73E-09
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Copper	7.10E-05	1.25E-08
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Lead	6.34E-06	1.12E-09
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Mercury	1.01E-06	1.79E-10
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Nickel	1.17E-04	2.06E-08
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Selenium	1.27E-05	2.24E-09
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Silver	6.34E-06	1.12E-09
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Thallium	6.34E-06	1.12E-09
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Vanadium	9.63E-05	1.70E-08
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Zinc	1.27E-04	2.24E-08
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Hexavalent Chromium	4.99E-07	8.81E-11
RPT5	Rock Plant: Conveyor Transfer Point Recycle Oversize to Cone	Low Grade Limestone	Crystalline Silica	2.13E-01	3.76E-05
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Antimony	4.20E-05	7.42E-09
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Arsenic	2.10E-05	3.71E-09
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Barium	1.31E-02	2.32E-06
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Beryllium	1.26E-05	2.23E-09
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Cadmium	2.10E-05	3.71E-09
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Chromium	4.03E-04	7.13E-08
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Cobalt	1.08E-04	1.90E-08
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Copper	2.35E-04	4.16E-08
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Lead	2.10E-05	3.71E-09
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Mercury	3.36E-06	5.94E-10
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Nickel	3.87E-04	6.83E-08
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Selenium	4.20E-05	7.42E-09
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Silver	2.10E-05	3.71E-09
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Thallium	2.10E-05	3.71E-09
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Vanadium	3.19E-04	5.64E-08
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Zinc	4.20E-04	7.42E-08
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Hexavalent Chromium	1.65E-06	2.92E-10
RPT6	Rock Plant: Conveyor Transfer Point Cone Crusher Feed	Low Grade Limestone	Crystalline Silica	7.06E-01	1.25E-04
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Antimony	4.20E-05	7.42E-09
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Arsenic	2.10E-05	3.71E-09
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Barium	1.31E-02	2.32E-06
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Beryllium	1.26E-05	2.23E-09
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Cadmium	2.10E-05	3.71E-09
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Chromium	4.03E-04	7.13E-08
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Cobalt	1.08E-04	1.90E-08
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Copper	2.35E-04	4.16E-08
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Lead	2.10E-05	3.71E-09
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Mercury	3.36E-06	5.94E-10
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Nickel	3.87E-04	6.83E-08
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Selenium	4.20E-05	7.42E-09
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Silver	2.10E-05	3.71E-09
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Thallium	2.10E-05	3.71E-09
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Vanadium	3.19E-04	5.64E-08
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Zinc	4.20E-04	7.42E-08
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Hexavalent Chromium	1.65E-06	2.92E-10
RPT7	Rock Plant: Conveyor Transfer Point Cone Crusher Discharge	Low Grade Limestone	Crystalline Silica	7.06E-01	1.25E-04

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Antimony	4.20E-05	7.42E-09
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Arsenic	2.10E-05	3.71E-09
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Barium	1.31E-02	2.32E-06
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Beryllium	1.26E-05	2.23E-09
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Cadmium	2.10E-05	3.71E-09
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Chromium	4.03E-04	7.13E-08
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Cobalt	1.08E-04	1.90E-08
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Copper	2.35E-04	4.16E-08
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Lead	2.10E-05	3.71E-09
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Mercury	3.36E-06	5.94E-10
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Nickel	3.87E-04	6.83E-08
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Selenium	4.20E-05	7.42E-09
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Silver	2.10E-05	3.71E-09
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Thallium	2.10E-05	3.71E-09
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Vanadium	3.19E-04	5.64E-08
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Zinc	4.20E-04	7.42E-08
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Hexavalent Chromium	1.65E-06	2.92E-10
RPT8	Rock Plant: Conveyor Transfer Point Cone Crusher to Screen #2	Low Grade Limestone	Crystalline Silica	7.06E-01	1.25E-04
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Antimony	1.27E-05	2.24E-09
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Arsenic	6.34E-06	1.12E-09
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Barium	3.96E-03	6.99E-07
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Beryllium	3.80E-06	6.72E-10
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Cadmium	6.34E-06	1.12E-09
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Chromium	1.22E-04	2.15E-08
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Cobalt	3.25E-05	5.73E-09
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Copper	7.10E-05	1.25E-08
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Lead	6.34E-06	1.12E-09
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Mercury	1.01E-06	1.79E-10
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Nickel	1.17E-04	2.06E-08
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Selenium	1.27E-05	2.24E-09
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Silver	6.34E-06	1.12E-09
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Thallium	6.34E-06	1.12E-09
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Vanadium	9.63E-05	1.70E-08
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Zinc	1.27E-04	2.24E-08
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Hexavalent Chromium	4.99E-07	8.81E-11
RPT9	Rock Plant: Conveyor Transfer Point Screen #2 to Cone Crusher	Low Grade Limestone	Crystalline Silica	2.13E-01	3.76E-05
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Antimony	2.93E-05	5.18E-09
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Arsenic	1.47E-05	2.59E-09
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Barium	9.15E-03	1.62E-06
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Beryllium	8.80E-06	1.56E-09
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Cadmium	1.47E-05	2.59E-09
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Chromium	2.82E-04	4.98E-08
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Cobalt	7.51E-05	1.33E-08
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Copper	1.64E-04	2.90E-08
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Lead	1.47E-05	2.59E-09
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Mercury	2.35E-06	4.15E-10
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Nickel	2.70E-04	4.77E-08
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Selenium	2.93E-05	5.18E-09
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Silver	1.47E-05	2.59E-09
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Thallium	1.47E-05	2.59E-09
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Vanadium	2.23E-04	3.94E-08
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Zinc	2.93E-04	5.18E-08
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Hexavalent Chromium	1.15E-06	2.04E-10
RPT10	Rock Plant: Conveyor Transfer Point Screen #2 to Screen #3	Low Grade Limestone	Crystalline Silica	4.93E-01	8.71E-05
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Antimony	2.93E-05	5.18E-09

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Arsenic	1.47E-05	2.59E-09
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Barium	9.15E-03	1.62E-06
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Beryllium	8.80E-06	1.56E-09
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Cadmium	1.47E-05	2.59E-09
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Chromium	2.82E-04	4.98E-08
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Cobalt	7.51E-05	1.33E-08
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Copper	1.64E-04	2.90E-08
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Lead	1.47E-05	2.59E-09
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Mercury	2.35E-06	4.15E-10
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Nickel	2.70E-04	4.77E-08
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Selenium	2.93E-05	5.18E-09
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Silver	1.47E-05	2.59E-09
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Thallium	1.47E-05	2.59E-09
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Vanadium	2.23E-04	3.94E-08
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Zinc	2.93E-04	5.18E-08
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Hexavalent Chromium	1.15E-06	2.04E-10
RPT11	Rock Plant: Conveyor Transfer Point Feed to Screen #3	Low Grade Limestone	Crystalline Silica	4.93E-01	8.71E-05
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Antimony	7.12E-06	1.26E-09
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Arsenic	3.56E-06	6.29E-10
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Barium	2.22E-03	3.93E-07
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Beryllium	2.14E-06	3.77E-10
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Cadmium	3.56E-06	6.29E-10
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Chromium	6.84E-05	1.21E-08
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Cobalt	1.82E-05	3.22E-09
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Copper	3.99E-05	7.05E-09
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Lead	3.56E-06	6.29E-10
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Mercury	5.70E-07	1.01E-10
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Nickel	6.55E-05	1.16E-08
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Selenium	7.12E-06	1.26E-09
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Silver	3.56E-06	6.29E-10
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Thallium	3.56E-06	6.29E-10
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Vanadium	5.41E-05	9.56E-09
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Zinc	7.12E-05	1.26E-08
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Hexavalent Chromium	2.80E-07	4.95E-11
RPT12	Rock Plant: Conveyor Transfer Point Screen #3 to Sand Stacker	Low Grade Limestone	Crystalline Silica	1.20E-01	2.11E-05
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Antimony	4.99E-06	8.81E-10
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Arsenic	2.49E-06	4.40E-10
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Barium	1.56E-03	2.75E-07
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Beryllium	1.50E-06	2.64E-10
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Cadmium	2.49E-06	4.40E-10
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Chromium	4.79E-05	8.46E-09
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Cobalt	1.28E-05	2.25E-09
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Copper	2.79E-05	4.93E-09
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Lead	2.49E-06	4.40E-10
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Mercury	3.99E-07	7.05E-11
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Nickel	4.59E-05	8.10E-09
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Selenium	4.99E-06	8.81E-10
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Silver	2.49E-06	4.40E-10
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Thallium	2.49E-06	4.40E-10
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Vanadium	3.79E-05	6.69E-09
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Zinc	4.99E-05	8.81E-09
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Hexavalent Chromium	1.96E-07	3.46E-11
RPT13	Rock Plant: Conveyor Transfer Point Screen #3 to 1/4" Stacker	Low Grade Limestone	Crystalline Silica	8.38E-02	1.48E-05
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Antimony	5.98E-06	1.06E-09
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Arsenic	2.99E-06	5.28E-10

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Barium	1.87E-03	3.30E-07
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Beryllium	1.79E-06	3.17E-10
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Cadmium	2.99E-06	5.28E-10
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Chromium	5.74E-05	1.01E-08
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Cobalt	1.53E-05	2.71E-09
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Copper	3.35E-05	5.92E-09
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Lead	2.99E-06	5.28E-10
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Mercury	4.79E-07	8.46E-11
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Nickel	5.50E-05	9.72E-09
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Selenium	5.98E-06	1.06E-09
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Silver	2.99E-06	5.28E-10
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Thallium	2.99E-06	5.28E-10
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Vanadium	4.55E-05	8.03E-09
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Zinc	5.98E-05	1.06E-08
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Hexavalent Chromium	2.35E-07	4.16E-11
RPT14	Rock Plant: Conveyor Transfer Point Screen #3 to 1/2" Stacker	Low Grade Limestone	Crystalline Silica	1.01E-01	1.78E-05
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Antimony	1.11E-05	1.96E-09
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Arsenic	5.56E-06	9.81E-10
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Barium	3.47E-03	6.12E-07
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Beryllium	3.33E-06	5.89E-10
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Cadmium	5.56E-06	9.81E-10
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Chromium	1.07E-04	1.88E-08
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Cobalt	2.84E-05	5.03E-09
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Copper	6.22E-05	1.10E-08
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Lead	5.56E-06	9.81E-10
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Mercury	8.89E-07	1.57E-10
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Nickel	1.02E-04	1.81E-08
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Selenium	1.11E-05	1.96E-09
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Silver	5.56E-06	9.81E-10
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Thallium	5.56E-06	9.81E-10
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Vanadium	8.44E-05	1.49E-08
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Zinc	1.11E-04	1.96E-08
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Hexavalent Chromium	4.37E-07	7.72E-11
RPT15	Rock Plant: Conveyor Transfer Point Screen #3 to 3/4" Stacker	Low Grade Limestone	Crystalline Silica	1.87E-01	3.30E-05

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
TOTAL	Total Proposed Emisisons	-	Antimony	4.30E-01	6.59E-05
TOTAL	Total Proposed Emisisons	-	Arsenic	5.11E-01	1.04E-04
TOTAL	Total Proposed Emisisons	-	Barium	1.58E+02	2.87E-02
TOTAL	Total Proposed Emisisons	-	Beryllium	1.75E-01	2.84E-05
TOTAL	Total Proposed Emisisons	-	Cadmium	2.28E-01	3.62E-05
TOTAL	Total Proposed Emisisons	-	Chromium	1.02E+01	1.90E-03
TOTAL	Total Proposed Emisisons	-	Cobalt	2.74E+00	5.03E-04
TOTAL	Total Proposed Emisisons	-	Copper	8.65E+00	1.82E-03
TOTAL	Total Proposed Emisisons	-	Lead	3.14E-01	5.23E-05
TOTAL	Total Proposed Emisisons	-	Mercury	3.62E-02	5.66E-06
TOTAL	Total Proposed Emisisons	-	Nickel	1.12E+01	2.15E-03
TOTAL	Total Proposed Emisisons	-	Selenium	4.30E-01	6.59E-05
TOTAL	Total Proposed Emisisons	-	Silver	1.60E-01	2.06E-05
TOTAL	Total Proposed Emisisons	-	Thallium	1.79E-01	2.49E-05
TOTAL	Total Proposed Emisisons	-	Vanadium	1.42E+01	2.79E-03
TOTAL	Total Proposed Emisisons	-	Zinc	9.80E+00	1.83E-03
TOTAL	Total Proposed Emisisons	-	Hexavalent Chromium	4.57E-01	9.19E-05
TOTAL	Total Proposed Emisisons	-	Crystalline Silica	5.18E+03	7.80E-01
TOTAL	Total Proposed Emisisons	-	Diesel PM	4.64E+03	7.22E-01
TOTAL	Total Proposed Emisisons	-	1,2,4-Trimethylbenzene	1.93E+01	2.51E-02
TOTAL	Total Proposed Emisisons	-	1,3-Butadiene	1.27E+01	1.66E-02
TOTAL	Total Proposed Emisisons	-	Acetaldehyde	1.15E+01	1.50E-02
TOTAL	Total Proposed Emisisons	-	Acrolein	2.76E+00	3.59E-03
TOTAL	Total Proposed Emisisons	-	Benzene	5.31E+01	7.00E-02
TOTAL	Total Proposed Emisisons	-	Chlorine	6.31E+00	8.21E-03
TOTAL	Total Proposed Emisisons	-	Ethyl benzene	2.30E+01	3.00E-02
TOTAL	Total Proposed Emisisons	-	Formaldehyde	4.78E+01	6.23E-02
TOTAL	Total Proposed Emisisons	-	Hexane	2.01E+01	2.62E-02
TOTAL	Total Proposed Emisisons	-	Manganese	4.57E-02	5.96E-05
TOTAL	Total Proposed Emisisons	-	Methanol	1.07E+01	1.40E-02
TOTAL	Total Proposed Emisisons	-	Methyl ethyl ketone {2-Butanone}	9.20E-01	1.20E-03
TOTAL	Total Proposed Emisisons	-	Methyl tert-butyl ether	2.85E+01	3.72E-02
TOTAL	Total Proposed Emisisons	-	m-Xylene	6.82E+01	8.88E-02
TOTAL	Total Proposed Emisisons	-	Naphthalene	2.00E+00	2.60E-03
TOTAL	Total Proposed Emisisons	-	o-Xylene	2.37E+01	3.09E-02
TOTAL	Total Proposed Emisisons	-	Styrene	2.00E+00	2.60E-03
TOTAL	Total Proposed Emisisons	-	Toluene	1.05E+02	1.38E-01
TOTAL	Total Proposed Emisisons	-	Xylenes (mixed)	7.54E-01	2.11E-03

Background Information: Material Speciation

Soil/Road Dust Speciation

Constituent	Concentration (mg/kg)	Weight Percent (%)
Antimony	1	0.0001
Arsenic	2.5	0.00025
Barium	460	0.046
Beryllium	0.63	0.000063
Cadmium	0.59	0.000059
Chromium	52	0.0052
Cobalt	14	0.0014
Copper	48	0.0048
Lead	1.2	0.00012
Mercury	0.093	0.0000093
Nickel	59	0.0059
Selenium	1	0.0001
Silver	0.125	0.0000125
Thallium	0.255	0.0000255
Vanadium	83	0.0083
Zinc	48	0.0048
Hexavalent Chromium	3.1	0.00031
Crystalline Silica		0.21

Source: Testing by Enthalpy Analytical on quarry soil conducted on 01/25/2019.
1/2 reporting limit was used for compounds where results were below reporting thresholds.
Crystalline Silica from RJ Lee Group analysis (report date 1/29/2019).

Limestone (High Grade) Speciation

Constituent	Concentration (mg/kg)	Weight Percent (%)
Antimony	1	0.0001
Arsenic	4.6	0.00046
Barium	810	0.081
Beryllium	0.055	0.0000055
Cadmium	2	0.0002
Chromium	19	0.0019
Cobalt	1.6	0.00016
Copper	36	0.0036
Lead	0.265	0.0000265
Mercury	0.18	0.000018
Nickel	24	0.0024
Selenium	2.7	0.00027
Silver	0.135	0.0000135
Thallium	0.265	0.0000265
Vanadium	110	0.011
Zinc	67	0.0067
Hexavalent Chromium	0.205	0.0000205
Crystalline Silica		2.2

Source: 2018 Q3 Lab Results provided by Talia on 11/19/2018 for High Grade Limestone.
Crystalline Silica conservatively assumed to be equal to Quartz Weight Percent.

Limestone (Medium Grade) Speciation

Constituent	Concentration (mg/kg)	Weight Percent (%)
Antimony	1	0.0001
Arsenic	3.8	0.00038
Barium	1300	0.13
Beryllium	0.0495	0.00000495
Cadmium	0.67	0.000067
Chromium	20	0.002
Cobalt	3.3	0.00033
Copper	47	0.0047
Lead	0.25	0.000025
Mercury	0.081	0.0000081
Nickel	20	0.002
Selenium	1	0.0001
Silver	0.125	0.0000125
Thallium	0.25	0.000025
Vanadium	34	0.0034
Zinc	28	0.0028
Hexavalent Chromium	0.195	0.0000195
Crystalline Silica		4.2

Source: 2018 Q3 Lab Results provided by Talia on 11/19/2018 for Medium Grade Limestone.
Crystalline Silica conservatively assumed to be equal to Quartz Weight Percent.

Limestone (Low Grade) Speciation

Constituent	Concentration (mg/kg)	Weight Percent (%)
Antimony	2.5	0.00025
Arsenic	1.25	0.000125
Barium	780	0.078
Beryllium	0.75	0.000075
Cadmium	1.25	0.000125
Chromium	24	0.0024
Cobalt	6.4	0.00064
Copper	14	0.0014
Lead	1.25	0.000125
Mercury	0.2	0.00002
Nickel	23	0.0023
Selenium	2.5	0.00025
Silver	1.25	0.000125
Thallium	1.25	0.000125
Vanadium	19	0.0019
Zinc	25	0.0025
Hexavalent Chromium	0.1	0.00001
Crystalline Silica		4.2

Source: Table A-1 of the 2014 HRA Addendum for Quarry Overburden (Low Grade) stockpiles as used in the CEIR

1/2 reporting limit was used for compounds where results were below reporting thresholds.
Crystalline Silica conservatively assumed to be equal to Quartz Weight Percent for Medium Grade Limestone.

Diesel Particulate Matter Speciation

Constituent	Weight Percent of PM_{10} (%)
Diesel PM	100

Source: BAAQMD Regulation 2, Rule 5, Table 2-5-1 Footnote 6

Diesel Storage Speciation

Constituent	Emission Factor (lb/lb VOC)
Benzene	0.00088
Toluene	0.00482
Xylenes (mixed)	0.0042

Source: SJVAPCD District Toxic Profile ID 23 for Diesel Storage Tanks from SJVAPCD 1993 District Memo "Diesel Storage Weight Fractions."

Gasoline Storage Speciation

Constituent	Emission Factor (lb/lb VOC)
Benzene	0.007
Toluene	0.01
Xylenes (mixed)	0.01

Source: SJVAPCD District Toxic Profile ID 24 for Gasoline Storage Tanks from SJVAPCD 1995 District Memo "Toxic Emissions Inventory Plan Regarding Diesel and Gasoline Storage Weight Fractions."

Gasoline Combustion Speciation

Constituent	Emission Factor (lb/mile)	Emission Factor (lb/1000 gal)
1,2,4-Trimethylbenzene	9.27E-05	1.39E+00
1,3-Butadiene	6.12E-05	9.18E-01
Acetaldehyde	5.53E-05	8.30E-01
Acrolein	1.33E-05	1.99E-01
Benzene	2.54E-04	3.81E+00
Chlorine	3.03E-05	4.55E-01
Copper	2.20E-07	3.30E-03
Ethyl benzene	1.11E-04	1.66E+00
Formaldehyde	2.30E-04	3.45E+00
Hexane	9.67E-05	1.45E+00
Manganese	2.20E-07	3.30E-03
Methanol	5.17E-05	7.75E-01
Methyl ethyl ketone {2-Butanone}	4.43E-06	6.64E-02
Methyl tert-butyl ether	1.37E-04	2.06E+00
m-Xylene	3.28E-04	4.92E+00
Naphthalene	9.60E-06	1.44E-01
Nickel	2.20E-07	3.30E-03
o-Xylene	1.14E-04	1.71E+00
Styrene	9.60E-06	1.44E-01
Toluene	5.01E-04	7.51E+00

Source: SJVAPCD District Toxic Profile ID 175 for Gasoline-Fired Non-Catalyst ICE from Table B-4 (Pg 17), "Default EF for Gasoline Combustion" in the January 2010 South Coast Air Quality Management District report, Supplemental Instructions Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory Annual Emissions Reporting Program.

APPENDIX B: BASELINE EMISSION CALCULATIONS

Table 1-1. Baseline: Emission Summary

Process Description	Criteria Pollutant Daily Emissions (lb/day)								Criteria Pollutant Annual Emissions (tpy)								Greenhouse Gas Annual Emissions (MT/yr)			
	Fugitive Dust PM_{10}	Fugitive Dust $PM_{2.5}$	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	Fugitive Dust PM_{10}	Fugitive Dust $PM_{2.5}$	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	CO_2	CH_4	N_2O	CO_2e
Mining and Reclamation Operations																				
Drilling	3.23	3.23	0	0	0	0	0	0	0.13	0.13	0	0	0	0	0	0	0	0	0	0
Blasting & Explosive Detonation	0.11	0.11	0	0	568.78	144.32	0	0	0.005	0.005	0	0	22.60	5.73	0	0	104.04	0	0	104.04
Bulldozing, Scraping & Grading	0.78	0.12	0	0	0	0	0	0	0.09	0.01	0	0	0	0	0	0	0	0	0	0
Material Handling	13.89	2.08	0	0	0	0	0	0	1.28	0.19	0	0	0	0	0	0	0	0	0	0
Wind Erosion (Disturbed Areas & Unpaved Roads)	410.19	61.53	0	0	0	0	0	0	74.86	11.23	0	0	0	0	0	0	0	0	0	0
Unpaved Road Dust Entrainment	352.92	35.29	0	0	0	0	0	0	40.59	4.06	0	0	0	0	0	0	0	0	0	0
Paved Roads Dust Entrainment	7.50	1.84	0	0	0	0	0	0	1.15	0.28	0	0	0	0	0	0	0	0	0	0
Rock Plant Equipment	0	0	57.78	8.05	0	0	0	0	0	0	2.69	0.37	0	0	0	0	0	0	0	0
Fuel Storage and Dispensing																				
Fuel Storage	0	0	0	0	0	0	0.09	0	0	0	0	0	0	0	0.01	0	0	0	0	0
Fuel Dispensing	0	0	0	0	0	0	0.34	0	0	0	0	0	0	0	0.04	0	0	0	0	0
Combustion Sources																				
Off Road Vehicles (Combustion)	0	0	14.84	13.69	190.39	447.68	26.34	0.91	0	0	1.71	1.57	21.90	51.48	3.03	0.10	10,273.47	0.61	0.28	10,370.97
On Road Vehicles (Combustion)	0	0	1.92	1.55	19.91	41.85	4.29	0.07	0	0	0.33	0.27	2.91	7.50	0.70	0.01	1125.33	0.04	0.16	1,174.83
Dewatering System	0	0	17.31	17.31	52.56	243.93	19.78	16.13	0	0	2.20	2.20	6.68	31.02	2.52	2.05	1304.22	0.07	0.03	1,315.97
Other																				
Electricity Use	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1027.12	0.06	0.01	1,031.04
Total	**788.6**	**104.2**	**91.8**	**40.6**	**831.6**	**877.8**	**50.8**	**17.1**	**118.1**	**15.9**	**6.9**	**4.4**	**54.1**	**95.7**	**6.3**	**2.2**	**13,834.2**	**0.8**	**0.5**	**13,996.9**

Table 1-2. Baseline: Inputs

Input Parameter	Value	Basis
Operating Schedule		
Operating Hours per Day	16	Calculated average based records of shifts worked provided by Lehigh for 2008-2017
Operating Days per Week	5	Calculated average based records of shifts worked provided by Lehigh for 2008-2017
Operating Weeks per Year	46	Calculated average based records of shifts worked provided by Lehigh for 2008-2017
Grading, Bulldozing, Scraping		
North Quarry		
Operating Hours per Day	26	Calculated based on annual operating hours and average operating schedule
Operating Hours per Year	6,019	Calculated based on quarry throughput and average hours/ton of material
Material Handling		
North Quarry - Limestone, Aggregate, and Waste Rock		
Hourly Throughput (tons)	1,067	Calculated based on annual throughput and average operating schedule
Daily Throughput (tons)	17,074	Calculated based on annual throughput and average operating schedule
Annual Throughput (tons)	3,927,063	Calculated average based on records of production data provided by Lehigh for 2008-2017
West Material Storage Area - Waste Rock		
Hourly Throughput (tons)	357	Calculated based on annual throughput and average operating schedule
Daily Throughput (tons)	5,707	Calculated based on annual throughput and average operating schedule
Annual Throughput (tons)	1,312,618	Calculated average based on records of production data provided by Lehigh for 2008-2017
West Material Storage Area - Rock Plant Fines		
Hourly Throughput (tons)	17	Calculated based on annual throughput and average operating schedule
Daily Throughput (tons)	280	Calculated based on annual throughput and average operating schedule
Annual Throughput (tons)	64,296	Calculated average based on records of production data provided by Lehigh for 2008-2017
Rock Plant		
Hourly Throughput (tons)	317	Calculated based on annual throughput and average operating schedule
Daily Throughput (tons)	5,068	Calculated based on hourly throughput and average operating schedule
Annual Throughput (tons)	445,846	Calculated average based on records of production data provided by Lehigh for 2008-2017
Topsoil Handling to/from On Site Storage		
Hourly Throughput (tons)	0	No topsoil handling during baseline period
Daily Throughput (tons)	0	No topsoil handling during baseline period
Annual Throughput (tons)	0	No topsoil handling during baseline period
Unpaved Roads		
Vehicle Miles Traveled - Off Road Vehicles		
Miles per Hour	98	Calculated based on daily miles and average operating schedule
Miles per Day	1,570	Calculated based on annual miles and average operating schedule
Miles per Year	361,149	Calculated based on annual operating hours and average speed of off-road equipment
Vehicle Miles Traveled - On Road Vehicles		
Miles per Hour	59	Calculated based on daily miles and average operating schedule
Miles per Day	937	Calculated based on annual miles and average operating schedule
Miles per Year	215,600	Calculated based on number of vehicles and average annual miles traveled per the 2011 Reclamation Plan Amendmen
Paved Roads		
On Road Vehicles		
Miles per Year	758,244	Calculated based on number of vehicles, trip distance, and average operating schedule
45 Ton Dump Trucks		
Miles per Year	2,332	Calculated based on number of vehicles, trip distance, and average operating schedule
Wind Erosion		
North Quarry		
Acres per Year Unpaved Roads	22	Calculated based on ratio of total disturbed area to unpaved road area for the baseline period in the 2011 Reclamation Plan Amendmen
Acres per Year Non-Road	243	North Quarry Total Disturbed Acres provided by Lehigh
WMSA		
Acres per Year Unpaved Roads	21	Calculated based on ratio of total disturbed area to unpaved road area for the baseline period in the 2011 Reclamation Plan Amendmen
Acres per Year Non-Road	152	WMSA Total Disturbed Acres provided by Lehigh
Rock Plant		
Acres per Year Stockpiles	10	Based on the facility's MFR permit

Input Parameter	Value	Basis
Electricity Use		
Dewatering System (Hours per Year)	6,104	Calculated average based on records of operating data from Lehigh for 2008-2017
Rock Plant (Hours per Year)	1,407	Calculated average based on records of operating data from Lehigh for 2008-2017
Quarry Office (Square Feet)	1,800	The quarry office measures 30 feet by 60 feet.
Fuel Dispensing and Storage		
Gasoline		
Gallons per Hour	4	Estimated based on in-plant vehicle use, mileage accruals, and fuel economy: medium duty vehicles assuming all are gasoline fueled with an average fuel efficiency of 15 mpg
Gallons per Day	62	Estimated based on in-plant vehicle use, mileage accruals, and fuel economy: medium duty vehicles assuming all are gasoline fueled with an average fuel efficiency of 15 mpg
Gallons per Year	14,373	Estimated based on in-plant vehicle use, mileage accruals, and fuel economy: medium duty vehicles assuming all are gasoline fueled with an average fuel efficiency of 15 mpg
Diesel		
Gallons per Hour	709	Estimated based on off road equipment use, diesel fuel consumption associated with equipment horsepower, and operating schedule
Gallons per Day	11,339	Estimated based on off road equipment use, diesel fuel consumption associated with equipment horsepower, and operating schedule
Gallons per Year	2,607,930	Estimated based on off road equipment use, diesel fuel consumption associated with equipment horsepower, and operating schedule
On Road Vehicles		
Medium Duty Vehicles (MDVs) (On Site)		
Miles per Year	215,600	Calculated based on number of vehicles, trip distance, and average operating schedule
Fuel Transport		
Miles per Year	7,447	Calculated based on number of vehicles, trip distance, and average operating schedule
Green Waste Transport		
Miles per Year	502,865	Calculated based on number of vehicles, trip distance, and average operating schedule
Employee Commute		
Miles per Year	247,931	Calculated based on number of vehicles, trip distance, and employee shifts
Blasting and Drilling		
Holes per Blast	95	Assumed consistent with 2018 quarry records provided by Lehigh
Tons of Quarry Material per Blast	49,488	Assumed consistent with 2018 quarry records provided by Lehigh
Tons of Explosives per Blast	8.5	Assumed consistent with 2018 quarry records provided by Lehigh
Area per Blast (Square Feet/Blast)	783	Area shifted per blast calculated based on maximum production, blasting, explosives, blast pattern, and related data provided by Lehigh
Rock Plant Trucks		
Trucks of Product per Year	13,785	Calculated average based on records of operating data from Lehigh for 2008-2017
Operating Hours per Year	1,488	Calculated average based on records of Rock Plant 3 operating data from Lehigh for 2008-2017
Trucks of Product per Day	38	Calculated average based on records of operating data from Lehigh for 2008-2017
Trucks of Product Per Hour	2	Calculated average based on records of operating data from Lehigh for 2008-2017

Table 1-3. Baseline: Drilling & Blasting

Description	Parameters [1]						Emission Factor [2]							Hourly Emissions (lb/hr) [3]				Daily Emissions (lb/day) [4]				Annual Emissions (lb/yr) [5]				Annual Emissions (MT/yr) [6]	
	Area per Blast (ft^2)	Number of Holes Drilled per Year	Explosives Used per Year (tons)	Blasts per Hour	Blasts per Day	Average Blasts Per Year	PM Control Factor (%)	PM_{10}	$PM_{2.5}$	NO_X	CO	CO_2	Units	PM_{10}	$PM_{2.5}$	NO_X	CO	PM_{10}	$PM_{2.5}$	NO_X	CO	PM_{10}	$PM_{2.5}$	NO_X	CO	CO_2	CO_2e
Drilling (Particulate)		7,541					95	0.68	0.68	0	0	0	lb/hole	3.23	3.23	0	0	3.23	3.23	0	0	256	256	0	0	0	0
Blasting (Particulate)	783			1	1	79	98	0.52	0.52	0	0	0	size factor	0.11	0.11	0	0	0.11	0.11	0	0	9	9	0	0	0	0
Explosive Detonation			675				0	0	0	17	67	340.00	lb/ton	0	0	144	569	0	0	144	569	0	0	11,468	45,197	104	104

1. Based on 2018 quarry records and scaled by annual blasted material throughput. Assumes maximum of 1 blast per hour and 1 blast per day
2. Emission Factor and units from MDAQMD Emission Inventory Guidance: Mineral Handling and Processing Industries, Sections A-C. Emission Factor of Explosive Detonation is for Ammonium Nitrate (ANFO) used as a conservative estimate for emulsio
   Emission Factor for CO_2 from National Greenhouse Accounts (NGA) Factors, Australian Government Department of Climate Change, January 2008, Section 1.3 (Explosives).
   Drilling PM Control Efficiency based on Western Governors' Association Western Regional Air Partnership (WRAP) Fugitive Dust Handbook (Section 11.3) as the conservative value for fabric filtration (95-99%). In addition, drilling is controlled by water spray and occurs below grade, but these additional controls are conservatively assumed to be included.
   Blasting PM Control Efficiency based on WRAP Fugitive Dust Handbook (Table 3-7) for prohibition of demolition blasting when wind speed exceeds 25 mph as mandated in Lehigh's BAAQMD Fugitive Dust Control Plan. In addition, blasting occurs below grade, but this additional control is conservatively assumed to be include
3. Drilling PM Hourly Emissions (lb/hr) = Number of Holes Drilled per Year / Number of Blasts per Year x Maximum Number of Blasts per Hour x Emission Factor (lb/hole) x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.A
   Blasting PM Hourly Emissions (lb/hr) = Size Factor x Number of Blasts per Hour x 0.0005 x (Area per Blast (ft^2))$^{1.5}$ x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.B
   Explosive Detonation Hourly Emissions (lb/hr) = Quantity Explosives Used per Year (ton) / Number of Blasts per Year x Maximum Number of Blasts per Hour x Emission Factor (lb/ton) per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.C
4. Drilling PM Daily Emissions (lb/day) = Number of Holes Drilled per Year / Number of Blasts per Year x Maximum Number of Blasts per Day x Emission Factor (lb/hole) x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.A
   Blasting PM Daily Emissions (lb/day) = Size Factor x Number of Blasts per Day x 0.0005 x (Area per Blast (ft^2))$^{1.5}$ x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.B
   Explosive Detonation Daily Emissions (lb/day) = Quantity Explosives Used per Year (ton) / Number of Blasts per Year x Maximum Number of Blasts per Day x Emission Factor (lb/ton) per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.C
5. Drilling PM Annual Emissions (lb/yr) = Number of Holes Drilled per Year x Emission Factor (lb/hole) x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.A
   Blasting PM Annual Emissions (lb/yr) = Size Factor x Number of Blasts per Year x 0.0005 x (Area per Blast (ft^2))$^{1.5}$ x [100 - Control Efficiency (%)] / 100 per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.B
   Explosive Detonation Annual Emissions (lb/yr) = Quantity Explosives Used per Year (ton) x Emission Factor (lb/ton) per MDAQMD Emissions Inventory Guidance, Mineral Handling and Processing Industries, Section VI.C
6. Explosive Detonation Annual Emissions (MT/yr) for CO_2 = Emission Factor (lb/ton) x Annual Explosive Used (ton/yr) / 2,204.62 lb/MT
   Explosive Detonation Annual Emissions (MT/yr) for CO_2e = [Annual Emissions (MT/yr) x GWP]CO_2
   Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)

Table 1-4. Baseline: Bulldozing, Scraping & Grading

Activity Type	Description	Parameters [1]			Operating Hours [2]		Particle Aerodynamic Factor [3]		Material Movement Emission Factor (lb/hr) [4]		Hourly Emissions (lb/hr) [5]		Daily Emissions (lb/day) [6]		Annual Emissions (lb/yr) [7]	
		Material Moisture Content (%)	Control Efficiency (%)	Silt Content (%)	Hours per Day	Hours per Year	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Mining	North Quarry/WMSA	2.1	76	0.5	26	6,019	0.36	0.054	0.12	0.02	0.03	0.004	0.78	0.12	180	27

1. Moisture Content from EPA AP-42 Table 13.2.4-1 for various limestone products.
   Control Efficiency of 58.5% is applied for active area in the quarry which is conservatively assumed as the median value for cross-wind ridges from the WRAP Dust Handbook (Page 3) as the pit is well below surface level.
   Control Efficiency of 42% (additional) is applied for active area in the quarry which is conservatively assumed as median value for watering of unpaved surfaces from the WRAP Dust Handbook (Page 3).
   Silt Content from MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries Section G, Stockpile Table 2 for Limestone.
2. Operating Hours calculated by scaling the hours provided in the 2011 Reclamation Plan Amendment by the revised baseline throughput.
3. Particulate Aerodynamic Factor for PM_{10} from MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.D.
   Particulate Aerodynamic Factors for $PM_{2.5}$ calculated as 0.15 x PM_{10} Particulate Aerodynamic Factor in accordance with Background Document for Revisions to Fine Fraction Ratios used as a basis for AP-42 Fugitive Dust Emission Factors (prepared for Western Governors' Association Western Regional Air Partnership (WRAP)), Midwest Research Institute, November 1, 2006, Table 1 (Proposed Particle Size Ratios for AP-42 for Aggregate Handling & Storage Piles (transfer))
4. Material Movement Emission Factor (lb/hr) = [2.76 x Particulate Aerodynamic Factor x Silt Content (%)]$^{1.5}$ / [Moisture Content (%)]$^{1.4}$ from MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.D
5. Hourly Emissions (lb/hr) = Emission Factor (lb/hr) x [100 - Control Efficiency (%)] / 100
6. Daily Emissions (lb/day) = Hourly Emissions (lb/hr) x Operating Schedule (hr/day)
7. Annual Emissions (lb/yr) = Hourly Emissions (lb/hr) x Operating Schedule (hr/yr)

Table 1-5. Baseline: Material Handling

Activity Type	Description	Parameters [1]					Throughputs [2]			Particle Aerodynamic Factor [3]		Material Handling Emission Factor (lb/ton) [4]		Hourly Emissions (lb/hr) [5]		Daily Emissions (lb/day) [6]		Annual Emissions (lb/yr) [7]	
		Mean Wind Speed (mph)	Representative Material	Material Moisture Content (%)	Control Efficiency (%)	Number of Transfer Points	Hourly Throughput (tons/hr)	Daily Throughput (tons/day)	Annual Throughput (tons/yr)	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Mining	North Quarry Cement, Aggregate, and Waste Rock	5.32	Limestone	2.1	81	2	1,067	17,074	3,927,063	0.36	0.054	1.17E-03	1.75E-04	0.48	0.07	7.63	1.14	1,756	263
Mining	Waste Rock Handling at Storage Area	5.32	Limestone	2.1	75	1	357	5,707	1,312,618	0.36	0.054	1.17E-03	1.75E-04	0.10	0.02	1.66	0.25	383	57
Mining	Rock Plant Fines to WMSA	5.32	Limestone	2.1	75	2	17	280	64,296	0.36	0.054	1.17E-03	1.75E-04	0.01	0.002	0.16	0.02	37	6
Mining	Rock Plant Aggregate	5.32	Limestone	2.1	75	3	317	5,068	445,846	0.36	0.054	1.17E-03	1.75E-04	0.28	0.04	4.43	0.66	390	58

1. Moisture Content is from EPA AP-42 Table 13.2.4-1 for various limestone products.
Control Efficiency is assumed to be 75% reflecting water spay (application point) per MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries Section E, Table 5 or adequate wetness per the Fugitive Dust Control Plan and for North Quarry Cement, Aggregate, and Waste Rock is a weighted control efficiency including 70% control for the drop into the Primary Crusher due to the 3 sided enclosure of the drop point.
Mean Wind Speed (mph) = 5.3 mph as based on meteorological data acquired from Lehigh's meteorological tower for the baseline years of 2008 through 201
2. Throughput based on facility records for the baseline period.
3. Particulate Aerodynamic Factor for PM_{10} comes from MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.E.
Particulate Aerodynamic Factor for $PM_{2.5}$ is calculated as 0.15 x PM_{10} Particulate Aerodynamic Factor in accordance with Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors
(prepared for Western Governors' Association Western Regional Air Partnership (WRAP)), Midwest Research Institute, November 1, 2006, Table 1 (Proposed Particle Size Ratios for AP-42 for Aggregate Handling & Storage Piles (transfer))
4. Material Handling Emission Factor (lb/ton) = Particle Aerodynamic Factor x 0.0032 x [Mean Wind Speed (mph) / 5]$^{1.3}$ / [Material Moisture Content (%) / 2]$^{1.4}$ in accordance with MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, Section VI.E.
5. Hourly Emissions (lb/hr) = Emission Factor (lb/ton) x Hourly Throughput (tons/hr) x [100 - Control Efficiency (%)] / 100 x Number of Transfer Points
6. Daily Emissions (lb/day) = Emission Factor (lb/ton) x Daily Throughput (tons/day) x [100 - Control Efficiency (%)] / 100 x Number of Transfer Points
7. Annual Emissions (lb/yr) = Emission Factor (lb/ton) x Annual Throughput (tons/yr) x [100 - Control Efficiency (%)] / 100 x Number of Transfer Points

Table 1-6. Baseline: Wind Erosion

Activity Type	Description	Particle Size Multiplier [1]		Active Disturbed Area Emission Factor (ton/acre-yr) [2]		Inactive Disturbed Area Emission Factor (ton/acre-yr) [2]		Area Disturbed (acre) [3]	Active Area Disturbed (acre) [3]	Inactive Area Disturbed (acre) [3]	Active Area Control Efficiency (%) [4]	Inactive Area Control Efficiency (%) [4]	Hourly Emissions (lb/hr) [5]		Daily Emissions (lb/day) [6]		Annual Emissions (lb/yr) [7]	
		PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$						PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Mining	North Quarry - Non-road	0.5	0.075	1.02	0.15	1.02	0.15	243	73	170	58.5	93.4	9.7	1.5	233	34.9	84,872	12,731
Mining	WMSA - Non-road	0.5	0.075	1.02	0.15	1.02	0.15	152	15	136	42.0	84.0	7.1	1.1	171.5	25.7	62,615	9,392
Mining	North Quarry - Unpaved Roads	0.5	0.075	0.02	0.003	0.02	0.003	22	22	0	87.6	87.6	0.01	0.002	0.3	0.04	98	15
Mining	WMSA - Unpaved Roads	0.5	0.075	0.02	0.003	0.02	0.003	21	21	0	70	70	0.03	0.004	0.6	0.1	225	34
Production	Rock Plant Stockpiles	0.5	0.075	0.31	0.05	0.31	0.047	10	10	0	70	70	0.2	0.03	5.2	0.8	1,908	286

1. Particle Size Multiplier from AP-42 Section 13.2.5, Table "Aerodynamic Particle Size multipliers for Equation 2'
2. Emission Factor (ton/acre-yr) = Emission Factor (g/m^2-yr) / 907,185 (g/ton) x 4,046.86 (m^2/acre), where

Active Disturbed Area:

Emission Factor for Quarry Material = 458.36 g/m^2-yr

Emission Factor for Unpaved Roads = 8.01 g/m^2-yr

as calculated pursuant to EPA AP-42 Section 13.2.5 based on meteorological data acquired from Lehigh's meteorological tower for the baseline years of 2008 through 2017. Average values from the baseline period are represented. Factor conservatively assumes area is disturbed once per da

Stockpile PM_{10} emission factor obtained from BAAQMD Permit Handbook Section 11.7, Crushing and Grinding. $PM_{2.5}$ stockpile emissions are calculated with the 15% conversion factor from PM_{10} to $PM_{2.5}$ in BAAQMD Permit Handbook in Section 11.5.

3. Applicable disturbed area provided by Lehigh, consistent with SMARA reports. Road and non-road ratio consistent with the 2011 Reclamation Plan Amendment. MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries Section L, Wind Erosion from Unpaved Operational Areas and Roads, notes that actively disturbed areas are disturbed at least once per day. It is conservatively estimated that 30% of the quarry and 10% of the WMSA acreage could be considered actively disturbed.
4. Control Efficiency of 84% is applied for inactive disturbed area as the terrain is similar to gravel cover consistent with Chapter 8, Open Area Wind Erosion, of the WRAP Fugitive Dust Handbook

Control Efficiency of 58.5% is applied for active and inactive disturbed area in the quarries which is conservatively assumed as the median value for cross-wind ridges from the WRAP Dust Handbook (Page 3) as the pit is well below surface level.

Control Efficiency of 42% is applied for active disturbed area in the WMSA which is conservatively assumed as one half the application of gravel per WRAP as the WMSA material is mostly large rocks similar to gravel.

Control Efficiency for watering of 70% utilized for unpaved roads consistent with AP-42 Section 13.2.2 and the BAAQMD Permit Handbook.

Control Efficiency for storage piles based on BAAQMD Permit Handbook for water spray.

5. Hourly Emissions (lb/hr) = Daily Emissions (lb/day) / 24 (hr/day)
6. Daily Emissions (lb/day) = Annual Emissions (lb/yr) / 365 (day/yr)
7. Annual Emissions (lb/yr) = Emission Factor (ton/acre-yr) x Area Disturbed (acre) x [100 - Control Efficiency (%)] / 10(

Table 1-7. Baseline: Unpaved Road Dust Entrainment

Description	Parameters [1]							Total Miles Traveled [2]			Emission Factor (lb/mile) [3]		Hourly Emissions (lb/hr) [4]		Daily Emissions (lb/day) [5]		Annual Emissions (lb/yr) [6]	
	Vehicle Weight (tons)	Control Efficiency (%)	Road Silt Content (%)	k		a	b											
				PM_{10}	$PM_{2.5}$			miles/hr	miles/day	miles/yr	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
On Road Vehicles	3.0	87.1	2.7	1.5	0.15	0.9	0.45	59	937	215,600	0.39	0.04	2.96	0.30	47.38	4.74	10,897	1,090
Off Road Vehicles	60.0	87.1	2.7	1.5	0.15	0.9	0.45	98	1,570	361,149	1.51	0.15	19.10	1.91	305.54	30.55	70,274	7,027

1. Inputs needed for the equations in AP-42 Section 13.2.2, as follows:
   Vehicle Weight calculated for MDVs and off road vehicles using an average MDV weight of 3 tons and an average off road vehicle weight of 60 tons.
   Control Efficiency assumed to be 70% for watering of unpaved roads per BAAQMD Permit Handbook Section 11.7 plus 57% for limiting maximum speeds below 15 miles per hour per Table 3-7 of the WRAP Fugitive Dust Handbook.
   Silt Content (%) from 2008 CEIR as used in the 2012 Reclamation Plan Amendment.
   Constants k, a, and b from AP-42 Table 13.2.2-2 for Industrial Roads
2. Off-road Miles Traveled calculated based on annual operating hours and average speed of off-road equipment.
   On road Miles Traveled calculated based on number of vehicles and average annual miles traveled per the 2011 Reclamation Plan Amendment.
3. Emission Factor (lb/mile) = k x [Road Silt Content (%) / 12]^{a} x [Vehicle Weight (tons) / 3]^{b} Per Equation 1a of AP-42 Section 13.2.2
4. Hourly Emissions (lb/hr) = Emission Factor (lb/mile) x Miles Traveled (miles/hr)
5. Daily Emissions (lb/day) = Emission Factor (lb/mile) x Miles Traveled (miles/day)
6. Annual Emissions (lb/yr) = Emission Factor (lb/mile) x Miles Traveled (miles/yr)

Table 1-8. Baseline: Paved Road Dust Entrainment

Road Type	Parameters [1]										Miles Traveled [2]			Hourly Emission Factor (lb/VMT) [3]		Daily Emission Factor (lb/VMT) [3]		Annual Emission Factor (lb/VMT) [3]		Hourly Emissions (lb/hr) [4]		Daily Emissions (lb/day) [5]		Annual Emissions (lb/yr) [6]	
	Vehicle Weight (tons)	Control Efficiency (%)	Road Silt Loading (g/m^2)	k		P		N		VMT Fraction	miles/hr	miles/day	miles/yr												
				PM_{10}	$PM_{2.5}$	Hourly	Daily	Hourly	Daily					PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
On Road Vehicles - Freeway	21.3	0	0.015	0.0022	0.00054	328	51	8760	365	0.434	151	1074	329,078	1.04E-03	2.55E-04	1.05E-03	2.58E-04	1.09E-03	2.67E-04	1.57E-01	3.85E-02	1.13E+00	2.77E-01	3.59E+02	8.80E+01
On Road Vehicles - Major	21.3	0	0.032	0.0022	0.00054	328	51	8760	365	0.449	156	1111	340,452	2.07E-03	5.09E-04	2.10E-03	5.14E-04	2.17E-03	5.33E-04	3.23E-01	7.93E-02	2.33E+00	5.71E-01	7.39E+02	1.81E+02
On Road Vehicles - Collector	21.3	0	0.032	0.0022	0.00054	328	51	8760	365	0.054	19	134	40,945	2.07E-03	5.09E-04	2.10E-03	5.14E-04	2.17E-03	5.33E-04	3.88E-02	9.53E-03	2.80E-01	6.87E-02	8.89E+01	2.18E+01
On Road Vehicles - Local	21.3	0	0.32	0.0022	0.00054	328	51	8760	365	0.064	22	158	48,528	1.69E-02	4.14E-03	1.70E-02	4.18E-03	1.76E-02	4.33E-03	3.74E-01	9.18E-02	2.70E+00	6.62E-01	8.56E+02	2.10E+02
45 ton Haul Trucks - Paved Plant Roads	60.0	65.6	2.4	0.0022	0.00054	328	51	8760	365	0.064	1	10	2,332	3.04E-01	7.45E-02	3.07E-01	7.53E-02	3.18E-01	7.80E-02	6.62E-02	1.62E-02	1.07E+00	2.63E-01	2.55E+02	6.26E+01

1. Inputs needed for the equations in AP-42 Section 13.2.1, as follows:
   Vehicle Weight is calculated as the weighted average of vehicle weights with respect to total annual miles traveled. On road vehicles on paved roads include employee vehicles, fuel transport vehicles, and rock plant delivery vehicles. 45 ton haul truck average weight (loaded and unloaded) used for 45 ton haul trucks on paved plant roads.
   Control Efficiency assumed to be 0% reflecting no controls and 65.6% reflecting sweeping and a speed limit of 15 mph on-site, pursuant to the Fugitive Dust Control Plan (revised June 2018), MDAQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries Section J, Dust Entrainment from Paved Roads, and Table 3-7 of the WRAP Fugitive Dust Handbook.
   Silt Loading (%) from California Air Resources Board, Entrained Dust from Paved Road Travel: Emission Estimation Methodology Background Document, November 2016, Table 7 (2008 Silt Loadings and PM10 Emission Factors for California Entrained Paved Road Dust Estimates) - silt loadings for Santa Clara County.
   Paved plant road silt loading (g/m^2) for 45 ton dump trucks from AP-42 Table 13.2.1-3 for Paved Roads at Industrial Facilities - Quarry minimum value.
   k (particle size multiplier) for $PM_{2.5}$ and PM_{10} are from AP-42 Table 13.2.1-1
   P (number of precipitation days or hours per year with at least 0.01 in) based on meteorological data from Lehigh's on-site meteorology tower as the average over the baseline years
   N (number of days and hours in the averaging period) is 365 days per year and 8,760 hours per year
   VMT Fraction from California Air Resources Board, Emissions Inventory Methodology Section 7.9: Entrained Paved Road Dust-Paved Road Travel, November 2016, Table 6 (2008 Roadway Travel Fractions and VMT Estimates for California Entrained Paved Road Dust)
2. Miles Traveled calculated based on number of vehicles, trip distance, and average operating schedule.
3. Hourly Emission Factor (lb/VMT) = k x [Road Silt Loading $(g/m^2)]^{0.91}$ x [Vehicle Weight (tons)]$^{1.02}$ x (1-1.2P/N) according to Equation 3 of AP-42 Section 13.2.1.
   Daily Emission Factor (lb/VMT) = k x [Road Silt Loading $(g/m^2)^{0.91}$ x [Vehicle Weight (tons)]$^{1.02}$ x (1-P/4N) according to Equation 2 of AP-42 Section 13.2.1.
   Annual Emission Factor (lb/VMT) = k x [Road Silt Loading $(g/m^2)]^{0.91}$ x [Vehicle Weight (tons)]$^{1.02}$ according to Equation 1 of AP-42 Section 13.2.1.
4. Hourly Emissions (lb/hr) = Emission Factor (lb/VMT) x Miles Traveled (miles/hr) x [100 - Control Efficiency (%)] / 100
5. Daily Emissions (lb/day) = Emission Factor (lb/mile) x Miles Traveled (miles/day) x [100 - Control Efficiency (%)] / 100
6. Annual Emissions (lb/yr) = Emission Factor (lb/mile) x Miles Traveled (miles/yr) x [100 - Control Efficiency (%)] / 100

Table 1-9. Baseline: Fuel Storage

Description	Hourly Emissions (lb/hr) [1]	Daily Emissions (lb/day) [2]	Annual Emissions (lb/yr) [3]
	ROG	ROG	ROG
Diesel Storage Tank, 15,000 gal	7.48E-02	7.48E-02	17.20
Diesel Storage Tank, 4,000 gal	1.81E-02	1.81E-02	4.17
Gasoline Storage Tank, 10,000 gal	3.49E-01	3.49E-01	80.26

1. Hourly Emissions (lb/hr) for fuel storage are conservatively set equal to daily emissions.
2. Daily Emissions (lb/day) for fuel storage are calculated based on the annual emissions and operating schedule.
3. Annual Emissions (lb/yr) for fuel storage are calculated based on tank parameters and annual fuel throughput using the formulas in EPA AP-42 Chapter 7.1.

Table 1-10. Baseline: Fuel Dispensing

Description	ROG Emission Factor (lb/gal) [1]	Fuel Throughput [2]			Hourly Emissions (lb/hr) [3]	Daily Emissions (lb/day) [4]	Annual Emissions (lb/yr) [5]
		gal/hr	gal/day	gal/yr	ROG	ROG	ROG
Diesel Fuel Dispensing	0.000028	709	11,339	2,607,930	1.99E-02	3.17E-01	7.30E+01
Gasoline Fuel Dispensing	0.00038	4	62	14,373	1.48E-03	2.37E-02	5.46E+00

1. ROG Emission Factor (lb/gal) for diesel comes from the South Coast Air Quality Management District's "Supplemental Instructions of Liquid Organic Storage Tanks and References" (June 2005). Assumes VOC = ROG.
   ROG Emission Factor (lb/gal) for gasoline from the California Air Resources Board's "Vapor Recovery Certification Procedure CP-201: Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities" (amended April 23, 2015). Assumes HC = ROG.
2. Diesel fuel throughput calculated based on off road equipment use, diesel fuel consumption associated with equipment horsepower, and operating schedule.
   Gasoline fuel throughput calculated based on in-plant vehicle use, mileage accruals, and fuel economy.
3. Hourly Emissions (lb/hr) for fuel dispensing = ROG Emission Factor (lb/gal) x Fuel Throughput (gal/hr)
4. Daily Emissions (lb/day) for fuel dispensing = ROG Emission Factor (lb/gal) x Fuel Throughput (gal/day)
5. Annual Emissions (lb/yr) for fuel dispensing = ROG Emission Factor (lb/gal) x Fuel Throughput (gal/yr)

Table 1-11. Baseline: Off Road Vehicle Fuel Combustion

Equipment Type	Parameters [1]					Emission Factor (g/hp-hr) [2]										Hourly Emissions (lb/hr) [3]										Daily Emissions (lb/day) [4]										Annual Emissions (lb/year) [5]								Annual Emissions (MT/year) [6]			
	Model	Model Year	Horse-power	Hours per Year	Hours per Day	Load Factor	THC	ROG	CO	NO_X	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	THC	ROG	CO	NO_X	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	THC	ROG	CO	NO_X	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	THC	ROG	CO	NO_X	PM	PM_{10}	$PM_{2.5}$	SO_2	CO_2	CH_4	N_2O	CO_2e
Skid Steer	226B	2000	61.7	355	1.5	0.37	1.39	1.16	4.60	6.42	0.26	0.26	0.24	0.005	586	0.03	0.01	0.07	0.06	0.23	0.32	0.01	0.01	0.01	0.0003	29	0.002	0.001	0.11	0.09	0.36	0.50	0.02	0.02	0.02	0.0004	45	0.002	0.001	24.72	20.72	82.03	114.50	4.70	4.70	4.34	0.10	5	0.0003	0.0001	5
Grader	CAT 16G	1995	275	708	3.1	0.41	0.95	0.80	3.56	8.72	0.49	0.49	0.45	0.005	528	0.03	0.01	0.24	0.20	0.88	2.17	0.12	0.12	0.11	0.001	131	0.008	0.004	0.73	0.61	2.72	6.67	0.38	0.38	0.35	0.004	404	0.02	0.01	167.65	140.52	626.22	1,535.18	86.58	86.58	79.90	0.85	42	0.003	0.001	43
Grader	870 Deere	2014	280	1,248	5.4	0.41	0.05	0.04	0.92	0.79	0.03	0.03	0.03	0.005	531	0.03	0.01	0.01	0.01	0.23	0.20	0.01	0.01	0.01	0.001	134	0.008	0.004	0.06	0.05	1.26	1.09	0.04	0.04	0.04	0.01	729	0.04	0.02	14.21	11.91	290.59	251.06	9.54	9.54	8.80	1.54	76	0.005	0.002	77
Rubber Tired Dozer	CAT 824C	1995	315	564	2.5	0.4	0.87	0.73	3.34	8.19	0.43	0.43	0.40	0.005	528	0.03	0.01	0.24	0.20	0.93	2.27	0.12	0.12	0.11	0.001	147	0.009	0.004	0.59	0.50	2.28	5.58	0.29	0.29	0.27	0.003	360	0.02	0.01	136.01	114.00	523.68	1,283.07	67.43	67.43	62.23	0.76	38	0.002	0.001	38
Rubber Tired Dozer	CAT 834	2014	562	1,248	5.4	0.4	0.05	0.04	0.92	0.92	0.03	0.03	0.03	0.005	531	0.03	0.01	0.02	0.02	0.46	0.46	0.02	0.02	0.02	0.002	263	0.016	0.007	0.12	0.10	2.47	2.48	0.09	0.09	0.08	0.01	1,428	0.09	0.04	27.83	23.33	569.03	571.53	20.29	20.29	18.73	3.02	149	0.009	0.004	150
Off-Highway Truck	CAT 777F	2007	938	11,998	52.2	0.38	0.37	0.31	1.14	3.92	0.16	0.16	0.15	0.005	530	0.03	0.01	0.29	0.24	0.89	3.08	0.13	0.13	0.12	0.004	416	0.025	0.011	14.99	12.57	46.67	160.70	6.59	6.59	6.08	0.20	21,722	1.30	0.58	3,448.58	2,890.60	10,733.45	36,961.57	1,515.82	1,515.82	1,398.95	45.93	2,266	0.136	0.061	2,288
Off-Highway Truck	45 Ton	2014	511	46,800	203.5	0.38	0.05	0.04	0.92	0.92	0.03	0.03	0.03	0.005	531	0.03	0.01	0.02	0.02	0.39	0.40	0.01	0.01	0.01	0.002	227	0.014	0.006	3.92	3.29	80.14	80.49	2.86	2.86	2.64	0.43	46,246	2.77	1.24	901.57	755.70	18,432.10	18,513.01	657.36	657.36	606.68	97.78	4,825	0.289	0.129	4,870
Off-Highway Truck	CAT 773B	1994	650	176	0.8	0.38	0.87	0.73	3.34	8.19	0.43	0.43	0.40	0.005	528	0.03	0.01	0.47	0.40	1.82	4.46	0.23	0.23	0.22	0.003	288	0.017	0.008	0.36	0.30	1.39	3.42	0.18	0.18	0.17	0.002	221	0.01	0.01	83.33	69.84	320.84	786.09	41.31	41.31	38.12	0.47	23	0.001	0.001	23
Dozer	CAT D10T	2005	580	2,175	9.5	0.43	0.36	0.30	1.14	4.36	0.12	0.12	0.11	0.005	530	0.03	0.01	0.20	0.17	0.63	2.39	0.07	0.07	0.06	0.003	291	0.017	0.008	1.87	1.57	5.92	22.64	0.62	0.62	0.57	0.03	2,755	0.17	0.07	430.44	360.79	1,361.14	5,207.33	142.27	142.27	131.30	5.82	287	0.017	0.008	290
Dozer	CAT D8	2014	354	3,744	16.3	0.43	0.05	0.04	0.92	0.92	0.03	0.03	0.03	0.005	531	0.03	0.01	0.02	0.01	0.31	0.31	0.01	0.01	0.01	0.002	178	0.011	0.005	0.25	0.21	5.03	5.05	0.18	0.18	0.17	0.03	2,900	0.17	0.08	56.54	47.39	1,155.93	1,161.01	41.23	41.23	38.05	6.13	303	0.018	0.008	305
Dozer	CAT D9	2014	469	1,248	5.4	0.43	0.05	0.04	0.92	0.92	0.03	0.03	0.03	0.005	531	0.03	0.01	0.02	0.02	0.41	0.41	0.01	0.01	0.01	0.002	236	0.014	0.006	0.11	0.09	2.22	2.23	0.08	0.08	0.07	0.01	1,281	0.08	0.03	24.97	20.93	510.48	512.72	18.21	18.21	16.80	2.71	134	0.008	0.004	135
Dozer	CAT D11	2014	913	936	4.1	0.43	0.09	0.08	0.92	2.90	0.06	0.06	0.06	0.005	531	0.03	0.01	0.08	0.07	0.80	2.51	0.06	0.06	0.05	0.004	459	0.027	0.012	0.32	0.27	3.24	10.20	0.23	0.23	0.21	0.02	1,869	0.11	0.05	72.91	61.11	745.31	2,345.96	52.27	52.27	48.24	3.95	195	0.012	0.005	197
Loader	CAT 992G	2006	800	5,127	22.3	0.37	0.38	0.32	1.14	6.40	0.14	0.14	0.13	0.005	530	0.03	0.01	0.25	0.21	0.74	4.18	0.09	0.09	0.09	0.003	346	0.021	0.009	5.55	4.65	16.56	93.10	2.06	2.06	1.90	0.07	7,708	0.46	0.21	1,276.79	1,070.21	3,808.97	21,412.09	474.19	474.19	437.63	16.30	804	0.048	0.022	812
Water Truck	CAT 773E	2003	671	1,701	7.4	0.38	0.37	0.31	1.14	5.93	0.12	0.12	0.11	0.005	530	0.03	0.01	0.21	0.17	0.64	3.33	0.07	0.07	0.06	0.003	298	0.018	0.008	1.52	1.27	4.73	24.67	0.52	0.52	0.48	0.02	2,203	0.13	0.06	349.83	293.23	1,088.82	5,673.69	119.16	119.16	109.97	4.66	230	0.014	0.006	232
Water Truck	Volvo A40	2014	476	1,248	5.4	0.38	0.05	0.04	0.92	0.92	0.03	0.03	0.03	0.005	531	0.03	0.01	0.02	0.02	0.37	0.37	0.01	0.01	0.01	0.002	212	0.013	0.006	0.10	0.08	1.99	2.00	0.07	0.07	0.07	0.01	1,149	0.07	0.03	22.40	18.77	457.86	459.87	16.33	16.33	15.07	2.43	120	0.007	0.003	121
Shovel	CAT 6015	2016	813	2,496	10.9	0.38	0.05	0.04	0.92	2.82	0.05	0.05	0.05	0.005	531	0.03	0.01	0.03	0.03	0.63	1.92	0.04	0.04	0.03	0.003	362	0.022	0.010	0.33	0.28	6.80	20.83	0.39	0.39	0.36	0.04	3,924	0.23	0.11	76.50	64.12	1,564.02	4,791.12	90.82	90.82	83.82	8.30	409	0.024	0.011	413
Excavator	CAT 374	2016	485	2,496	10.9	0.38	0.05	0.04	0.92	0.86	0.03	0.03	0.03	0.005	531	0.03	0.01	0.02	0.02	0.37	0.35	0.01	0.01	0.01	0.002	216	0.013	0.006	0.20	0.17	4.06	3.79	0.15	0.15	0.14	0.02	2,341	0.14	0.06	45.64	38.25	933.03	871.08	35.11	35.11	32.41	4.95	244	0.015	0.007	247
Excavator	460 Volvo	2014	329	624	2.7	0.38	0.05	0.04	0.92	0.92	0.03	0.03	0.03	0.005	531	0.03	0.01	0.01	0.01	0.25	0.25	0.01	0.01	0.01	0.001	146	0.009	0.004	0.03	0.03	0.69	0.69	0.02	0.02	0.02	0.004	397	0.02	0.01	7.74	6.49	158.23	158.92	5.64	5.64	5.21	0.84	41	0.002	0.001	42
Excavator	340 Volvo	2014	247	624	2.7	0.38	0.05	0.04	0.92	0.79	0.03	0.03	0.03	0.005	531	0.03	0.01	0.01	0.01	0.19	0.16	0.01	0.01	0.01	0.001	110	0.007	0.003	0.03	0.02	0.52	0.45	0.02	0.02	0.02	0.003	298	0.02	0.01	5.81	4.87	118.79	102.63	3.90	3.90	3.60	0.63	31	0.002	0.001	31
Excavator	870 Deere	2014	382	624	2.7	0.38	0.05	0.04	0.92	0.92	0.03	0.03	0.03	0.005	531	0.03	0.01	0.01	0.01	0.29	0.30	0.01	0.01	0.01	0.002	170	0.010	0.005	0.04	0.03	0.80	0.80	0.03	0.03	0.03	0.004	461	0.03	0.01	8.99	7.53	183.72	184.53	6.55	6.55	6.05	0.97	48	0.003	0.001	49
Portable Light Tower	ML 695	2002	11	1,840	8.0	0.31	3.30	2.77	9.14	5.04	0.26	0.26	0.24	0.005	580	0.03	0.01	0.02	0.02	0.07	0.04	0.002	0.002	0.002	0.00004	4	0.0002	0.0001	0.20	0.17	0.55	0.30	0.02	0.02	0.01	0.0003	35	0.00	0.001	45.69	38.30	126.43	69.75	3.65	3.65	3.37	0.07	4	0.0002	0.0001	4

1. Model, Model Year, and Horsepower based on facility records.
   Operating hours based on facility records
   Load factors from ARB's OFFROAD 2017 Model except for Portable Light Tower which is consistent with the 2011 Reclamation Plan Amendment.
2. Emission Factors (g/hp-hr) for criteria pollutants are from ARB's OFFROAD 2017 Model
   ROG = 83.82% THC, PM_{10} = 100% PM, and $PM_{2.5}$ = 92.29% PM per the 2008 Estimated Annual Average Emissions – Statewide, California Air Resources Board, data for Off-Road Equipment, sorted for diesel-fueled vehicles.
   Diesel PM Emissions = PM_{10} Emissions
   Emission Factors for CO_2, CH_4, and N_2O are based on the Climate Registry's 2018 default emission factors (May 2018), Tables 13.1 (US Default CO2 Emission Factors for Transport Fuels) and 13.7 (US Default Factors for Calculating CH4 and N2O Emissions from Non-Highway Vehicles) for Construction/Mining Equipment.
3. Hourly Emissions (lb/hour) = Daily Emissions (lb/day) / Operating Hours (hr/day)
4. Daily Emissions (lb/day) = Emission Factor (g/hp-hr) / 453.59 (g/lb) x Horsepower (hp) x Hours per Day x Load Factor
5. Annual Emissions (lb/year) = Emission Factor (g/hp-hr) / 453.59 (g/lb) x Horsepower (hp) x Hours per Year x Load Factor
6. Annual Emissions (MT/yr) for CO_2, CH_4, and N_2O = Emission Factor (g/hp-hr) / 1,000,000 (g/MT) x Horsepower (hp) x Hours per Year x Load Factor
   Annual Emissions (MT/yr) for CO_2e = [Annual Emissions (MT/yr) x GWP]CO_2 + [Annual Emissions (MT/yr) x GWP]CH_4 + [Annual Emissions (MT/yr) x GWP]N_2O
   Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)

Table 1-12. Baseline: On Road Vehicle Fuel Combustion

Vehicle Type [1]	Time Period	Total Miles Traveled [2]	Emission Factor (lb/mile) [3]										Hourly Emissions (lb/hr) [4]										Daily Emissions (lb/day) [5]										Annual Emissions (lb/year) [6]							Annual Emissions (MT/yr) [7]			
			PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	Diesel PM	CO_2	CH_4	N_2O	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	Diesel PM	CO_2	CH_4	N_2O	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	Diesel PM	CO_2	CH_4	N_2O	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	Diesel PM	CO_2	CH_4	N_2O	CO_2e
On Site																																											
Medium Duty Vehicles (MDVs)	Annual	215,600	1.04E-04	4.43E-05	7.31E-03	1.03E-03	7.31E-04	1.10E-05	0	1.11E+00	8.36E-05	6.65E-05																							22.49	9.56	1,575.01	222.11	157.55	2.37	0	109.01	0.0082	0.0065	111.15
	Daily	937	1.04E-04	4.43E-05	7.31E-03	1.03E-03	7.31E-04	1.10E-05	0	1.11E+00	8.36E-05	6.65E-05											0.098	0.042	6.848	0.966	0.685	0.010	0	1044.891	0.078	0.062										
	Hourly	59	1.04E-04	4.43E-05	7.31E-03	1.03E-03	7.31E-04	1.10E-05	0	1.11E+00	8.36E-05	6.65E-05	0.006	0.003	0.428	0.060	0.043	0.001	0	65.306	0.005	0.004																						
Off Site																																											
Fuel Transport (HHDT-DSL)	Annual	7,447	1.16E-03	9.82E-04	6.61E-03	2.84E-02	2.24E-03	3.87E-05	1.16E-03	4.11E+00	1.04E-04	6.45E-04																							8.63	7.32	49.20	211.53	16.68	0.29	8.63	13.87	0.0004	0.0022	14.53
	Daily	20	1.16E-03	9.82E-04	6.61E-03	2.84E-02	2.24E-03	3.87E-05	1.16E-03	4.11E+00	1.04E-04	6.45E-04											0.023	0.020	0.132	0.568	0.045	0.001	0.023	82.128	0.002	0.013										
	Hourly	20	1.16E-03	9.82E-04	6.61E-03	2.84E-02	2.24E-03	3.87E-05	1.16E-03	4.11E+00	1.04E-04	6.45E-04	0.023	0.020	0.132	0.568	0.045	0.001	0.023	82.128	0.002	0.013																						
Rock Plant Delivery Vehicles (HHDT-DSL)	Annual	502,865	1.16E-03	9.82E-04	6.61E-03	2.84E-02	2.24E-03	3.87E-05	1.16E-03	4.11E+00	1.04E-04	6.45E-04																							582.57	493.95	3322.35	14282.79	1126.36	19.48	582.57	936.66	0.02373	0.1470	981.06
	Daily	1377	1.16E-03	9.82E-04	6.61E-03	2.84E-02	2.24E-03	3.87E-05	1.16E-03	4.11E+00	1.04E-04	6.45E-04											1.595	1.352	9.096	39.104	3.084	0.053	1.595	5653.603	0.143	0.887										
	Hourly	57.4	1.16E-03	9.82E-04	6.61E-03	2.84E-02	2.24E-03	3.87E-05	1.16E-03	4.11E+00	1.04E-04	6.45E-04	0.066	0.056	0.379	1.629	0.128	0.002	0.066	235.567	0.006	0.037																						
Employee Commute (Passenger)	Annual	247,931	1.89E-04	1.26E-04	3.55E-03	1.12E-03	4.38E-04	5.65E-06	1.23E-04	5.85E-01	3.54E-05	6.55E-05																							46.91	31.16	881.05	278.14	108.53	1.40	30.59	65.80	0.0040	0.0074	68.09
	Daily	1078	1.89E-04	1.26E-04	3.55E-03	1.12E-03	4.38E-04	5.65E-06	1.23E-04	5.85E-01	3.54E-05	6.55E-05											0.204	0.135	3.831	1.209	0.472	0.006	0.133	630.675	0.038	0.071										
	Hourly	269	1.89E-04	1.26E-04	3.55E-03	1.12E-03	4.38E-04	5.65E-06	1.23E-04	5.85E-01	3.54E-05	6.55E-05	0.051	0.034	0.958	0.302	0.118	0.002	0.03325	157.669	0.010	0.018																						

1. HHDT-DSL = Heavy-Heavy Duty Diesel Trucks
2. Calculated based on material throughput, number of employees, fuel usage, and facility records.
3. Emission Factor (lb/mile) from EMFAC2017 for Santa Clara County for each vehicle type
   Emission Factor for MDVs is the average of MDV vehicles for the baseline years of 2008 through 2017 in EMFAC 2017 for Santa Clara County, gasoline fuel type, and aggregated model years.
   Emission Factor for Fuel Transport vehicles is the average of HHDT vehicles for the baseline years of 2008 through 2017 in EMFAC 2017 for Santa Clara County, diesel fuel type, and aggregated model years.
   Emission Factor for Rock Plant Delivery Vehicles is the average of HHDT vehicles for the baseline years of 2008 through 2017 in EMFAC 2017 for Santa Clara County, diesel fuel type, and aggregated model years.
   Emission Factor for Employee Vehicles is the average of LDA, LDT1, and LDT2 vehicles for the baseline years of 2008 through 2017 in EMFAC 2017 for Santa Clara County, all fuel types, and aggregated model years.
4. Hourly Emissions (lb/hr) = Emission Factor (lb/mile) x Miles Traveled (hourly)
5. Daily Emissions (lb/day) = Emission Factor (lb/mile) x Miles Traveled (daily)
6. Annual Emissions (lb/year) = Emission Factor (lb/mile) x Miles Traveled (annual)
7. Annual Emissions (MT/yr) for CO_2, CH_4, and N_2O = Emission Factor (lb/mile) x Miles Traveled (annual) / 2000 (lb/ton) / 1.10231 (ton/MT)
   Annual Emissions (MT/yr) for CO_2e = [Annual Emissions (MT/yr) x GWP]CO_2 + [Annual Emissions (MT/yr) x GWP]CH_4 + [Annual Emissions (MT/yr) x GWP]N_2O
   Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)

Table 1-13. Baseline: Dewatering System Diesel Pumps

Equipment	Parameters [1]			Emission Factor (lb/hp-hr) [2]										Hourly Emissions (lb/hr) [3]										Daily Emissions (lb/day) [4]										Annual Emissions (lb/yr) [5]						Annual Emissions (MT/yr) [6]			
	Engine Horsepower	Daily Operating Hours	Annual Operating Hours	PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	CO_2	CH_4	N_2O		PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	CO_2	CH_4	N_2O		PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	CO_2	CH_4	N_2O		PM_{10}	$PM_{2.5}$	CO	NO_X	ROG	SO_X	CO_2	CH_4	N_2O	CO_2e
Dewatering System Diesel Pumps	328	24	6,104	2.20E-03	2.20E-03	6.68E-03	3.10E-02	2.51E-03	2.05E-03	1.44E+00	8.16E-05	3.66E-05		0.72	0.72	2.19	10.16	0.82	0.67	471.05	0.03	0.01		17.31	17.31	52.56	243.93	19.78	16.13	11,305.29	0.64	0.29		4,402.73	4,402.73	13,368.28	62,038.44	5,031.32	4,102.54	1304.22	0.07	0.03	1,315.97

1. Total diesel pump horsepower and operating hours averaged over the baseline period based on facility records. Engine horsepower estimated from pump horsepower based on an efficiency of 70%.
2. Criteria pollutant emission factors (lb/hp-hr) from AP-42 Table 3.3-1. Assumes TOC = ROG. GHG emission factors based on the Climate Registry's 2018 default emission factors (May 2018), Tables 13.1 (US Default CO_2 Emission Factors for Transport Fuels) and 13.7 (US Default Factors for Calculating CH_4 and N_2O Emissions from Non-Highway Vehicles) for Construction/Mining Equipment.
3. Hourly Emissions (lb/hr) = Emission Factor (lb/hp-hr) x Total Diesel BHP
4. Daily Emissions (lb/day) = Hourly Emissions (lb/hr) x Daily Operating Hours
5. Annual Emissions (lb/yr) = Hourly Emissions (lb/hr) x Annual Operating Hours
6. Annual Emissions (MT/yr) for CO_2, CH_4, and N_2O = Hourly Emissions (lb/hr) x Annual Operating Hours / 2,000 lb/ton / 1.10231 ton/MT
   Annual Emissions (MT/yr) for CO_2e = [Annual Emissions (MT/yr) x GWP]CO_2 + [Annual Emissions (MT/yr) x GWP]CH_4 + [Annual Emissions (MT/yr) x GWP]N_2O
   Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)

Table 1-14. Baseline: Rock Plant Equipment

Source		Parameters [1]			Emission Factor (lb/ton) [2]		Dust Collector Specifications [3]		Hourly Emissions (lb/hr) [4]		Daily Emissions (lb/day) [5]		Annual Emissions (lb/yr) [6]	
		Annual Throughput (tpy)	Daily Operating Hours	Annual Operating Hours	PM_{10}	$PM_{2.5}$	Grain Loading (gr/dscf)	Flow Rate (dscfm)	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
S-187	Sand Hopper and Storage Bin	445,846	16	1,488	0.00099	0.0001485	-	-	0.30	4.45E-02	4.75	0.71	441.39	66.21
S-201	Primary Crusher	445,846	16	1,488	0.0024	0.00036	-	-	0.64	9.56E-02	10.20	1.53	948.56	142.28
S-609		445,846	16	1,488	-	-	0.0013	3,162						
S-202	Secondary Crusher	445,846	16	1,488	0.0024	0.00036	-	-	0.64	9.56E-02	10.20	1.53	948.56	142.28
S-612		445,846	16	1,488	-	-	0.0013	3,162						
S-340	Coarse Rock Withdrawal System	445,846	16	1,488	-	-	0.0013	10,539	0.12	1.76E-02	1.88	0.28	174.77	26.22
S-341	Pre-Crushing Screens Rock Plant 3	445,846	16	1,488	-	-	0.0013	12,455	0.14	2.08E-02	2.22	0.33	206.55	30.98
S-343	Crushed Rock Returns Conveyor	445,846	16	1,488	-	-								
S-342	Coarse Rock Crushing System 2 ea. Symons 5.5 Ft	445,846	16	1,488	-	-	0.0013	14,371	0.16	2.40E-02	2.56	0.38	238.32	35.75
		445,846	16	1,488	-	-								
S-344	Wet Screening Feed Conveyor	445,846	16	1,488	0.000046	0.000013	-	-	0.01	3.89E-03	0.22	0.06	20.51	5.80
S-350	Wet Screening and Conveying	445,846	16	1,488	0.00074	0.00005	-	-	0.22	1.50E-02	3.55	0.24	329.93	22.29
S-360	Wet Aggregate Loadout System	445,846	16	1,488	0.000046	0.000013	-	-	0.01	3.89E-03	0.22	0.06	20.51	5.80
		445,846	16	1,488	0.000046	0.000013	-	-	0.01	3.89E-03	0.22	0.06	20.51	5.80
		445,846	16	1,488	0.000046	0.000013	-	-	0.01	3.89E-03	0.22	0.06	20.51	5.80
		445,846	16	1,488	0.0001	0.000015	-	-	0.03	4.49E-03	0.48	0.07	44.58	6.69
		445,846	16	1,488	0.0001	0.000015	-	-	0.03	4.49E-03	0.48	0.07	44.58	6.69
S-370	Class 2 Aggregate Additive Transfer System	445,846	16	1,488	0.000046	0.000013	-	-	0.01	3.89E-03	0.22	0.06	20.51	5.80
		445,846	16	1,488	0.000046	0.000013	-	-	0.01	3.89E-03	0.22	0.06	20.51	5.80
S-380	Sand Transfer Class 2 Hopper	445,846	16	1,488	0.00099	0.0001485	-	-	0.30	4.45E-02	4.75	0.71	441.39	66.21
S-381	Sand Storage Pile Conveyor	445,846	16	1,488	0.00099	0.0001485	-	-	0.30	4.45E-02	4.75	0.71	441.39	66.21
S-382	Water Clarifier Fines System	445,846	16	1,488	0.000046	0.000013	-	-	0.01	3.89E-03	0.22	0.06	20.51	5.80
		445,846	16	1,488	0.000046	0.000013	-	-	0.01	3.89E-03	0.22	0.06	20.51	5.80
S-383[7]	Rock Plant 2 Conveyors	445,846	16	1,488	0.000046	0.000013	-	-	0.01	3.89E-03	0.22	0.06	20.51	5.80
S-384[7]	Rock Plant 2 Screens - 16	445,846	16	1,488	0.00074	0.00005	-	-	0.22	1.50E-02	3.55	0.24	329.93	22.29
	Rock Plant 2 Screens - 17	445,846	16	1,488	0.00074	0.00005	-	-	0.22	1.50E-02	3.55	0.24	329.93	22.29
S-390	Conveyor Belt 15-M	445,846	16	1,488	-	-	0.0013	16,288	0.18	2.72E-02	2.90	0.44	270.10	40.51

1. Based on records of production data for the baseline period.
2. Aggregate emission factors (lb/ton) from AP-42 Table 11.19.2-2. Assumes $PM_{2.5}$ is 15% of PM_{10} where a $PM_{2.5}$ emission factor is not available, per the BAAQMD Permit Handbook.
   Sand emission factors (lb/ton) from AP-42 Table 11.12-2. Assumes $PM_{2.5}$ is 15% of PM_{10} where a $PM_{2.5}$ emission factor is not available, per the BAAQMD Permit Handbook.
3. Dust collector grain loading values from the facility's MFR permit.
   Dust collector flow rates per facility records.
4. Hourly Emissions (lb/hr) = Annual Emissions (lb/yr) / Annual Operating Hours (hrs/yr)
   or Hourly Emissions (lb/hr) = Grain Loading (gr/dscf) x Flow Rate (dscfm) x 60 (min/hr) / 7,000 (gr/lb)
5. Daily emissions (lb/day) = Hourly Emissions (lb/hr) x Daily Operating Hours (hrs/day)
6. Annual Emissions (lb/yr) = Emission Factor (lb/ton) x Annual Throughput (tons/yr)
   or Annual Emissions (lb/yr) = Hourly Emissions (lb/hr) x Annual Operating Hours (hrs/yr)
   Note that the Primary and Secondary Crushers were replaced in 2014 with newer equipment and dust collectors. The emissions represent a weighted average based on throughput during the baseline period.
7. These sources are controlled by a dust collector. EPA AP-42 Table 11.19.2-2 emission factors are utilized in place of a tested grain loading.

Table 1-15. Baseline: Electricity Use

Source	Parameters [1]		Electricity Conversion Factor [2]		Annual Electricity Use (kWh/yr) [3]	Emission Factor (lb/MWh) [4]			Global Warming Potential [5]			Annual Emissions (MT/yr) [6]			
	Value	Units	Value	Units		CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2	CH_4	N_2O	CO_2e
Dewatering System	6,104	hours/year	417	kW	2,547,761	527.9	0.033	0.004	1	25	298	610	0.0381	0.0046	612
Rock Plant Equipment	-	hours/year	-	kW	1,713,294	527.9	0.033	0.004	1	25	298	410	0.0256	0.0031	412
Quarry Office	1,800	ft^2	15.8	kWh/ft^2 - year	28,440	527.9	0.033	0.004	1	25	298	6.81	0.0004	0.0001	6.84

1. Input parameters based on facility records.
2. The dewatering system electricity conversion factor is calculated using the electric power usage from the 2011 Reclamation Plan Amendment and scaling by electric pump horsepower.
   The quarry office electricity conversion factor is based on the Electricity Energy Intensity (EEI) value of 15.8 kW-hr/sqft-year from the 2012 Commercial Buildings Energy Consumption Survey (CBECS): 2012 Detailed Tables , US Department of Energy - Energy Information Agency, Table C19 (Electricity Consumption and Conditional Energy Intensity by Census Division for Non-Mall Buildings, Part 3), data for office buildings, Pacific Census Division.
3. Annual Electricity Use (kWh/yr) = Usage x Electricity Emission Factor
   Annual Electricity Use for the Rock Plant Equipment from SAP reports.
4. Emission factors from the US Department of Energy, Emissions & Generation Resource Integrated Database (eGRID), Summary Table: 1. Subregion Output Emission Rates (eGRID2016), data for Western Electricity Coordinating Council (WECC) California (CAMX) Subregion.
5. Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)
6. Annual Emissions (MT/yr) = Emission Factor (lb/MWh) x 0.45359 (kg/lb) / 1,000 (kg/MT) / 1,000 kWh/MWh * Annual Electricity Use (kWh/yr)
   Annual Emissions (MT/yr) for CO_2e = [Annual Emissions (MT/yr) x GWP]CO_2 + [Annual Emissions (MT/yr) x GWP]CH_4 + [Annual Emissions (MT/yr) x GWP]N_2O
   Global Warming Potential (GWP) from 40 CFR 98 Table A-1 (accessed December 2018)

Table 1-16. Baseline: Summary of Toxic Air Emissions

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
DRILL	Drilling (Particulate)	Medium Grade Limestone	Antimony	2.56E-04	3.23E-06
DRILL	Drilling (Particulate)	Medium Grade Limestone	Arsenic	9.74E-04	1.23E-05
DRILL	Drilling (Particulate)	Medium Grade Limestone	Barium	3.33E-01	4.19E-03
DRILL	Drilling (Particulate)	Medium Grade Limestone	Beryllium	1.27E-05	1.60E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Cadmium	1.72E-04	2.16E-06
DRILL	Drilling (Particulate)	Medium Grade Limestone	Chromium	5.13E-03	6.45E-05
DRILL	Drilling (Particulate)	Medium Grade Limestone	Cobalt	8.46E-04	1.06E-05
DRILL	Drilling (Particulate)	Medium Grade Limestone	Copper	1.21E-02	1.52E-04
DRILL	Drilling (Particulate)	Medium Grade Limestone	Lead	6.41E-05	8.07E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Mercury	2.08E-05	2.61E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Nickel	5.13E-03	6.45E-05
DRILL	Drilling (Particulate)	Medium Grade Limestone	Selenium	2.56E-04	3.23E-06
DRILL	Drilling (Particulate)	Medium Grade Limestone	Silver	3.20E-05	4.03E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Thallium	6.41E-05	8.07E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Vanadium	8.72E-03	1.10E-04
DRILL	Drilling (Particulate)	Medium Grade Limestone	Zinc	7.18E-03	9.03E-05
DRILL	Drilling (Particulate)	Medium Grade Limestone	Hexavalent Chromium	5.00E-05	6.29E-07
DRILL	Drilling (Particulate)	Medium Grade Limestone	Crystalline Silica	1.08E+01	1.36E-01
BLAST	Blasting (Particulate)	Medium Grade Limestone	Antimony	9.05E-06	1.14E-07
BLAST	Blasting (Particulate)	Medium Grade Limestone	Arsenic	3.44E-05	4.33E-07
BLAST	Blasting (Particulate)	Medium Grade Limestone	Barium	1.18E-02	1.48E-04
BLAST	Blasting (Particulate)	Medium Grade Limestone	Beryllium	4.48E-07	5.64E-09
BLAST	Blasting (Particulate)	Medium Grade Limestone	Cadmium	6.07E-06	7.63E-08
BLAST	Blasting (Particulate)	Medium Grade Limestone	Chromium	1.81E-04	2.28E-06
BLAST	Blasting (Particulate)	Medium Grade Limestone	Cobalt	2.99E-05	3.76E-07
BLAST	Blasting (Particulate)	Medium Grade Limestone	Copper	4.26E-04	5.35E-06
BLAST	Blasting (Particulate)	Medium Grade Limestone	Lead	2.26E-06	2.85E-08
BLAST	Blasting (Particulate)	Medium Grade Limestone	Mercury	7.33E-07	9.23E-09
BLAST	Blasting (Particulate)	Medium Grade Limestone	Nickel	1.81E-04	2.28E-06
BLAST	Blasting (Particulate)	Medium Grade Limestone	Selenium	9.05E-06	1.14E-07
BLAST	Blasting (Particulate)	Medium Grade Limestone	Silver	1.13E-06	1.42E-08
BLAST	Blasting (Particulate)	Medium Grade Limestone	Thallium	2.26E-06	2.85E-08
BLAST	Blasting (Particulate)	Medium Grade Limestone	Vanadium	3.08E-04	3.87E-06
BLAST	Blasting (Particulate)	Medium Grade Limestone	Zinc	2.53E-04	3.19E-06
BLAST	Blasting (Particulate)	Medium Grade Limestone	Hexavalent Chromium	1.77E-06	2.22E-08
BLAST	Blasting (Particulate)	Medium Grade Limestone	Crystalline Silica	3.80E-01	4.79E-03
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Antimony	1.80E-04	2.99E-08
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Arsenic	6.84E-04	1.14E-07
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Barium	2.34E-01	3.89E-05
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Beryllium	8.92E-06	1.48E-09
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Cadmium	1.21E-04	2.00E-08
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Chromium	3.60E-03	5.99E-07
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Cobalt	5.94E-04	9.88E-08
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Copper	8.47E-03	1.41E-06
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Lead	4.50E-05	7.48E-09
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Mercury	1.46E-05	2.42E-09
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Nickel	3.60E-03	5.99E-07
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Selenium	1.80E-04	2.99E-08
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Silver	2.25E-05	3.74E-09
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Thallium	4.50E-05	7.48E-09
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Vanadium	6.12E-03	1.02E-06
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Zinc	5.04E-03	8.38E-07
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Hexavalent Chromium	3.51E-05	5.84E-09
BSG	Bulldozing, Scraping, and Grading: North Quarry/WMSA (Mining)	Medium Grade Limestone	Crystalline Silica	7.56E+00	1.26E-03

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Antimony	1.76E-03	4.77E-07
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Arsenic	6.67E-03	1.81E-06
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Barium	2.28E+00	6.20E-04
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Beryllium	8.69E-05	2.36E-08
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Cadmium	1.18E-03	3.20E-07
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Chromium	3.51E-02	9.54E-06
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Cobalt	5.79E-03	1.57E-06
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Copper	8.25E-02	2.24E-05
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Lead	4.39E-04	1.19E-07
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Mercury	1.42E-04	3.86E-08
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Nickel	3.51E-02	9.54E-06
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Selenium	1.76E-03	4.77E-07
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Silver	2.19E-04	5.96E-08
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Thallium	4.39E-04	1.19E-07
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Vanadium	5.97E-02	1.62E-05
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Zinc	4.92E-02	1.34E-05
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Hexavalent Chromium	3.42E-04	9.30E-08
MHNRTH	Material Handling: North Quarry Cement, Aggregate, and Waste Rock (Mining)	Medium Grade Limestone	Crystalline Silica	7.37E+01	2.00E-02
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Antimony	9.56E-04	2.60E-07
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Arsenic	4.78E-04	1.30E-07
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Barium	2.98E-01	8.11E-05
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Beryllium	2.87E-04	7.80E-08
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Cadmium	4.78E-04	1.30E-07
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Chromium	9.18E-03	2.49E-06
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Cobalt	2.45E-03	6.65E-07
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Copper	5.36E-03	1.46E-06
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Lead	4.78E-04	1.30E-07
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Mercury	7.65E-05	2.08E-08
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Nickel	8.80E-03	2.39E-06
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Selenium	9.56E-04	2.60E-07
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Silver	4.78E-04	1.30E-07
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Thallium	4.78E-04	1.30E-07
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Vanadium	7.27E-03	1.98E-06
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Zinc	9.56E-03	2.60E-06
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Hexavalent Chromium	3.76E-05	1.02E-08
MHWRH	Material Handling: Waste Rock Handling at Storage Area (Mining)	Low Grade Limestone	Crystalline Silica	1.61E+01	4.37E-03
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Antimony	9.75E-04	6.92E-07
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Arsenic	4.87E-04	3.46E-07
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Barium	3.04E-01	2.16E-04
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Beryllium	2.92E-04	2.08E-07
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Cadmium	4.87E-04	3.46E-07
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Chromium	9.36E-03	6.65E-06
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Cobalt	2.49E-03	1.77E-06
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Copper	5.46E-03	3.88E-06
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Lead	4.87E-04	3.46E-07
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Mercury	7.80E-05	5.54E-08
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Nickel	8.97E-03	6.37E-06
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Selenium	9.75E-04	6.92E-07
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Silver	4.87E-04	3.46E-07
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Thallium	4.87E-04	3.46E-07
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Vanadium	7.41E-03	5.26E-06
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Zinc	9.75E-03	6.92E-06
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Hexavalent Chromium	3.83E-05	2.72E-08
MHRPA	Material Handling: Rock Plant Aggregate (Mining)	Low Grade Limestone	Crystalline Silica	1.64E+01	1.16E-02
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Antimony	1.49E-01	1.70E-05

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Arsenic	1.59E-01	1.82E-05
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Barium	5.26E+01	6.01E-03
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Beryllium	5.86E-02	6.69E-06
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Cadmium	7.81E-02	8.91E-06
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Chromium	3.23E+00	3.68E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Cobalt	8.66E-01	9.88E-05
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Copper	2.63E+00	3.00E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Lead	1.04E-01	1.19E-05
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Mercury	1.24E-02	1.42E-06
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Nickel	3.48E+00	3.97E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Selenium	1.49E-01	1.70E-05
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Silver	5.83E-02	6.66E-06
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Thallium	6.39E-02	7.29E-06
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Vanadium	4.33E+00	4.94E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Zinc	3.10E+00	3.54E-04
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Hexavalent Chromium	1.36E-01	1.55E-05
WENQNR	Wind Erosion: North Quarry - Non-road (Mining)	Road Dust/Low Grade Limestone	Crystalline Silica	1.87E+03	2.14E-01
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Antimony	1.57E-01	1.79E-05
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Arsenic	7.83E-02	8.93E-06
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Barium	4.88E+01	5.58E-03
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Beryllium	4.70E-02	5.36E-06
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Cadmium	7.83E-02	8.93E-06
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Chromium	1.50E+00	1.72E-04
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Cobalt	4.01E-01	4.57E-05
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Copper	8.77E-01	1.00E-04
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Lead	7.83E-02	8.93E-06
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Mercury	1.25E-02	1.43E-06
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Nickel	1.44E+00	1.64E-04
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Selenium	1.57E-01	1.79E-05
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Silver	7.83E-02	8.93E-06
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Thallium	7.83E-02	8.93E-06
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Vanadium	1.19E+00	1.36E-04
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Zinc	1.57E+00	1.79E-04
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Hexavalent Chromium	6.16E-03	7.03E-07
WEWMSN	Wind Erosion: WMSA - Non-road (Mining)	Low Grade Limestone	Crystalline Silica	2.63E+03	3.00E-01
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Antimony	9.84E-05	1.12E-08
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Arsenic	2.46E-04	2.81E-08
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Barium	4.53E-02	5.17E-06
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Beryllium	6.20E-05	7.08E-09
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Cadmium	5.81E-05	6.63E-09
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Chromium	5.12E-03	5.84E-07
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Cobalt	1.38E-03	1.57E-07
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Copper	4.72E-03	5.39E-07
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Lead	1.18E-04	1.35E-08
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Mercury	9.15E-06	1.04E-09
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Nickel	5.81E-03	6.63E-07
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Selenium	9.84E-05	1.12E-08
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Silver	1.23E-05	1.40E-09
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Thallium	2.51E-05	2.86E-09
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Vanadium	8.17E-03	9.32E-07
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Zinc	4.72E-03	5.39E-07
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Hexavalent Chromium	3.05E-04	3.48E-08
WENQUR	Wind Erosion: North Quarry - Unpaved Roads (Mining)	Road Dust	Crystalline Silica	2.07E-01	2.36E-05
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Antimony	2.25E-04	2.57E-08
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Arsenic	5.63E-04	6.42E-08

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Barium	1.04E-01	1.18E-05
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Beryllium	1.42E-04	1.62E-08
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Cadmium	1.33E-04	1.52E-08
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Chromium	1.17E-02	1.34E-06
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Cobalt	3.15E-03	3.60E-07
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Copper	1.08E-02	1.23E-06
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Lead	2.70E-04	3.08E-08
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Mercury	2.09E-05	2.39E-09
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Nickel	1.33E-02	1.52E-06
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Selenium	2.25E-04	2.57E-08
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Silver	2.81E-05	3.21E-09
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Thallium	5.74E-05	6.55E-09
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Vanadium	1.87E-02	2.13E-06
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Zinc	1.08E-02	1.23E-06
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Hexavalent Chromium	6.98E-04	7.96E-08
WEWMSU	Wind Erosion: WMSA - Unpaved Roads (Mining)	Road Dust	Crystalline Silica	4.73E-01	5.39E-05
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Antimony	4.77E-03	5.45E-07
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Arsenic	2.39E-03	2.72E-07
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Barium	1.49E+00	1.70E-04
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Beryllium	1.43E-03	1.63E-07
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Cadmium	2.39E-03	2.72E-07
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Chromium	4.58E-02	5.23E-06
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Cobalt	1.22E-02	1.39E-06
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Copper	2.67E-02	3.05E-06
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Lead	2.39E-03	2.72E-07
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Mercury	3.82E-04	4.36E-08
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Nickel	4.39E-02	5.01E-06
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Selenium	4.77E-03	5.45E-07
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Silver	2.39E-03	2.72E-07
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Thallium	2.39E-03	2.72E-07
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Vanadium	3.63E-02	4.14E-06
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Zinc	4.77E-02	5.45E-06
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Hexavalent Chromium	1.88E-04	2.14E-08
WERPS	Wind Erosion: Rock Plant Stockpiles (Production)	Low Grade Limestone	Crystalline Silica	8.01E+01	9.15E-03
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Antimony	1.09E-02	2.96E-06
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Arsenic	2.72E-02	7.40E-06
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Barium	5.01E+00	1.36E-03
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Beryllium	6.86E-03	1.87E-06
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Cadmium	6.43E-03	1.75E-06
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Chromium	5.67E-01	1.54E-04
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Cobalt	1.53E-01	4.15E-05
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Copper	5.23E-01	1.42E-04
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Lead	1.31E-02	3.55E-06
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Mercury	1.01E-03	2.75E-07
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Nickel	6.43E-01	1.75E-04
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Selenium	1.09E-02	2.96E-06
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Silver	1.36E-03	3.70E-07
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Thallium	2.78E-03	7.55E-07
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Vanadium	9.04E-01	2.46E-04
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Zinc	5.23E-01	1.42E-04
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Hexavalent Chromium	3.38E-02	9.18E-06
URON	Unpaved Road Dust Entrainment: On Road Vehicles	Road Dust	Crystalline Silica	2.29E+01	6.22E-03
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Antimony	7.03E-02	1.91E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Arsenic	1.76E-01	4.77E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Barium	3.23E+01	8.78E-03

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Beryllium	4.43E-02	1.20E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Cadmium	4.15E-02	1.13E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Chromium	3.65E+00	9.93E-04
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Cobalt	9.84E-01	2.67E-04
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Copper	3.37E+00	9.17E-04
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Lead	8.43E-02	2.29E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Mercury	6.54E-03	1.78E-06
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Nickel	4.15E+00	1.13E-03
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Selenium	7.03E-02	1.91E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Silver	8.78E-03	2.39E-06
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Thallium	1.79E-02	4.87E-06
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Vanadium	5.83E+00	1.58E-03
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Zinc	3.37E+00	9.17E-04
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Hexavalent Chromium	2.18E-01	5.92E-05
UROFF	Unpaved Road Dust Entrainment: Off Road Vehicles	Road Dust	Crystalline Silica	1.48E+02	4.01E-02
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Antimony	3.59E-04	1.57E-07
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Arsenic	8.96E-04	3.92E-07
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Barium	1.65E-01	7.21E-05
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Beryllium	2.26E-04	9.87E-08
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Cadmium	2.12E-04	9.24E-08
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Chromium	1.86E-02	8.15E-06
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Cobalt	5.02E-03	2.19E-06
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Copper	1.72E-02	7.52E-06
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Lead	4.30E-04	1.88E-07
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Mercury	3.33E-05	1.46E-08
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Nickel	2.12E-02	9.24E-06
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Selenium	3.59E-04	1.57E-07
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Silver	4.48E-05	1.96E-08
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Thallium	9.14E-05	3.99E-08
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Vanadium	2.98E-02	1.30E-05
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Zinc	1.72E-02	7.52E-06
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Hexavalent Chromium	1.11E-03	4.86E-07
PRFWY	Paved Road Dust Entrainment: On Road Vehicles - Freeway	Road Dust	Crystalline Silica	7.53E-01	3.29E-04
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Antimony	7.39E-04	3.23E-07
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Arsenic	1.85E-03	8.07E-07
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Barium	3.40E-01	1.49E-04
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Beryllium	4.66E-04	2.03E-07
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Cadmium	4.36E-04	1.91E-07
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Chromium	3.84E-02	1.68E-05
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Cobalt	1.03E-02	4.52E-06
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Copper	3.55E-02	1.55E-05
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Lead	8.87E-04	3.88E-07
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Mercury	6.87E-05	3.00E-08
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Nickel	4.36E-02	1.91E-05
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Selenium	7.39E-04	3.23E-07
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Silver	9.24E-05	4.04E-08
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Thallium	1.88E-04	8.24E-08
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Vanadium	6.14E-02	2.68E-05
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Zinc	3.55E-02	1.55E-05
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Hexavalent Chromium	2.29E-03	1.00E-06
PRMAJ	Paved Road Dust Entrainment: On Road Vehicles - Major	Road Dust	Crystalline Silica	1.55E+00	6.78E-04
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Antimony	8.89E-05	3.88E-08
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Arsenic	2.22E-04	9.71E-08
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Barium	4.09E-02	1.79E-05
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Beryllium	5.60E-05	2.45E-08

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Cadmium	5.24E-05	2.29E-08
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Chromium	4.62E-03	2.02E-06
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Cobalt	1.24E-03	5.44E-07
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Copper	4.27E-03	1.86E-06
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Lead	1.07E-04	4.66E-08
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Mercury	8.27E-06	3.61E-09
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Nickel	5.24E-03	2.29E-06
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Selenium	8.89E-05	3.88E-08
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Silver	1.11E-05	4.85E-09
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Thallium	2.27E-05	9.90E-09
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Vanadium	7.38E-03	3.22E-06
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Zinc	4.27E-03	1.86E-06
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Hexavalent Chromium	2.76E-04	1.20E-07
PRCOL	Paved Road Dust Entrainment: On Road Vehicles - Collector	Road Dust	Crystalline Silica	1.87E-01	8.16E-05
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Antimony	8.56E-04	3.74E-07
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Arsenic	2.14E-03	9.35E-07
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Barium	3.94E-01	1.72E-04
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Beryllium	5.40E-04	2.36E-07
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Cadmium	5.05E-04	2.21E-07
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Chromium	4.45E-02	1.95E-05
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Cobalt	1.20E-02	5.24E-06
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Copper	4.11E-02	1.80E-05
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Lead	1.03E-03	4.49E-07
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Mercury	7.96E-05	3.48E-08
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Nickel	5.05E-02	2.21E-05
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Selenium	8.56E-04	3.74E-07
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Silver	1.07E-04	4.68E-08
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Thallium	2.18E-04	9.54E-08
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Vanadium	7.11E-02	3.11E-05
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Zinc	4.11E-02	1.80E-05
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Hexavalent Chromium	2.65E-03	1.16E-06
PRLOC	Paved Road Dust Entrainment: On Road Vehicles - Local	Road Dust	Crystalline Silica	1.80E+00	7.86E-04
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Antimony	2.55E-04	6.62E-08
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Arsenic	6.37E-04	1.65E-07
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Barium	1.17E-01	3.04E-05
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Beryllium	1.61E-04	4.17E-08
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Cadmium	1.50E-04	3.90E-08
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Chromium	1.33E-02	3.44E-06
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Cobalt	3.57E-03	9.26E-07
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Copper	1.22E-02	3.18E-06
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Lead	3.06E-04	7.94E-08
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Mercury	2.37E-05	6.15E-09
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Nickel	1.50E-02	3.90E-06
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Selenium	2.55E-04	6.62E-08
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Silver	3.19E-05	8.27E-09
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Thallium	6.50E-05	1.69E-08
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Vanadium	2.12E-02	5.49E-06
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Zinc	1.22E-02	3.18E-06
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Hexavalent Chromium	7.90E-04	2.05E-07
PRRP	Paved Road Dust Entrainment: 45 ton Haul Trucks - Paved Plant Roads	Road Dust	Crystalline Silica	5.35E-01	1.39E-04
D15K	Diesel Storage Tank, 15,000 gal	Diesel Storage	Benzene	1.51E-04	6.58E-07
D15K	Diesel Storage Tank, 15,000 gal	Diesel Storage	Toluene	8.29E-04	3.60E-06
D15K	Diesel Storage Tank, 15,000 gal	Diesel Storage	Xylenes (mixed)	7.22E-04	3.14E-06
D4K	Diesel Storage Tank, 4,000 gal	Diesel Storage	Benzene	3.67E-05	1.59E-07
D4K	Diesel Storage Tank, 4,000 gal	Diesel Storage	Toluene	2.01E-04	8.73E-07

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
D4K	Diesel Storage Tank, 4,000 gal	Diesel Storage	Xylenes (mixed)	1.75E-04	7.61E-07
G10K	Gasoline Storage Tank, 10,000 gal	Gasoline Storage	Benzene	5.62E-03	2.44E-05
G10K	Gasoline Storage Tank, 10,000 gal	Gasoline Storage	Toluene	8.03E-03	3.49E-05
G10K	Gasoline Storage Tank, 10,000 gal	Gasoline Storage	Xylenes (mixed)	8.03E-03	3.49E-05
DDISP	Diesel Fuel Dispensing	Diesel Storage	Benzene	6.43E-04	1.75E-07
DDISP	Diesel Fuel Dispensing	Diesel Storage	Toluene	3.52E-03	9.57E-07
DDISP	Diesel Fuel Dispensing	Diesel Storage	Xylenes (mixed)	3.07E-03	8.34E-07
GDISP	Gasoline Fuel Dispensing	Gasoline Storage	Benzene	3.82E-04	1.04E-07
GDISP	Gasoline Fuel Dispensing	Gasoline Storage	Toluene	5.46E-04	1.48E-07
GDISP	Gasoline Fuel Dispensing	Gasoline Storage	Xylenes (mixed)	5.46E-04	1.48E-07
ORD226	Off Road Vehicle Diesel Combustion: Skid Steer	DPM	Diesel PM	4.70E+00	1.33E-02
ORD16G	Off Road Vehicle Diesel Combustion: Grader	DPM	Diesel PM	8.66E+01	1.22E-01
ORDG87	Off Road Vehicle Diesel Combustion: Grader	DPM	Diesel PM	9.54E+00	7.64E-03
ORD824	Off Road Vehicle Diesel Combustion: Rubber Tired Dozer	DPM	Diesel PM	6.74E+01	1.20E-01
ORD834	Off Road Vehicle Diesel Combustion: Rubber Tired Dozer	DPM	Diesel PM	2.03E+01	1.63E-02
ORD777	Off Road Vehicle Diesel Combustion: Off-Highway Truck	DPM	Diesel PM	1.52E+03	1.26E-01
ORD45	Off Road Vehicle Diesel Combustion: Off-Highway Truck	DPM	Diesel PM	6.57E+02	1.40E-02
ORD773	Off Road Vehicle Diesel Combustion: Off-Highway Truck	DPM	Diesel PM	4.13E+01	2.34E-01
ORDD10	Off Road Vehicle Diesel Combustion: Dozer	DPM	Diesel PM	1.42E+02	6.54E-02
ORDD8	Off Road Vehicle Diesel Combustion: Dozer	DPM	Diesel PM	4.12E+01	1.10E-02
ORDD9	Off Road Vehicle Diesel Combustion: Dozer	DPM	Diesel PM	1.82E+01	1.46E-02
ORDD11	Off Road Vehicle Diesel Combustion: Dozer	DPM	Diesel PM	5.23E+01	5.58E-02
ORD992	Off Road Vehicle Diesel Combustion: Loader	DPM	Diesel PM	4.74E+02	9.25E-02
ORD773	Off Road Vehicle Diesel Combustion: Off-Highway Truck	DPM	Diesel PM	4.13E+01	2.34E-01
ORDA40	Off Road Vehicle Diesel Combustion: Water Truck	DPM	Diesel PM	1.63E+01	1.31E-02
ORD601	Off Road Vehicle Diesel Combustion: Shovel	DPM	Diesel PM	9.08E+01	3.64E-02
ORD374	Off Road Vehicle Diesel Combustion: Excavator	DPM	Diesel PM	3.51E+01	1.41E-02
ORD460	Off Road Vehicle Diesel Combustion: Excavator	DPM	Diesel PM	5.64E+00	9.04E-03
ORD340	Off Road Vehicle Diesel Combustion: Excavator	DPM	Diesel PM	3.90E+00	6.25E-03
ORDE87	Off Road Vehicle Diesel Combustion: Excavator	DPM	Diesel PM	6.55E+00	1.05E-02
ORD695	Off Road Vehicle Diesel Combustion: Portable Light Tower	DPM	Diesel PM	3.65E+00	1.99E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Copper	4.74E-02	1.29E-05
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Nickel	4.74E-02	1.29E-05
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	1,2,4-Trimethylbenzene	2.00E+01	5.43E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	1,3-Butadiene	1.32E+01	3.59E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Acetaldehyde	1.19E+01	3.24E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Acrolein	2.86E+00	7.77E-04
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Benzene	5.48E+01	1.49E-02
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Chlorine	6.54E+00	1.78E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Ethyl benzene	2.39E+01	6.48E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Formaldehyde	4.96E+01	1.35E-02
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Hexane	2.08E+01	5.66E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Manganese	4.74E-02	1.29E-05
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Methanol	1.11E+01	3.03E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Methyl ethyl ketone {2-Butanone}	9.54E-01	2.59E-04
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Methyl tert-butyl ether	2.96E+01	8.05E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	m-Xylene	7.07E+01	1.92E-02
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Naphthalene	2.07E+00	5.62E-04
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	o-Xylene	2.46E+01	6.68E-03
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Styrene	2.07E+00	5.62E-04
MDV	On Road Vehicle Diesel Combustion: Medium Duty Vehicles (MDVs)	Gasoline	Toluene	1.08E+02	2.93E-02
HHDTTR	On Road Vehicle Diesel Combustion: Fuel Transport (HHDT-DSL)	DPM	Diesel PM	8.63E+00	2.32E-02
HHDTDE	On Road Vehicle Diesel Combustion: Rock Plant Delivery Vehicles (HHDT-DSL)	DPM	Diesel PM	5.83E+02	6.65E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Copper	5.45E-02	5.93E-05
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Nickel	5.45E-02	5.93E-05

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	1,2,4-Trimethylbenzene	2.30E+01	2.50E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	1,3-Butadiene	1.52E+01	1.65E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Acetaldehyde	1.37E+01	1.49E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Acrolein	3.29E+00	3.58E-03
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Benzene	6.30E+01	6.85E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Chlorine	7.52E+00	8.17E-03
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Ethyl benzene	2.74E+01	2.98E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Formaldehyde	5.70E+01	6.20E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Hexane	2.40E+01	2.61E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Manganese	5.45E-02	5.93E-05
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Methanol	1.28E+01	1.39E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Methyl ethyl ketone {2-Butanone}	1.10E+00	1.19E-03
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Methyl tert-butyl ether	3.40E+01	3.70E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	m-Xylene	8.13E+01	8.84E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Naphthalene	2.38E+00	2.59E-03
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	o-Xylene	2.83E+01	3.07E-02
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Styrene	2.38E+00	2.59E-03
PAS	On Road Vehicle Diesel Combustion: Employee Commute (Passenger)	Gasoline	Toluene	1.24E+02	1.35E-01
DEW	Dewatering System Diesel Pumps	DPM	Diesel PM	4.40E+03	7.21E-01
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Antimony	1.10E-03	7.41E-07
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Arsenic	5.52E-04	3.71E-07
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Barium	3.44E-01	2.31E-04
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Beryllium	3.31E-04	2.22E-07
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Cadmium	5.52E-04	3.71E-07
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Chromium	1.06E-02	7.12E-06
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Cobalt	2.82E-03	1.90E-06
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Copper	6.18E-03	4.15E-06
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Lead	5.52E-04	3.71E-07
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Mercury	8.83E-05	5.93E-08
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Nickel	1.02E-02	6.82E-06
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Selenium	1.10E-03	7.41E-07
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Silver	5.52E-04	3.71E-07
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Thallium	5.52E-04	3.71E-07
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Vanadium	8.39E-03	5.64E-06
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Zinc	1.10E-02	7.41E-06
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Hexavalent Chromium	4.34E-05	2.92E-08
S187	Rock Plant: Sand Hopper and Storage Bin (S-187)	Low Grade Limestone	Crystalline Silica	1.85E+01	1.25E-02
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Antimony	2.37E-03	1.59E-06
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Arsenic	1.19E-03	7.97E-07
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Barium	7.40E-01	4.97E-04
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Beryllium	7.11E-04	4.78E-07
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Cadmium	1.19E-03	7.97E-07
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Chromium	2.28E-02	1.53E-05
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Cobalt	6.07E-03	4.08E-06
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Copper	1.33E-02	8.92E-06
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Lead	1.19E-03	7.97E-07
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Mercury	1.90E-04	1.27E-07
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Nickel	2.18E-02	1.47E-05
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Selenium	2.37E-03	1.59E-06
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Silver	1.19E-03	7.97E-07
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Thallium	1.19E-03	7.97E-07
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Vanadium	1.80E-02	1.21E-05
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Zinc	2.37E-02	1.59E-05
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Hexavalent Chromium	9.33E-05	6.27E-08
S201	Rock Plant: Primary Crusher (S-201)	Low Grade Limestone	Crystalline Silica	3.98E+01	2.68E-02

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Antimony	2.37E-03	1.59E-06
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Arsenic	1.19E-03	7.97E-07
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Barium	7.40E-01	4.97E-04
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Beryllium	7.11E-04	4.78E-07
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Cadmium	1.19E-03	7.97E-07
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Chromium	2.28E-02	1.53E-05
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Cobalt	6.07E-03	4.08E-06
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Copper	1.33E-02	8.92E-06
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Lead	1.19E-03	7.97E-07
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Mercury	1.90E-04	1.27E-07
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Nickel	2.18E-02	1.47E-05
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Selenium	2.37E-03	1.59E-06
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Silver	1.19E-03	7.97E-07
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Thallium	1.19E-03	7.97E-07
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Vanadium	1.80E-02	1.21E-05
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Zinc	2.37E-02	1.59E-05
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Hexavalent Chromium	9.33E-05	6.27E-08
S202	Rock Plant: Secondary Crusher (S-202)	Low Grade Limestone	Crystalline Silica	3.98E+01	2.68E-02
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Antimony	4.37E-04	2.94E-07
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Arsenic	2.18E-04	1.47E-07
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Barium	1.36E-01	9.16E-05
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Beryllium	1.31E-04	8.81E-08
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Cadmium	2.18E-04	1.47E-07
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Chromium	4.19E-03	2.82E-06
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Cobalt	1.12E-03	7.52E-07
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Copper	2.45E-03	1.64E-06
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Lead	2.18E-04	1.47E-07
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Mercury	3.50E-05	2.35E-08
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Nickel	4.02E-03	2.70E-06
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Selenium	4.37E-04	2.94E-07
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Silver	2.18E-04	1.47E-07
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Thallium	2.18E-04	1.47E-07
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Vanadium	3.32E-03	2.23E-06
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Zinc	4.37E-03	2.94E-06
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Hexavalent Chromium	1.72E-05	1.15E-08
S340	Rock Plant: Coarse Rock Withdrawal System (S-340)	Low Grade Limestone	Crystalline Silica	7.34E+00	4.93E-03
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Antimony	5.16E-04	3.47E-07
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Arsenic	2.58E-04	1.73E-07
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Barium	1.61E-01	1.08E-04
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Beryllium	1.55E-04	1.04E-07
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Cadmium	2.58E-04	1.73E-07
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Chromium	4.96E-03	3.33E-06
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Cobalt	1.32E-03	8.88E-07
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Copper	2.89E-03	1.94E-06
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Lead	2.58E-04	1.73E-07
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Mercury	4.13E-05	2.78E-08
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Nickel	4.75E-03	3.19E-06
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Selenium	5.16E-04	3.47E-07
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Silver	2.58E-04	1.73E-07
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Thallium	2.58E-04	1.73E-07
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Vanadium	3.92E-03	2.64E-06
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Zinc	5.16E-03	3.47E-06
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Hexavalent Chromium	2.03E-05	1.36E-08
S341	Rock Plant: Pre-Crushing Screens Rock Plant 3 (S-341)	Low Grade Limestone	Crystalline Silica	8.67E+00	5.83E-03
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Antimony	5.96E-04	4.00E-07

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Arsenic	2.98E-04	2.00E-07
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Barium	1.86E-01	1.25E-04
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Beryllium	1.79E-04	1.20E-07
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Cadmium	2.98E-04	2.00E-07
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Chromium	5.72E-03	3.84E-06
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Cobalt	1.53E-03	1.02E-06
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Copper	3.34E-03	2.24E-06
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Lead	2.98E-04	2.00E-07
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Mercury	4.77E-05	3.20E-08
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Nickel	5.48E-03	3.68E-06
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Selenium	5.96E-04	4.00E-07
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Silver	2.98E-04	2.00E-07
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Thallium	2.98E-04	2.00E-07
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Vanadium	4.53E-03	3.04E-06
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Zinc	5.96E-03	4.00E-06
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Hexavalent Chromium	2.34E-05	1.57E-08
S3421	Rock Plant: Coarse Rock Crushing System 2 ea. Symons 5.5 Ft (S-342A)	Low Grade Limestone	Crystalline Silica	1.00E+01	6.73E-03
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Antimony	5.13E-05	3.45E-08
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Arsenic	2.56E-05	1.72E-08
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Barium	1.60E-02	1.07E-05
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Beryllium	1.54E-05	1.03E-08
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Cadmium	2.56E-05	1.72E-08
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Chromium	4.92E-04	3.31E-07
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Cobalt	1.31E-04	8.82E-08
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Copper	2.87E-04	1.93E-07
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Lead	2.56E-05	1.72E-08
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Mercury	4.10E-06	2.76E-09
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Nickel	4.72E-04	3.17E-07
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Selenium	5.13E-05	3.45E-08
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Silver	2.56E-05	1.72E-08
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Thallium	2.56E-05	1.72E-08
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Vanadium	3.90E-04	2.62E-07
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Zinc	5.13E-04	3.45E-07
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Hexavalent Chromium	2.02E-06	1.36E-09
S344	Rock Plant: Wet Screening Feed Conveyor (S-344)	Low Grade Limestone	Crystalline Silica	8.61E-01	5.79E-04
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Antimony	8.25E-04	5.54E-07
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Arsenic	4.12E-04	2.77E-07
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Barium	2.57E-01	1.73E-04
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Beryllium	2.47E-04	1.66E-07
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Cadmium	4.12E-04	2.77E-07
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Chromium	7.92E-03	5.32E-06
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Cobalt	2.11E-03	1.42E-06
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Copper	4.62E-03	3.10E-06
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Lead	4.12E-04	2.77E-07
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Mercury	6.60E-05	4.43E-08
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Nickel	7.59E-03	5.10E-06
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Selenium	8.25E-04	5.54E-07
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Silver	4.12E-04	2.77E-07
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Thallium	4.12E-04	2.77E-07
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Vanadium	6.27E-03	4.21E-06
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Zinc	8.25E-03	5.54E-06
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Hexavalent Chromium	3.24E-05	2.18E-08
S350	Rock Plant: Wet Screening and Conveying (S-350)	Low Grade Limestone	Crystalline Silica	1.39E+01	9.31E-03
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Antimony	5.13E-05	3.45E-08
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Arsenic	2.56E-05	1.72E-08

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Barium	1.60E-02	1.07E-05
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Beryllium	1.54E-05	1.03E-08
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Cadmium	2.56E-05	1.72E-08
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Chromium	4.92E-04	3.31E-07
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Cobalt	1.31E-04	8.82E-08
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Copper	2.87E-04	1.93E-07
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Lead	2.56E-05	1.72E-08
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Mercury	4.10E-06	2.76E-09
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Nickel	4.72E-04	3.17E-07
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Selenium	5.13E-05	3.45E-08
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Silver	2.56E-05	1.72E-08
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Thallium	2.56E-05	1.72E-08
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Vanadium	3.90E-04	2.62E-07
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Zinc	5.13E-04	3.45E-07
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Hexavalent Chromium	2.02E-06	1.36E-09
S3601	Rock Plant: Wet Aggregate Loadout System (S-360A)	Low Grade Limestone	Crystalline Silica	8.61E-01	5.79E-04
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Antimony	5.13E-05	3.45E-08
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Arsenic	2.56E-05	1.72E-08
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Barium	1.60E-02	1.07E-05
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Beryllium	1.54E-05	1.03E-08
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Cadmium	2.56E-05	1.72E-08
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Chromium	4.92E-04	3.31E-07
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Cobalt	1.31E-04	8.82E-08
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Copper	2.87E-04	1.93E-07
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Lead	2.56E-05	1.72E-08
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Mercury	4.10E-06	2.76E-09
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Nickel	4.72E-04	3.17E-07
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Selenium	5.13E-05	3.45E-08
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Silver	2.56E-05	1.72E-08
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Thallium	2.56E-05	1.72E-08
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Vanadium	3.90E-04	2.62E-07
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Zinc	5.13E-04	3.45E-07
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Hexavalent Chromium	2.02E-06	1.36E-09
S3602	Rock Plant: Wet Aggregate Loadout System (S-360B)	Low Grade Limestone	Crystalline Silica	8.61E-01	5.79E-04
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Antimony	5.13E-05	3.45E-08
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Arsenic	2.56E-05	1.72E-08
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Barium	1.60E-02	1.07E-05
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Beryllium	1.54E-05	1.03E-08
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Cadmium	2.56E-05	1.72E-08
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Chromium	4.92E-04	3.31E-07
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Cobalt	1.31E-04	8.82E-08
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Copper	2.87E-04	1.93E-07
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Lead	2.56E-05	1.72E-08
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Mercury	4.10E-06	2.76E-09
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Nickel	4.72E-04	3.17E-07
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Selenium	5.13E-05	3.45E-08
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Silver	2.56E-05	1.72E-08
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Thallium	2.56E-05	1.72E-08
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Vanadium	3.90E-04	2.62E-07
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Zinc	5.13E-04	3.45E-07
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Hexavalent Chromium	2.02E-06	1.36E-09
S3603	Rock Plant: Wet Aggregate Loadout System (S-360C)	Low Grade Limestone	Crystalline Silica	8.61E-01	5.79E-04
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Antimony	1.11E-04	7.49E-08
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Arsenic	5.57E-05	3.74E-08
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Barium	3.48E-02	2.34E-05

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Beryllium	3.34E-05	2.25E-08
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Cadmium	5.57E-05	3.74E-08
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Chromium	1.07E-03	7.19E-07
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Cobalt	2.85E-04	1.92E-07
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Copper	6.24E-04	4.19E-07
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Lead	5.57E-05	3.74E-08
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Mercury	8.92E-06	5.99E-09
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Nickel	1.03E-03	6.89E-07
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Selenium	1.11E-04	7.49E-08
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Silver	5.57E-05	3.74E-08
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Thallium	5.57E-05	3.74E-08
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Vanadium	8.47E-04	5.69E-07
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Zinc	1.11E-03	7.49E-07
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Hexavalent Chromium	4.38E-06	2.95E-09
S3604	Rock Plant: Wet Aggregate Loadout System (S-360D)	Low Grade Limestone	Crystalline Silica	1.87E+00	1.26E-03
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Antimony	1.11E-04	7.49E-08
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Arsenic	5.57E-05	3.74E-08
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Barium	3.48E-02	2.34E-05
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Beryllium	3.34E-05	2.25E-08
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Cadmium	5.57E-05	3.74E-08
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Chromium	1.07E-03	7.19E-07
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Cobalt	2.85E-04	1.92E-07
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Copper	6.24E-04	4.19E-07
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Lead	5.57E-05	3.74E-08
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Mercury	8.92E-06	5.99E-09
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Nickel	1.03E-03	6.89E-07
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Selenium	1.11E-04	7.49E-08
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Silver	5.57E-05	3.74E-08
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Thallium	5.57E-05	3.74E-08
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Vanadium	8.47E-04	5.69E-07
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Zinc	1.11E-03	7.49E-07
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Hexavalent Chromium	4.38E-06	2.95E-09
S3605	Rock Plant: Wet Aggregate Loadout System (S-360E)	Low Grade Limestone	Crystalline Silica	1.87E+00	1.26E-03
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Antimony	5.13E-05	3.45E-08
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Arsenic	2.56E-05	1.72E-08
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Barium	1.60E-02	1.07E-05
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Beryllium	1.54E-05	1.03E-08
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Cadmium	2.56E-05	1.72E-08
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Chromium	4.92E-04	3.31E-07
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Cobalt	1.31E-04	8.82E-08
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Copper	2.87E-04	1.93E-07
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Lead	2.56E-05	1.72E-08
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Mercury	4.10E-06	2.76E-09
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Nickel	4.72E-04	3.17E-07
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Selenium	5.13E-05	3.45E-08
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Silver	2.56E-05	1.72E-08
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Thallium	2.56E-05	1.72E-08
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Vanadium	3.90E-04	2.62E-07
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Zinc	5.13E-04	3.45E-07
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Hexavalent Chromium	2.02E-06	1.36E-09
S3701	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370A)	Low Grade Limestone	Crystalline Silica	8.61E-01	5.79E-04
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Antimony	5.13E-05	3.45E-08
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Arsenic	2.56E-05	1.72E-08
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Barium	1.60E-02	1.07E-05
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Beryllium	1.54E-05	1.03E-08

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Cadmium	2.56E-05	1.72E-08
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Chromium	4.92E-04	3.31E-07
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Cobalt	1.31E-04	8.82E-08
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Copper	2.87E-04	1.93E-07
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Lead	2.56E-05	1.72E-08
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Mercury	4.10E-06	2.76E-09
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Nickel	4.72E-04	3.17E-07
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Selenium	5.13E-05	3.45E-08
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Silver	2.56E-05	1.72E-08
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Thallium	2.56E-05	1.72E-08
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Vanadium	3.90E-04	2.62E-07
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Zinc	5.13E-04	3.45E-07
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Hexavalent Chromium	2.02E-06	1.36E-09
S3702	Rock Plant: Class 2 Aggregate Additive Transfer System (S-370B)	Low Grade Limestone	Crystalline Silica	8.61E-01	5.79E-04
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Antimony	1.10E-03	7.41E-07
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Arsenic	5.52E-04	3.71E-07
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Barium	3.44E-01	2.31E-04
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Beryllium	3.31E-04	2.22E-07
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Cadmium	5.52E-04	3.71E-07
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Chromium	1.06E-02	7.12E-06
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Cobalt	2.82E-03	1.90E-06
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Copper	6.18E-03	4.15E-06
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Lead	5.52E-04	3.71E-07
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Mercury	8.83E-05	5.93E-08
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Nickel	1.02E-02	6.82E-06
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Selenium	1.10E-03	7.41E-07
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Silver	5.52E-04	3.71E-07
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Thallium	5.52E-04	3.71E-07
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Vanadium	8.39E-03	5.64E-06
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Zinc	1.10E-02	7.41E-06
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Hexavalent Chromium	4.34E-05	2.92E-08
S380	Rock Plant: Sand Transfer Class 2 Hopper (S-380)	Low Grade Limestone	Crystalline Silica	1.85E+01	1.25E-02
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Antimony	1.10E-03	7.41E-07
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Arsenic	5.52E-04	3.71E-07
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Barium	3.44E-01	2.31E-04
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Beryllium	3.31E-04	2.22E-07
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Cadmium	5.52E-04	3.71E-07
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Chromium	1.06E-02	7.12E-06
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Cobalt	2.82E-03	1.90E-06
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Copper	6.18E-03	4.15E-06
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Lead	5.52E-04	3.71E-07
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Mercury	8.83E-05	5.93E-08
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Nickel	1.02E-02	6.82E-06
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Selenium	1.10E-03	7.41E-07
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Silver	5.52E-04	3.71E-07
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Thallium	5.52E-04	3.71E-07
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Vanadium	8.39E-03	5.64E-06
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Zinc	1.10E-02	7.41E-06
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Hexavalent Chromium	4.34E-05	2.92E-08
S381	Rock Plant: Sand Storage Pile Conveyor (S-381)	Low Grade Limestone	Crystalline Silica	1.85E+01	1.25E-02
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Antimony	5.13E-05	3.45E-08
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Arsenic	2.56E-05	1.72E-08
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Barium	1.60E-02	1.07E-05
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Beryllium	1.54E-05	1.03E-08
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Cadmium	2.56E-05	1.72E-08

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Chromium	4.92E-04	3.31E-07
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Cobalt	1.31E-04	8.82E-08
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Copper	2.87E-04	1.93E-07
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Lead	2.56E-05	1.72E-08
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Mercury	4.10E-06	2.76E-09
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Nickel	4.72E-04	3.17E-07
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Selenium	5.13E-05	3.45E-08
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Silver	2.56E-05	1.72E-08
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Thallium	2.56E-05	1.72E-08
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Vanadium	3.90E-04	2.62E-07
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Zinc	5.13E-04	3.45E-07
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Hexavalent Chromium	2.02E-06	1.36E-09
S3821	Rock Plant: Water Clarifier Fines System (S-382A)	Low Grade Limestone	Crystalline Silica	8.61E-01	5.79E-04
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Antimony	5.13E-05	3.45E-08
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Arsenic	2.56E-05	1.72E-08
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Barium	1.60E-02	1.07E-05
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Beryllium	1.54E-05	1.03E-08
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Cadmium	2.56E-05	1.72E-08
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Chromium	4.92E-04	3.31E-07
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Cobalt	1.31E-04	8.82E-08
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Copper	2.87E-04	1.93E-07
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Lead	2.56E-05	1.72E-08
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Mercury	4.10E-06	2.76E-09
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Nickel	4.72E-04	3.17E-07
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Selenium	5.13E-05	3.45E-08
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Silver	2.56E-05	1.72E-08
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Thallium	2.56E-05	1.72E-08
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Vanadium	3.90E-04	2.62E-07
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Zinc	5.13E-04	3.45E-07
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Hexavalent Chromium	2.02E-06	1.36E-09
S3822	Rock Plant: Water Clarifier Fines System (S-382B)	Low Grade Limestone	Crystalline Silica	8.61E-01	5.79E-04
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Antimony	5.13E-05	3.45E-08
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Arsenic	2.56E-05	1.72E-08
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Barium	1.60E-02	1.07E-05
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Beryllium	1.54E-05	1.03E-08
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Cadmium	2.56E-05	1.72E-08
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Chromium	4.92E-04	3.31E-07
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Cobalt	1.31E-04	8.82E-08
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Copper	2.87E-04	1.93E-07
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Lead	2.56E-05	1.72E-08
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Mercury	4.10E-06	2.76E-09
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Nickel	4.72E-04	3.17E-07
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Selenium	5.13E-05	3.45E-08
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Silver	2.56E-05	1.72E-08
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Thallium	2.56E-05	1.72E-08
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Vanadium	3.90E-04	2.62E-07
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Zinc	5.13E-04	3.45E-07
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Hexavalent Chromium	2.02E-06	1.36E-09
S383	Rock Plant: Rock Plant 2 Conveyors (S-383)	Low Grade Limestone	Crystalline Silica	8.61E-01	5.79E-04
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Antimony	8.25E-04	5.54E-07
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Arsenic	4.12E-04	2.77E-07
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Barium	2.57E-01	1.73E-04
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Beryllium	2.47E-04	1.66E-07
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Cadmium	4.12E-04	2.77E-07
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Chromium	7.92E-03	5.32E-06

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Cobalt	2.11E-03	1.42E-06
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Copper	4.62E-03	3.10E-06
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Lead	4.12E-04	2.77E-07
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Mercury	6.60E-05	4.43E-08
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Nickel	7.59E-03	5.10E-06
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Selenium	8.25E-04	5.54E-07
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Silver	4.12E-04	2.77E-07
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Thallium	4.12E-04	2.77E-07
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Vanadium	6.27E-03	4.21E-06
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Zinc	8.25E-03	5.54E-06
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Hexavalent Chromium	3.24E-05	2.18E-08
S3841	Rock Plant: Rock Plant 2 Screens - 16 (S-384)	Low Grade Limestone	Crystalline Silica	1.39E+01	9.31E-03
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Antimony	8.25E-04	5.54E-07
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Arsenic	4.12E-04	2.77E-07
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Barium	2.57E-01	1.73E-04
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Beryllium	2.47E-04	1.66E-07
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Cadmium	4.12E-04	2.77E-07
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Chromium	7.92E-03	5.32E-06
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Cobalt	2.11E-03	1.42E-06
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Copper	4.62E-03	3.10E-06
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Lead	4.12E-04	2.77E-07
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Mercury	6.60E-05	4.43E-08
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Nickel	7.59E-03	5.10E-06
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Selenium	8.25E-04	5.54E-07
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Silver	4.12E-04	2.77E-07
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Thallium	4.12E-04	2.77E-07
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Vanadium	6.27E-03	4.21E-06
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Zinc	8.25E-03	5.54E-06
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Hexavalent Chromium	3.24E-05	2.18E-08
S3842	Rock Plant: Rock Plant 2 Screens - 17 (S-384)	Low Grade Limestone	Crystalline Silica	1.39E+01	9.31E-03
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Antimony	6.75E-04	4.54E-07
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Arsenic	3.38E-04	2.27E-07
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Barium	2.11E-01	1.42E-04
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Beryllium	2.03E-04	1.36E-07
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Cadmium	3.38E-04	2.27E-07
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Chromium	6.48E-03	4.36E-06
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Cobalt	1.73E-03	1.16E-06
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Copper	3.78E-03	2.54E-06
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Lead	3.38E-04	2.27E-07
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Mercury	5.40E-05	3.63E-08
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Nickel	6.21E-03	4.17E-06
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Selenium	6.75E-04	4.54E-07
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Silver	3.38E-04	2.27E-07
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Thallium	3.38E-04	2.27E-07
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Vanadium	5.13E-03	3.45E-06
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Zinc	6.75E-03	4.54E-06
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Hexavalent Chromium	2.66E-05	1.78E-08
S390	Rock Plant: Conveyor Belt 15-M (S-390)	Low Grade Limestone	Crystalline Silica	1.13E+01	7.62E-03
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Antimony	9.37E-05	2.55E-08
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Arsenic	4.68E-05	1.27E-08
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Barium	2.92E-02	7.94E-06
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Beryllium	2.81E-05	7.64E-09
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Cadmium	4.68E-05	1.27E-08
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Chromium	8.99E-04	2.44E-07
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Cobalt	2.40E-04	6.52E-08

Model ID Reference	Source	Representative Material	Pollutant	Annual Emissions (lb/yr)	Hourly Emissions (lb/hr)
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Copper	5.25E-04	1.43E-07
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Lead	4.68E-05	1.27E-08
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Mercury	7.50E-06	2.04E-09
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Nickel	8.62E-04	2.34E-07
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Selenium	9.37E-05	2.55E-08
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Silver	4.68E-05	1.27E-08
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Thallium	4.68E-05	1.27E-08
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Vanadium	7.12E-04	1.93E-07
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Zinc	9.37E-04	2.55E-07
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Hexavalent Chromium	3.69E-06	1.00E-09
MHRPF	Material Handling: Rock Plant Fines to WMSA (Mining)	Low Grade Limestone	Crystalline Silica	1.57E+00	4.28E-04
TOTAL	Total Baseline Emisisons	-	Antimony	4.11E-01	7.23E-05
TOTAL	Total Baseline Emisisons	-	Arsenic	4.65E-01	1.05E-04
TOTAL	Total Baseline Emisisons	-	Barium	1.49E+02	3.05E-02
TOTAL	Total Baseline Emisisons	-	Beryllium	1.64E-01	2.99E-05
TOTAL	Total Baseline Emisisons	-	Cadmium	2.17E-01	3.93E-05
TOTAL	Total Baseline Emisisons	-	Chromium	9.32E+00	1.92E-03
TOTAL	Total Baseline Emisisons	-	Cobalt	2.50E+00	5.07E-04
TOTAL	Total Baseline Emisisons	-	Copper	7.85E+00	1.82E-03
TOTAL	Total Baseline Emisisons	-	Lead	2.93E-01	5.47E-05
TOTAL	Total Baseline Emisisons	-	Mercury	3.45E-02	6.15E-06
TOTAL	Total Baseline Emisisons	-	Nickel	1.02E+01	2.17E-03
TOTAL	Total Baseline Emisisons	-	Selenium	4.11E-01	7.23E-05
TOTAL	Total Baseline Emisisons	-	Silver	1.57E-01	2.42E-05
TOTAL	Total Baseline Emisisons	-	Thallium	1.74E-01	2.83E-05
TOTAL	Total Baseline Emisisons	-	Vanadium	1.27E+01	2.75E-03
TOTAL	Total Baseline Emisisons	-	Zinc	8.95E+00	1.85E-03
TOTAL	Total Baseline Emisisons	-	Hexavalent Chromium	4.03E-01	8.88E-05
TOTAL	Total Baseline Emisisons	-	Crystalline Silica	5.11E+03	9.01E-01
TOTAL	Total Baseline Emisisons	-	Diesel PM	8.33E+03	2.03E+00
TOTAL	Total Baseline Emisisons	-	1,2,4-Trimethylbenzene	4.30E+01	3.04E-02
TOTAL	Total Baseline Emisisons	-	1,3-Butadiene	2.84E+01	2.01E-02
TOTAL	Total Baseline Emisisons	-	Acetaldehyde	2.56E+01	1.82E-02
TOTAL	Total Baseline Emisisons	-	Acrolein	6.15E+00	4.35E-03
TOTAL	Total Baseline Emisisons	-	Benzene	1.18E+02	8.34E-02
TOTAL	Total Baseline Emisisons	-	Chlorine	1.41E+01	9.95E-03
TOTAL	Total Baseline Emisisons	-	Ethyl benzene	5.13E+01	3.63E-02
TOTAL	Total Baseline Emisisons	-	Formaldehyde	1.07E+02	7.55E-02
TOTAL	Total Baseline Emisisons	-	Hexane	4.48E+01	3.17E-02
TOTAL	Total Baseline Emisisons	-	Manganese	1.02E-01	7.22E-05
TOTAL	Total Baseline Emisisons	-	Methanol	2.39E+01	1.70E-02
TOTAL	Total Baseline Emisisons	-	Methyl ethyl ketone {2-Butanone}	2.05E+00	1.45E-03
TOTAL	Total Baseline Emisisons	-	Methyl tert-butyl ether	6.37E+01	4.51E-02
TOTAL	Total Baseline Emisisons	-	m-Xylene	1.52E+02	1.08E-01
TOTAL	Total Baseline Emisisons	-	Naphthalene	4.45E+00	3.15E-03
TOTAL	Total Baseline Emisisons	-	o-Xylene	5.28E+01	3.74E-02
TOTAL	Total Baseline Emisisons	-	Styrene	4.45E+00	3.15E-03
TOTAL	Total Baseline Emisisons	-	Toluene	2.32E+02	1.64E-01
TOTAL	Total Baseline Emisisons	-	Xylenes (mixed)	1.25E-02	3.98E-05

Background Information: Material Speciation

Soil/Road Dust Speciation

Constituent	Concentration (mg/kg)	Weight Percent (%)
Antimony	1	0.0001
Arsenic	2.5	0.00025
Barium	460	0.046
Beryllium	0.63	0.000063
Cadmium	0.59	0.000059
Chromium	52	0.0052
Cobalt	14	0.0014
Copper	48	0.0048
Lead	1.2	0.00012
Mercury	0.093	0.0000093
Nickel	59	0.0059
Selenium	1	0.0001
Silver	0.125	0.0000125
Thallium	0.255	0.0000255
Vanadium	83	0.0083
Zinc	48	0.0048
Hexavalent Chromium	3.1	0.00031
Crystalline Silica		0.21

Source: Testing by Enthalpy Analytical on quarry soil conducted on 01/25/2019.
1/2 reporting limit was used for compounds where results were below reporting thresholds.
Crystalline Silica from RJ Lee Group analysis (report date 1/29/2019).

Limestone (High Grade) Speciation

Constituent	Concentration (mg/kg)	Weight Percent (%)
Antimony	1	0.0001
Arsenic	4.6	0.00046
Barium	810	0.081
Beryllium	0.055	0.0000055
Cadmium	2	0.0002
Chromium	19	0.0019
Cobalt	1.6	0.00016
Copper	36	0.0036
Lead	0.265	0.0000265
Mercury	0.18	0.000018
Nickel	24	0.0024
Selenium	2.7	0.00027
Silver	0.135	0.0000135
Thallium	0.265	0.0000265
Vanadium	110	0.011
Zinc	67	0.0067
Hexavalent Chromium	0.205	0.0000205
Crystalline Silica		2.2

Source: 2018 Q3 Lab Results provided by Talia on 11/19/2018 for High Grade Limestone.
Crystalline Silica conservatively assumed to be equal to Quartz Weight Percent.

Limestone (Medium Grade) Speciation

Constituent	Concentration (mg/kg)	Weight Percent (%)
Antimony	1	0.0001
Arsenic	3.8	0.00038
Barium	1300	0.13
Beryllium	0.0495	0.00000495
Cadmium	0.67	0.000067
Chromium	20	0.002
Cobalt	3.3	0.00033
Copper	47	0.0047
Lead	0.25	0.000025
Mercury	0.081	0.0000081
Nickel	20	0.002
Selenium	1	0.0001
Silver	0.125	0.0000125
Thallium	0.25	0.000025
Vanadium	34	0.0034
Zinc	28	0.0028
Hexavalent Chromium	0.195	0.0000195
Crystalline Silica		4.2

Source: 2018 Q3 Lab Results provided by Talia on 11/19/2018 for Medium Grade Limestone.
Crystalline Silica conservatively assumed to be equal to Quartz Weight Percent.

Limestone (Low Grade) Speciation

Constituent	Concentration (mg/kg)	Weight Percent (%)
Antimony	2.5	0.00025
Arsenic	1.25	0.000125
Barium	780	0.078
Beryllium	0.75	0.000075
Cadmium	1.25	0.000125
Chromium	24	0.0024
Cobalt	6.4	0.00064
Copper	14	0.0014
Lead	1.25	0.000125
Mercury	0.2	0.00002
Nickel	23	0.0023
Selenium	2.5	0.00025
Silver	1.25	0.000125
Thallium	1.25	0.000125
Vanadium	19	0.0019
Zinc	25	0.0025
Hexavalent Chromium	0.1	0.00001
Crystalline Silica		4.2

Source: Table A-1 of the 2014 HRA Addendum for Quarry Overburden (Low Grade) stockpiles as used in the CEIR

1/2 reporting limit was used for compounds where results were below reporting thresholds.
Crystalline Silica conservatively assumed to be equal to Quartz Weight Percent for Medium Grade Limestone.

Diesel Particulate Matter Speciation

Constituent	Weight Percent of PM_{10} (%)
Diesel PM	100

Source: BAAQMD Regulation 2, Rule 5, Table 2-5-1 Footnote 6

Diesel Storage Speciation

Constituent	Emission Factor (lb/lb VOC)
Benzene	0.00088
Toluene	0.00482
Xylenes (mixed)	0.0042

Source: SJVAPCD District Toxic Profile ID 23 for Diesel Storage Tanks from SJVAPCD 1993 District Memo "Diesel Storage Weight Fractions."

Gasoline Storage Speciation

Constituent	Emission Factor (lb/lb VOC)
Benzene	0.007
Toluene	0.01
Xylenes (mixed)	0.01

Source: SJVAPCD District Toxic Profile ID 24 for Gasoline Storage Tanks from SJVAPCD 1995 District Memo "Toxic Emissions Inventory Plan Regarding Diesel and Gasoline Storage Weight Fractions."

Gasoline Combustion Speciation

Constituent	Emission Factor (lb/mile)	Emission Factor (lb/1000 gal)
1,2,4-Trimethylbenzene	9.27E-05	1.39E+00
1,3-Butadiene	6.12E-05	9.18E-01
Acetaldehyde	5.53E-05	8.30E-01
Acrolein	1.33E-05	1.99E-01
Benzene	2.54E-04	3.81E+00
Chlorine	3.03E-05	4.55E-01
Copper	2.20E-07	3.30E-03
Ethyl benzene	1.11E-04	1.66E+00
Formaldehyde	2.30E-04	3.45E+00
Hexane	9.67E-05	1.45E+00
Manganese	2.20E-07	3.30E-03
Methanol	5.17E-05	7.75E-01
Methyl ethyl ketone {2-Butanone}	4.43E-06	6.64E-02
Methyl tert-butyl ether	1.37E-04	2.06E+00
m-Xylene	3.28E-04	4.92E+00
Naphthalene	9.60E-06	1.44E-01
Nickel	2.20E-07	3.30E-03
o-Xylene	1.14E-04	1.71E+00
Styrene	9.60E-06	1.44E-01
Toluene	5.01E-04	7.51E+00

Source: SJVAPCD District Toxic Profile ID 175 for Gasoline-Fired Non-Catalyst ICE from Table B-4 (Pg 17), "Default EF for Gasoline Combustion" in the January 2010 South Coast Air Quality Management District report, Supplemental Instructions Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory Annual Emissions Reporting Program.

APPENDIX C: DISPERSION MODELING DOCUMENTATION

Project Description: **AQIA - Proposed Project Scenario Modeling**

Emission Unit Data - Point Sources

Model ID	Emission Unit	Stack Location (UTM Coordinates)			Grade Elevation	Stack Height		Inner Diameter		Exhaust Flow Rate	Stack Velocity	Stack Temperature		HRA Emission Rate	$PM_{2.5}$ Emission Rate
		East (m)	North (m)	UTM Zone	(m)	(ft)	(m)	(ft)	(m)	(acfm)	(m/s)	(°F)	(°K)	(g/s)	(g/s)
PUMP1	Pit Pump Engine	578965.20	4130752.20	10	261.34	5.00	1.52	0.50	0.15	3,164	81.86	1026	825.15	1	1.50E-02
PUMP2	Seep Pump Engine	579001.70	4130755.60	10	269.08	5.00	1.52	0.50	0.15	3,164	81.86	1026	825.15	1	1.50E-02
PUMP3	Fill Stand Pump	578468.90	4130486.60	10	373.37	4.75	1.45	0.33	0.10	520	30.27	869	738.15	1	1.98E-02

Notes:
1. Engine stack parameters assumed based on similar size engines.
2. HRA emission factor scaled by air toxic emission rates in HARP.

Emission Unit Data - Volume

Model ID	Emission Unit	Location (UTM Coordinates)			Grade Elevation	Release Height		Initial Lateral Dimension		Initial Vertical Dimension		HRA Emission Rate	$PM_{2.5}$ Emission Rate
		East (m)	North (m)	UTM Zone	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(g/s)	(g/s)
CRUSH1	CRJ3042 Jaw Plant	580396.00	4129911.00	10	200.85	15.08	4.597	2.15	0.656	7.02	2.138	1	5.70E-04
CRUSH2	CRC380X Cone Plant	580428.00	4129910.00	10	202.30	15.67	4.775	2.34	0.715	7.29	2.221	1	5.26E-04
SCRN1	CRS620H Screen Plant #1	580418.00	4129899.00	10	200.65	13.50	4.115	3.53	1.075	6.28	1.914	1	3.56E-04
SCRN2	CRS620H Screen Plant #2	580449.00	4129896.00	10	199.51	13.50	4.115	3.53	1.075	6.28	1.914	1	2.63E-04
SCRN3	CRS820H Screen Plant #3	580468.00	4129892.00	10	202.82	13.50	4.115	3.68	1.122	6.28	1.914	1	1.83E-04
TP1	Conveyor Transfer Point Jaw to Screen #1 Feed	580401.00	4129908.00	10	200.75	1.42	0.432	0.47	0.142	0.70	0.213	1	7.41E-05
TP2	Conveyor Transfer Point Screen #1 to Base Stacker	580411.00	4129903.00	10	200.68	7.67	2.337	0.47	0.142	0.70	0.213	1	4.49E-05
TP3	Conveyor Transfer Point Feed to Screen #1	580414.00	4129901.00	10	200.67	13.50	4.115	0.47	0.142	0.70	0.213	1	9.26E-05
TP4	Conveyor Transfer Point Screen #1 to Cone Crusher	580421.00	4129899.00	10	201.22	4.67	1.422	0.58	0.177	0.70	0.213	1	4.77E-05
TP5	Conveyor Transfer Point Recycle Oversize to Cone	580425.00	4129906.00	10	202.16	4.67	1.422	0.58	0.177	0.70	0.213	1	2.06E-05
TP6	Conveyor Transfer Point Cone Crusher Feed	580427.00	4129909.00	10	202.00	15.67	4.775	0.70	0.213	0.70	0.213	1	6.83E-05
TP7	Conveyor Transfer Point Cone Crusher Discharge	580436.00	4129906.00	10	206.83	2.08	0.635	0.81	0.248	0.70	0.213	1	6.83E-05
TP8	Conveyor Transfer Point Cone Crusher to Screen #2	580449.00	4129899.00	10	200.44	13.50	4.115	0.81	0.248	0.70	0.213	1	6.83E-05
TP9	Conveyor Transfer Point Screen #2 to Cone Crusher	580446.00	4129895.00	10	199.96	4.67	1.422	0.58	0.177	0.70	0.213	1	2.06E-05
TP10	Conveyor Transfer Point Screen #2 to Screen #3	580451.00	4129900.00	10	199.68	4.67	1.422	0.58	0.177	0.70	0.213	1	4.77E-05
TP11	Conveyor Transfer Point Feed to Screen #3	580463.00	4129894.00	10	199.68	13.50	4.115	0.58	0.177	0.70	0.213	1	4.77E-05
TP12	Conveyor Transfer Point Screen #3 to Sand Stacker	580462.00	4129895.00	10	199.03	4.00	1.219	0.70	0.213	0.70	0.213	1	1.16E-05
TP13	Conveyor Transfer Point Screen #3 to 1/4" Stacker	580469.00	4129889.00	10	203.59	4.00	1.219	0.70	0.213	0.70	0.213	1	8.11E-06
TP14	Conveyor Transfer Point Screen #3 to 1/2" Stacker	580470.00	4129888.00	10	203.80	4.00	1.219	0.70	0.213	0.70	0.213	1	9.73E-06
TP15	Conveyor Transfer Point Screen #3 to 3/4" Stacker	580472.00	4129890.00	10	203.19	4.00	1.219	0.70	0.213	0.70	0.213	1	1.81E-05
VGRP1	WMSA Fugitive Sources	577613.20	4130931.40	10	558.22	22.97	7.000	394.85	120.349	10.68	3.256	1	8.29E-04
VGRP2	Quarry Fugitive Sources	578979.60	4130867.60	10	234.01	22.97	7.000	653.96	199.326	10.68	3.256	1	2.22E-01
VGRP3	Fugitive Sources between Quarry and Rock Plant	579956.50	4130312.10	10	263.69	22.97	7.000	126.66	38.605	10.68	3.256	1	0.00E+00
VGRP4	Rock Plant and Infill Staging Fugitive Sources	580537.50	4129858.80	10	200.82	22.97	7.000	214.55	65.395	10.68	3.256	1	1.51E-03

Notes:
1. UTM coordinates for the grouped volume sources (VRGP) are the center of the volume source and taken from BREEZE as drawn.
2. Release height for the grouped volume sources (VRGP) consistent with the 2014 HRA submitted to BAAQMD.
3. Initial vertical and lateral dimension calculated per AERMOD User Guide Table 3-1 from Release Height and Side Length, respectively.
4. HRA emission factor scaled by air toxic emission rates in HARP.

Project Description: **AQIA - Proposed Project Scenario Modeling**

Emission Unit Data - Circular Area

Model ID	Emission Unit	Stack Location (UTM Coordinates)			Grade Elevation	Release Height		Radius		Initial Vertical Dimension		Area	HRA Emission Rate	$PM_{2.5}$ Emission Rate
		East (m)	North (m)	UTM Zone	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(m^2)	($g/(s\text{-}m^2)$)	($g/(s\text{-}m^2)$)
PILE1	Rock Plant Surge Feed Pile	580375.00	4129911.00	10	207.35	15.00	4.57	83.3	25.379	0.00	0.00	2023.43	4.94E-04	9.92E-08
PILE2	Oversize Base Storage Pile	580410.00	4129917.00	10	199.79	15.00	4.57	58.9	17.945	0.00	0.00	1011.71	9.88E-04	9.92E-08
PILE3	Sand Storage Pile	580456.00	4129910.00	10	198.93	15.00	4.57	58.9	17.945	0.00	0.00	1011.71	9.88E-04	9.92E-08
PILE4	1/4" Storage Pile	580462.00	4129877.00	10	202.25	15.00	4.57	58.9	17.945	0.00	0.00	1011.71	9.88E-04	9.92E-08
PILE5	1/2" Storage Pile	580485.00	4129880.00	10	205.15	15.00	4.57	58.9	17.945	0.00	0.00	1011.71	9.88E-04	9.92E-08
PILE6	3/4" Storage Pile	580479.00	4129902.00	10	199.26	15.00	4.57	58.9	17.945	0.00	0.00	1011.71	9.88E-04	9.92E-08

Notes:

1. Initial vertical and lateral dimension calculated per AERMOD User Guide Table 3-1 from Release Height and Side Length, respectively.
2. HRA emission factor (equivalent to 1 g/s divided by the storage pile area) scaled by air toxic emission rates in HARP.

Emission Unit Data - Volume (Roads)

Model ID	Description	Paved or Unpaved?	Vehicle Height		Road Width		Adjusted Road Width		Release Height		Initial Vertical Dimension		Initial Lateral Dimension		HRA Emission Rate	$PM_{2.5}$ Emission Rate
			(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(g/s)	(g/s)
QTPC	High Grade Limestone Quarry to Primary Crusher	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.011	2.14E-04
QTSP	Low Grade Limestone Quarry to Stockpile	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.008	2.50E-04
STRP	Low Grade Limestone from Stockpile to Rock Plant	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.006	0.00E+00
QTRP	Low Grade Limestone from Quarry to Rock Plant	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.006	3.26E-05
ITSA	Infill to Staging Area (incl. 1000 ft outside boundary)	Paved	7.98	2.43	40.00	12.19	59.69	18.19	6.78	2.07	6.31	1.92	27.76	8.46	0.012	1.05E-05
ITQP	Infill from Staging Area to Quarry - Paved	Paved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.015	2.22E-04
ITQU	Infill from Staging Area to Quarry - Unpaved	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.010	1.34E-04
RPTC	Rock Plant Products to Customer (incl. 1000 ft outside boundary)	Paved	7.98	2.43	40.00	12.19	59.69	18.19	6.78	2.07	6.31	1.92	27.76	8.46	0.010	1.79E-06
GTBF	Greenstone to Backfill	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.006	2.81E-04
GTWA	Greenstone to WMSA	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.005	0.00E+00
COMM	Employee Commute and Fuel Transport (incl. 1000 ft outside boundary)	Paved	4.96	1.51	40.00	12.19	59.69	18.19	4.21	1.28	3.92	1.19459	27.76	8.46	0.014	8.69E-07

Notes:

1. Vehicle heights based on representative vehicles (45-ton haul trucks, 25-ton haul trucks, and Toyota Camry), including ratio of annual miles traveled for employee commute and fuel transport.
2. Road width adjusted consistent with EPA Guidance: https://www3.epa.gov/scram001/reports/Haul_Road_Workgroup-Final_Report_Package-20120302.pdf
3. The HRA emission rate is equivalent to 1 g/s; however, the emissions are divided equally between each volume source in the road section. 1 g/s for each road source scaled by air toxic emission rates in HARP.
4. The $PM_{2.5}$ the emissions are divided equally between each volume source in the road section.

Project Description: **AQIA - Baseline Scenario Modeling**

Emission Unit Data - Point Sources

Model ID	Emission Unit	Stack Location (UTM Coordinates)			Grade Elevation	Stack Height		Inner Diameter		Exhaust Flow Rate	Stack Velocity	Stack Temperature		HRA Emission Rate	$PM_{2.5}$ Emission Rate
		East (m)	North (m)	UTM Zone	(m)	(ft)	(m)	(ft)	(m)	(acfm)	(m/s)	(°F)	(°K)	(g/s)	(g/s)
PUMP1	Psuedo pump in pit	578965.20	4130752.20	10	269.08	5.00	1.52	0.50	0.15	3,164	81.86	1026	825.15	1	4.27E-02
PUMP2	Fill Stand Pump	578468.90	4130486.60	10	373.37	4.75	1.45	0.33	0.10	520	30.27	869	738.15	1	2.07E-02

Notes:
1. Engine stack parameters assumed based on similar size engines.
2. HRA emission factor scaled by air toxic emission rates in HARP.

Emission Unit Data - Volume

Model ID	Emission Unit	Location (UTM Coordinates)			Grade Elevation	Release Height		Initial Lateral Dimension		Initial Vertical Dimension		HRA Emission Rate	$PM_{2.5}$ Emission Rate
		East (m)	North (m)	UTM Zone	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(g/s)	(g/s)
VGRP1	WMSA Fugitive Sources	577613.20	4130931.40	10	558.22	22.97	7.000	394.85	120.349	10.68	3.256	1	1.40E-01
VGRP2	Quarry Fugitive Sources	578979.60	4130867.60	10	234.01	22.97	7.000	653.96	199.326	10.68	3.256	1	2.01E-01
VGRP3	Fugitive Sources between Quarry and Rock Plant	579956.50	4130312.10	10	263.69	22.97	7.000	126.66	38.605	10.68	3.256	1	0.00E+00
VGRP4	Rock Plant Fugitive Sources	580537.50	4129858.80	10	200.82	22.97	7.000	214.55	65.395	10.68	3.256	1	1.58E-02

Notes:
1. UTM coordinates for the grouped volume sources (VRGP) are the center of the volume source and taken from BREEZE as drawn
2. Release height for the grouped volume sources (VRGP) consistent with the 2014 HRA submitted to BAAQMD
3. Initial vertical and lateral dimension calculated per AERMOD User Guide Table 3-1 from Release Height and Side Length, respectively
4. HRA emission factor scaled by air toxic emission rates in HARP.

Emission Unit Data - Volume (Roads)

Model ID	Description	Paved or Unpaved?	Vehicle Height		Road Width		Adjusted Road Width		Release Height		Initial Vertical Dimension		Initial Lateral Dimension		HRA Emission Rate	$PM_{2.5}$ Emission Rate
			(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(g/s)	(g/s)
QTPC	High/Med/Low Grade Limestone Quarry to Primary Crusher	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.011	7.03E-04
QTSP	Low Grade Limestone Quarry to Stockpile	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.008	9.29E-05
RPTC	Rock Plant Products to Customer (incl. 1000 ft outside boundary)	Paved	7.98	2.43	40.00	12.19	59.69	18.19	6.78	2.07	6.31	1.92	27.76	8.46	0.010	2.71E-10
GTWA	Greenstone to WMSA	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.005	3.64E-04
COMM	Employee Commute and Fuel Transport (incl. 1000 ft outside boundary)	Paved	4.84	1.47	40.00	12.19	59.69	18.19	4.11	1.25	3.82	1.17	27.76	8.46	0.014	4.10E-11
RPFU	Rock Plant Fines to WMSA - Unpaved	Unpaved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.006	1.83E-05
RPFP	Rock Plant Fines to WMSA - Paved	Paved	12.67	3.86	40.00	12.19	59.69	18.19	10.77	3.28	10.02	3.05	27.76	8.46	0.014	1.58E-05

Notes:
1. Vehicle heights based on representative vehicles (45-ton haul trucks, 25-ton haul trucks, and Toyota Camry), including ratio of annual miles traveled for employee commute and fuel transport
2. Road width adjusted consistent with EPA Guidance: https://www3.epa.gov/scram001/reports/Haul_Road_Workgroup-Final_Report_Package-20120302.pd
3. The HRA emission rate is equivalent to 1 g/s; however, the emissions are divided equally between each volume source in the road section. 1 g/s for each road source scaled by air toxic emission rates in HARP
4. The $PM_{2.5}$ the emissions are divided equally between each volume source in the road section.

APPENDIX D: HEALTH RISK ANALYSIS DOCUMENTATION

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
PUMP1	0	0	9901	DieselExhPM	1	1042.48913	0.178508413	1
PUMP2	0	0	9901	DieselExhPM	1	1042.48913	0.178508413	1
PUMP3	0	0	9901	DieselExhPM	1	1376.57143	0.235714286	1
PILE1	0	0	7440360	Antimony	1	0.00023269	2.66E-08	1
PILE1	0	0	7440382	Arsenic	1	0.00011634	1.33E-08	1
PILE1	0	0	7440393	Barium	1	0.0725985	8.29E-06	1
PILE1	0	0	7440417	Beryllium	1	6.98E-05	7.97E-09	1
PILE1	0	0	7440439	Cadmium	1	0.00011634	1.33E-08	1
PILE1	0	0	7440473	Chromium	1	0.0022338	0.000000255	1
PILE1	0	0	7440484	Cobalt	1	0.00059568	0.000000068	1
PILE1	0	0	7440508	Copper	1	0.00130305	1.49E-07	1
PILE1	0	0	7439921	Lead	1	0.00011634	1.33E-08	1
PILE1	0	0	7439976	Mercury	1	1.8615E-05	2.13E-09	1
PILE1	0	0	7440020	Nickel	1	0.00214073	2.44E-07	1
PILE1	0	0	7782492	Selenium	1	0.00023269	2.66E-08	1
PILE1	0	0	7440224	Silver	1	0.00011634	1.33E-08	1
PILE1	0	0	7440280	Thallium	1	0.00011634	1.33E-08	1
PILE1	0	0	7440622	Vanadium	1	0.00176843	2.02E-07	1
PILE1	0	0	7440666	Zinc	1	0.00232688	2.66E-07	1
PILE1	0	0	18540299	Cr(VI)	1	9.15E-06	1.04E-09	1
PILE1	0	0	1175	Silica, Crystln	1	3.90915	0.00044625	1
PILE2	0	0	7440360	Antimony	1	0.00011634	1.33E-08	1
PILE2	0	0	7440382	Arsenic	1	5.82E-05	6.64E-09	1
PILE2	0	0	7440393	Barium	1	0.03629925	4.14E-06	1
PILE2	0	0	7440417	Beryllium	1	3.49E-05	3.98E-09	1
PILE2	0	0	7440439	Cadmium	1	5.82E-05	6.64E-09	1
PILE2	0	0	7440473	Chromium	1	0.0011169	1.28E-07	1
PILE2	0	0	7440484	Cobalt	1	0.00029784	0.000000034	1
PILE2	0	0	7440508	Copper	1	0.00065153	7.44E-08	1
PILE2	0	0	7439921	Lead	1	5.82E-05	6.64E-09	1
PILE2	0	0	7439976	Mercury	1	9.31E-06	1.06E-09	1
PILE2	0	0	7440020	Nickel	1	0.00107036	1.22E-07	1
PILE2	0	0	7782492	Selenium	1	0.00011634	1.33E-08	1
PILE2	0	0	7440224	Silver	1	5.82E-05	6.64E-09	1
PILE2	0	0	7440280	Thallium	1	5.82E-05	6.64E-09	1
PILE2	0	0	7440622	Vanadium	1	0.00088421	1.01E-07	1
PILE2	0	0	7440666	Zinc	1	0.00116344	1.33E-07	1
PILE2	0	0	18540299	Cr(VI)	1	4.58E-06	5.22E-10	1
PILE2	0	0	1175	Silica, Crystln	1	1.954575	0.000223125	1
PILE3	0	0	7440360	Antimony	1	0.00011634	1.33E-08	1
PILE3	0	0	7440382	Arsenic	1	5.82E-05	6.64E-09	1
PILE3	0	0	7440393	Barium	1	0.03629925	4.14E-06	1
PILE3	0	0	7440417	Beryllium	1	3.49E-05	3.98E-09	1
PILE3	0	0	7440439	Cadmium	1	5.82E-05	6.64E-09	1
PILE3	0	0	7440473	Chromium	1	0.0011169	1.28E-07	1
PILE3	0	0	7440484	Cobalt	1	0.00029784	0.000000034	1
PILE3	0	0	7440508	Copper	1	0.00065153	7.44E-08	1
PILE3	0	0	7439921	Lead	1	5.82E-05	6.64E-09	1
PILE3	0	0	7439976	Mercury	1	9.31E-06	1.06E-09	1
PILE3	0	0	7440020	Nickel	1	0.00107036	1.22E-07	1
PILE3	0	0	7782492	Selenium	1	0.00011634	1.33E-08	1
PILE3	0	0	7440224	Silver	1	5.82E-05	6.64E-09	1
PILE3	0	0	7440280	Thallium	1	5.82E-05	6.64E-09	1
PILE3	0	0	7440622	Vanadium	1	0.00088421	1.01E-07	1
PILE3	0	0	7440666	Zinc	1	0.00116344	1.33E-07	1
PILE3	0	0	18540299	Cr(VI)	1	4.58E-06	5.22E-10	1
PILE3	0	0	1175	Silica, Crystln	1	1.954575	0.000223125	1
PILE4	0	0	7440360	Antimony	1	0.00011634	1.33E-08	1
PILE4	0	0	7440382	Arsenic	1	5.82E-05	6.64E-09	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
PILE4	0	0	7440393	Barium	1	0.03629925	4.14E-06	1
PILE4	0	0	7440417	Beryllium	1	3.49E-05	3.98E-09	1
PILE4	0	0	7440439	Cadmium	1	5.82E-05	6.64E-09	1
PILE4	0	0	7440473	Chromium	1	0.0011169	1.28E-07	1
PILE4	0	0	7440484	Cobalt	1	0.00029784	0.000000034	1
PILE4	0	0	7440508	Copper	1	0.00065153	7.44E-08	1
PILE4	0	0	7439921	Lead	1	5.82E-05	6.64E-09	1
PILE4	0	0	7439976	Mercury	1	9.31E-06	1.06E-09	1
PILE4	0	0	7440020	Nickel	1	0.00107036	1.22E-07	1
PILE4	0	0	7782492	Selenium	1	0.00011634	1.33E-08	1
PILE4	0	0	7440224	Silver	1	5.82E-05	6.64E-09	1
PILE4	0	0	7440280	Thallium	1	5.82E-05	6.64E-09	1
PILE4	0	0	7440622	Vanadium	1	0.00088421	1.01E-07	1
PILE4	0	0	7440666	Zinc	1	0.00116344	1.33E-07	1
PILE4	0	0	18540299	Cr(VI)	1	4.58E-06	5.22E-10	1
PILE4	0	0	1175	Silica, Crystln	1	1.954575	0.000223125	1
PILE5	0	0	7440360	Antimony	1	0.00011634	1.33E-08	1
PILE5	0	0	7440382	Arsenic	1	5.82E-05	6.64E-09	1
PILE5	0	0	7440393	Barium	1	0.03629925	4.14E-06	1
PILE5	0	0	7440417	Beryllium	1	3.49E-05	3.98E-09	1
PILE5	0	0	7440439	Cadmium	1	5.82E-05	6.64E-09	1
PILE5	0	0	7440473	Chromium	1	0.0011169	1.28E-07	1
PILE5	0	0	7440484	Cobalt	1	0.00029784	0.000000034	1
PILE5	0	0	7440508	Copper	1	0.00065153	7.44E-08	1
PILE5	0	0	7439921	Lead	1	5.82E-05	6.64E-09	1
PILE5	0	0	7439976	Mercury	1	9.31E-06	1.06E-09	1
PILE5	0	0	7440020	Nickel	1	0.00107036	1.22E-07	1
PILE5	0	0	7782492	Selenium	1	0.00011634	1.33E-08	1
PILE5	0	0	7440224	Silver	1	5.82E-05	6.64E-09	1
PILE5	0	0	7440280	Thallium	1	5.82E-05	6.64E-09	1
PILE5	0	0	7440622	Vanadium	1	0.00088421	1.01E-07	1
PILE5	0	0	7440666	Zinc	1	0.00116344	1.33E-07	1
PILE5	0	0	18540299	Cr(VI)	1	4.58E-06	5.22E-10	1
PILE5	0	0	1175	Silica, Crystln	1	1.954575	0.000223125	1
PILE6	0	0	7440360	Antimony	1	0.00011634	1.33E-08	1
PILE6	0	0	7440382	Arsenic	1	5.82E-05	6.64E-09	1
PILE6	0	0	7440393	Barium	1	0.03629925	4.14E-06	1
PILE6	0	0	7440417	Beryllium	1	3.49E-05	3.98E-09	1
PILE6	0	0	7440439	Cadmium	1	5.82E-05	6.64E-09	1
PILE6	0	0	7440473	Chromium	1	0.0011169	1.28E-07	1
PILE6	0	0	7440484	Cobalt	1	0.00029784	0.000000034	1
PILE6	0	0	7440508	Copper	1	0.00065153	7.44E-08	1
PILE6	0	0	7439921	Lead	1	5.82E-05	6.64E-09	1
PILE6	0	0	7439976	Mercury	1	9.31E-06	1.06E-09	1
PILE6	0	0	7440020	Nickel	1	0.00107036	1.22E-07	1
PILE6	0	0	7782492	Selenium	1	0.00011634	1.33E-08	1
PILE6	0	0	7440224	Silver	1	5.82E-05	6.64E-09	1
PILE6	0	0	7440280	Thallium	1	5.82E-05	6.64E-09	1
PILE6	0	0	7440622	Vanadium	1	0.00088421	1.01E-07	1
PILE6	0	0	7440666	Zinc	1	0.00116344	1.33E-07	1
PILE6	0	0	18540299	Cr(VI)	1	4.58E-06	5.22E-10	1
PILE6	0	0	1175	Silica, Crystln	1	1.954575	0.000223125	1
CRUSH1	0	0	7440360	Antimony	1	0.00053508	9.45E-08	1
CRUSH1	0	0	7440382	Arsenic	1	0.00026754	4.73E-08	1
CRUSH1	0	0	7440393	Barium	1	0.16694441	2.95E-05	1
CRUSH1	0	0	7440417	Beryllium	1	0.00016052	2.84E-08	1
CRUSH1	0	0	7440439	Cadmium	1	0.00026754	4.73E-08	1
CRUSH1	0	0	7440473	Chromium	1	0.00513675	9.08E-07	1
CRUSH1	0	0	7440484	Cobalt	1	0.0013698	2.42E-07	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
CRUSH1	0	0	7440508	Copper	1	0.00299644	5.29E-07	1
CRUSH1	0	0	7439921	Lead	1	0.00026754	4.73E-08	1
CRUSH1	0	0	7439976	Mercury	1	4.28E-05	7.56E-09	1
CRUSH1	0	0	7440020	Nickel	1	0.00492272	8.70E-07	1
CRUSH1	0	0	7782492	Selenium	1	0.00053508	9.45E-08	1
CRUSH1	0	0	7440224	Silver	1	0.00026754	4.73E-08	1
CRUSH1	0	0	7440280	Thallium	1	0.00026754	4.73E-08	1
CRUSH1	0	0	7440622	Vanadium	1	0.0040666	7.18E-07	1
CRUSH1	0	0	7440666	Zinc	1	0.00535078	9.45E-07	1
CRUSH1	0	0	18540299	Cr(VI)	1	2.10E-05	3.72E-09	1
CRUSH1	0	0	1175	Silica, Crystln	1	8.98931447	0.001588218	1
CRUSH2	0	0	7440360	Antimony	1	0.00049328	8.72E-08	1
CRUSH2	0	0	7440382	Arsenic	1	0.00024664	4.36E-08	1
CRUSH2	0	0	7440393	Barium	1	0.15390188	2.72E-05	1
CRUSH2	0	0	7440417	Beryllium	1	0.00014798	2.61E-08	1
CRUSH2	0	0	7440439	Cadmium	1	0.00024664	4.36E-08	1
CRUSH2	0	0	7440473	Chromium	1	0.00473544	8.37E-07	1
CRUSH2	0	0	7440484	Cobalt	1	0.00126279	2.23E-07	1
CRUSH2	0	0	7440508	Copper	1	0.00276234	4.88E-07	1
CRUSH2	0	0	7439921	Lead	1	0.00024664	4.36E-08	1
CRUSH2	0	0	7439976	Mercury	1	3.95E-05	6.97E-09	1
CRUSH2	0	0	7440020	Nickel	1	0.00453813	8.02E-07	1
CRUSH2	0	0	7782492	Selenium	1	0.00049328	8.72E-08	1
CRUSH2	0	0	7440224	Silver	1	0.00024664	4.36E-08	1
CRUSH2	0	0	7440280	Thallium	1	0.00024664	4.36E-08	1
CRUSH2	0	0	7440622	Vanadium	1	0.00374889	6.62E-07	1
CRUSH2	0	0	7440666	Zinc	1	0.00493275	8.72E-07	1
CRUSH2	0	0	18540299	Cr(VI)	1	1.94E-05	3.43E-09	1
CRUSH2	0	0	1175	Silica, Crystln	1	8.28702428	0.001464139	1
SCRN1	0	0	7440360	Antimony	1	0.00091657	1.62E-07	1
SCRN1	0	0	7440382	Arsenic	1	0.00045829	8.10E-08	1
SCRN1	0	0	7440393	Barium	1	0.28596959	5.05E-05	1
SCRN1	0	0	7440417	Beryllium	1	0.00027497	4.86E-08	1
SCRN1	0	0	7440439	Cadmium	1	0.00045829	8.10E-08	1
SCRN1	0	0	7440473	Chromium	1	0.00879906	1.55E-06	1
SCRN1	0	0	7440484	Cobalt	1	0.00234642	4.15E-07	1
SCRN1	0	0	7440508	Copper	1	0.00513279	9.07E-07	1
SCRN1	0	0	7439921	Lead	1	0.00045829	8.10E-08	1
SCRN1	0	0	7439976	Mercury	1	7.33E-05	1.30E-08	1
SCRN1	0	0	7440020	Nickel	1	0.00843244	1.49E-06	1
SCRN1	0	0	7782492	Selenium	1	0.00091657	1.62E-07	1
SCRN1	0	0	7440224	Silver	1	0.00045829	8.10E-08	1
SCRN1	0	0	7440280	Thallium	1	0.00045829	8.10E-08	1
SCRN1	0	0	7440622	Vanadium	1	0.00696593	1.23E-06	1
SCRN1	0	0	7440666	Zinc	1	0.00916569	1.62E-06	1
SCRN1	0	0	18540299	Cr(VI)	1	3.61E-05	6.37E-09	1
SCRN1	0	0	1175	Silica, Crystln	1	15.3983628	0.002720559	1
SCRN2	0	0	7440360	Antimony	1	0.00067597	1.19E-07	1
SCRN2	0	0	7440382	Arsenic	1	0.00033799	5.97E-08	1
SCRN2	0	0	7440393	Barium	1	0.21090258	3.73E-05	1
SCRN2	0	0	7440417	Beryllium	1	0.00020279	3.58E-08	1
SCRN2	0	0	7440439	Cadmium	1	0.00033799	5.97E-08	1
SCRN2	0	0	7440473	Chromium	1	0.00648931	1.15E-06	1
SCRN2	0	0	7440484	Cobalt	1	0.00173048	3.06E-07	1
SCRN2	0	0	7440508	Copper	1	0.00378543	6.69E-07	1
SCRN2	0	0	7439921	Lead	1	0.00033799	5.97E-08	1
SCRN2	0	0	7439976	Mercury	1	5.41E-05	9.55E-09	1
SCRN2	0	0	7440020	Nickel	1	0.00621892	1.10E-06	1
SCRN2	0	0	7782492	Selenium	1	0.00067597	1.19E-07	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
SCRN2	0	0	7440224	Silver	1	0.00033799	5.97E-08	1
SCRN2	0	0	7440280	Thallium	1	0.00033799	5.97E-08	1
SCRN2	0	0	7440622	Vanadium	1	0.00513737	9.08E-07	1
SCRN2	0	0	7440666	Zinc	1	0.0067597	1.19E-06	1
SCRN2	0	0	18540299	Cr(VI)	1	2.66E-05	4.70E-09	1
SCRN2	0	0	1175	Silica, Crystln	1	11.3562925	0.002006412	1
SCRN3	0	0	7440360	Antimony	1	0.00047203	8.34E-08	1
SCRN3	0	0	7440382	Arsenic	1	0.00023602	4.17E-08	1
SCRN3	0	0	7440393	Barium	1	0.14727434	2.60E-05	1
SCRN3	0	0	7440417	Beryllium	1	0.00014161	2.50E-08	1
SCRN3	0	0	7440439	Cadmium	1	0.00023602	4.17E-08	1
SCRN3	0	0	7440473	Chromium	1	0.00453152	8.01E-07	1
SCRN3	0	0	7440484	Cobalt	1	0.00120841	2.13E-07	1
SCRN3	0	0	7440508	Copper	1	0.00264339	4.67E-07	1
SCRN3	0	0	7439921	Lead	1	0.00023602	4.17E-08	1
SCRN3	0	0	7439976	Mercury	1	3.78E-05	6.67E-09	1
SCRN3	0	0	7440020	Nickel	1	0.00434271	7.67E-07	1
SCRN3	0	0	7782492	Selenium	1	0.00047203	8.34E-08	1
SCRN3	0	0	7440224	Silver	1	0.00023602	4.17E-08	1
SCRN3	0	0	7440280	Thallium	1	0.00023602	4.17E-08	1
SCRN3	0	0	7440622	Vanadium	1	0.00358745	6.34E-07	1
SCRN3	0	0	7440666	Zinc	1	0.00472033	8.34E-07	1
SCRN3	0	0	18540299	Cr(VI)	1	1.86E-05	3.28E-09	1
SCRN3	0	0	1175	Silica, Crystln	1	7.93015682	0.001401088	1
TP1	0	0	7440360	Antimony	1	4.56E-05	8.05E-09	1
TP1	0	0	7440382	Arsenic	1	2.28E-05	4.03E-09	1
TP1	0	0	7440393	Barium	1	0.01422119	2.51E-06	1
TP1	0	0	7440417	Beryllium	1	1.37E-05	2.42E-09	1
TP1	0	0	7440439	Cadmium	1	2.28E-05	4.03E-09	1
TP1	0	0	7440473	Chromium	1	0.00043758	7.73E-08	1
TP1	0	0	7440484	Cobalt	1	0.00011669	2.06E-08	1
TP1	0	0	7440508	Copper	1	0.00025525	4.51E-08	1
TP1	0	0	7439921	Lead	1	2.28E-05	4.03E-09	1
TP1	0	0	7439976	Mercury	1	3.65E-06	6.44E-10	1
TP1	0	0	7440020	Nickel	1	0.00041934	7.41E-08	1
TP1	0	0	7782492	Selenium	1	4.56E-05	8.05E-09	1
TP1	0	0	7440224	Silver	1	2.28E-05	4.03E-09	1
TP1	0	0	7440280	Thallium	1	2.28E-05	4.03E-09	1
TP1	0	0	7440622	Vanadium	1	0.00034641	6.12E-08	1
TP1	0	0	7440666	Zinc	1	0.00045581	8.05E-08	1
TP1	0	0	18540299	Cr(VI)	1	1.79E-06	3.17E-10	1
TP1	0	0	1175	Silica, Crystln	1	0.76575642	0.000135293	1
TP2	0	0	7440360	Antimony	1	2.76E-05	4.88E-09	1
TP2	0	0	7440382	Arsenic	1	1.38E-05	2.44E-09	1
TP2	0	0	7440393	Barium	1	0.0086216	1.52E-06	1
TP2	0	0	7440417	Beryllium	1	8.29E-06	1.46E-09	1
TP2	0	0	7440439	Cadmium	1	1.38E-05	2.44E-09	1
TP2	0	0	7440473	Chromium	1	0.00026528	4.69E-08	1
TP2	0	0	7440484	Cobalt	1	7.07E-05	1.25E-08	1
TP2	0	0	7440508	Copper	1	0.00015475	2.73E-08	1
TP2	0	0	7439921	Lead	1	1.38E-05	2.44E-09	1
TP2	0	0	7439976	Mercury	1	2.21E-06	3.91E-10	1
TP2	0	0	7440020	Nickel	1	0.00025423	4.49E-08	1
TP2	0	0	7782492	Selenium	1	2.76E-05	4.88E-09	1
TP2	0	0	7440224	Silver	1	1.38E-05	2.44E-09	1
TP2	0	0	7440280	Thallium	1	1.38E-05	2.44E-09	1
TP2	0	0	7440622	Vanadium	1	0.00021001	3.71E-08	1
TP2	0	0	7440666	Zinc	1	0.00027633	4.88E-08	1
TP2	0	0	18540299	Cr(VI)	1	1.09E-06	1.92E-10	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
TP2	0	0	1175	Silica, Crystln	1	0.46423983	8.20E-05	1
TP3	0	0	7440360	Antimony	1	5.70E-05	1.01E-08	1
TP3	0	0	7440382	Arsenic	1	2.85E-05	5.03E-09	1
TP3	0	0	7440393	Barium	1	0.01777649	3.14E-06	1
TP3	0	0	7440417	Beryllium	1	1.71E-05	3.02E-09	1
TP3	0	0	7440439	Cadmium	1	2.85E-05	5.03E-09	1
TP3	0	0	7440473	Chromium	1	0.00054697	9.66E-08	1
TP3	0	0	7440484	Cobalt	1	0.00014586	2.58E-08	1
TP3	0	0	7440508	Copper	1	0.00031907	5.64E-08	1
TP3	0	0	7439921	Lead	1	2.85E-05	5.03E-09	1
TP3	0	0	7439976	Mercury	1	4.56E-06	8.05E-10	1
TP3	0	0	7440020	Nickel	1	0.00052418	9.26E-08	1
TP3	0	0	7782492	Selenium	1	5.70E-05	1.01E-08	1
TP3	0	0	7440224	Silver	1	2.85E-05	5.03E-09	1
TP3	0	0	7440280	Thallium	1	2.85E-05	5.03E-09	1
TP3	0	0	7440622	Vanadium	1	0.00043302	7.65E-08	1
TP3	0	0	7440666	Zinc	1	0.00056976	1.01E-07	1
TP3	0	0	18540299	Cr(VI)	1	2.24E-06	3.96E-10	1
TP3	0	0	1175	Silica, Crystln	1	0.95719552	0.000169116	1
TP4	0	0	7440360	Antimony	1	2.93E-05	5.18E-09	1
TP4	0	0	7440382	Arsenic	1	1.47E-05	2.59E-09	1
TP4	0	0	7440393	Barium	1	0.00915489	1.62E-06	1
TP4	0	0	7440417	Beryllium	1	8.80E-06	1.56E-09	1
TP4	0	0	7440439	Cadmium	1	1.47E-05	2.59E-09	1
TP4	0	0	7440473	Chromium	1	0.00028169	4.98E-08	1
TP4	0	0	7440484	Cobalt	1	7.51E-05	1.33E-08	1
TP4	0	0	7440508	Copper	1	0.00016432	2.90E-08	1
TP4	0	0	7439921	Lead	1	1.47E-05	2.59E-09	1
TP4	0	0	7439976	Mercury	1	2.35E-06	4.15E-10	1
TP4	0	0	7440020	Nickel	1	0.00026995	4.77E-08	1
TP4	0	0	7782492	Selenium	1	2.93E-05	5.18E-09	1
TP4	0	0	7440224	Silver	1	1.47E-05	2.59E-09	1
TP4	0	0	7440280	Thallium	1	1.47E-05	2.59E-09	1
TP4	0	0	7440622	Vanadium	1	0.000223	3.94E-08	1
TP4	0	0	7440666	Zinc	1	0.00029343	5.18E-08	1
TP4	0	0	18540299	Cr(VI)	1	1.15E-06	2.04E-10	1
TP4	0	0	1175	Silica, Crystln	1	0.49295569	8.71E-05	1
TP5	0	0	7440360	Antimony	1	1.27E-05	2.24E-09	1
TP5	0	0	7440382	Arsenic	1	6.34E-06	1.12E-09	1
TP5	0	0	7440393	Barium	1	0.00395527	6.99E-07	1
TP5	0	0	7440417	Beryllium	1	3.80E-06	6.72E-10	1
TP5	0	0	7440439	Cadmium	1	6.34E-06	1.12E-09	1
TP5	0	0	7440473	Chromium	1	0.0001217	2.15E-08	1
TP5	0	0	7440484	Cobalt	1	3.25E-05	5.73E-09	1
TP5	0	0	7440508	Copper	1	7.10E-05	1.25E-08	1
TP5	0	0	7439921	Lead	1	6.34E-06	1.12E-09	1
TP5	0	0	7439976	Mercury	1	1.01E-06	1.79E-10	1
TP5	0	0	7440020	Nickel	1	0.00011663	2.06E-08	1
TP5	0	0	7782492	Selenium	1	1.27E-05	2.24E-09	1
TP5	0	0	7440224	Silver	1	6.34E-06	1.12E-09	1
TP5	0	0	7440280	Thallium	1	6.34E-06	1.12E-09	1
TP5	0	0	7440622	Vanadium	1	9.63E-05	1.70E-08	1
TP5	0	0	7440666	Zinc	1	0.00012677	2.24E-08	1
TP5	0	0	18540299	Cr(VI)	1	4.99E-07	8.81E-11	1
TP5	0	0	1175	Silica, Crystln	1	0.212976	3.76E-05	1
TP6	0	0	7440360	Antimony	1	4.20E-05	7.42E-09	1
TP6	0	0	7440382	Arsenic	1	2.10E-05	3.71E-09	1
TP6	0	0	7440393	Barium	1	0.01311016	2.32E-06	1
TP6	0	0	7440417	Beryllium	1	1.26E-05	2.23E-09	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
TP6	0	0	7440439	Cadmium	1	2.10E-05	3.71E-09	1
TP6	0	0	7440473	Chromium	1	0.00040339	7.13E-08	1
TP6	0	0	7440484	Cobalt	1	0.00010757	1.90E-08	1
TP6	0	0	7440508	Copper	1	0.00023531	4.16E-08	1
TP6	0	0	7439921	Lead	1	2.10E-05	3.71E-09	1
TP6	0	0	7439976	Mercury	1	3.36E-06	5.94E-10	1
TP6	0	0	7440020	Nickel	1	0.00038658	6.83E-08	1
TP6	0	0	7782492	Selenium	1	4.20E-05	7.42E-09	1
TP6	0	0	7440224	Silver	1	2.10E-05	3.71E-09	1
TP6	0	0	7440280	Thallium	1	2.10E-05	3.71E-09	1
TP6	0	0	7440622	Vanadium	1	0.00031935	5.64E-08	1
TP6	0	0	7440666	Zinc	1	0.0004202	7.42E-08	1
TP6	0	0	18540299	Cr(VI)	1	1.65E-06	2.92E-10	1
TP6	0	0	1175	Silica, Crystln	1	0.7059317	0.000124723	1
TP7	0	0	7440360	Antimony	1	4.20E-05	7.42E-09	1
TP7	0	0	7440382	Arsenic	1	2.10E-05	3.71E-09	1
TP7	0	0	7440393	Barium	1	0.01311016	2.32E-06	1
TP7	0	0	7440417	Beryllium	1	1.26E-05	2.23E-09	1
TP7	0	0	7440439	Cadmium	1	2.10E-05	3.71E-09	1
TP7	0	0	7440473	Chromium	1	0.00040339	7.13E-08	1
TP7	0	0	7440484	Cobalt	1	0.00010757	1.90E-08	1
TP7	0	0	7440508	Copper	1	0.00023531	4.16E-08	1
TP7	0	0	7439921	Lead	1	2.10E-05	3.71E-09	1
TP7	0	0	7439976	Mercury	1	3.36E-06	5.94E-10	1
TP7	0	0	7440020	Nickel	1	0.00038658	6.83E-08	1
TP7	0	0	7782492	Selenium	1	4.20E-05	7.42E-09	1
TP7	0	0	7440224	Silver	1	2.10E-05	3.71E-09	1
TP7	0	0	7440280	Thallium	1	2.10E-05	3.71E-09	1
TP7	0	0	7440622	Vanadium	1	0.00031935	5.64E-08	1
TP7	0	0	7440666	Zinc	1	0.0004202	7.42E-08	1
TP7	0	0	18540299	Cr(VI)	1	1.65E-06	2.92E-10	1
TP7	0	0	1175	Silica, Crystln	1	0.7059317	0.000124723	1
TP8	0	0	7440360	Antimony	1	4.20E-05	7.42E-09	1
TP8	0	0	7440382	Arsenic	1	2.10E-05	3.71E-09	1
TP8	0	0	7440393	Barium	1	0.01311016	2.32E-06	1
TP8	0	0	7440417	Beryllium	1	1.26E-05	2.23E-09	1
TP8	0	0	7440439	Cadmium	1	2.10E-05	3.71E-09	1
TP8	0	0	7440473	Chromium	1	0.00040339	7.13E-08	1
TP8	0	0	7440484	Cobalt	1	0.00010757	1.90E-08	1
TP8	0	0	7440508	Copper	1	0.00023531	4.16E-08	1
TP8	0	0	7439921	Lead	1	2.10E-05	3.71E-09	1
TP8	0	0	7439976	Mercury	1	3.36E-06	5.94E-10	1
TP8	0	0	7440020	Nickel	1	0.00038658	6.83E-08	1
TP8	0	0	7782492	Selenium	1	4.20E-05	7.42E-09	1
TP8	0	0	7440224	Silver	1	2.10E-05	3.71E-09	1
TP8	0	0	7440280	Thallium	1	2.10E-05	3.71E-09	1
TP8	0	0	7440622	Vanadium	1	0.00031935	5.64E-08	1
TP8	0	0	7440666	Zinc	1	0.0004202	7.42E-08	1
TP8	0	0	18540299	Cr(VI)	1	1.65E-06	2.92E-10	1
TP8	0	0	1175	Silica, Crystln	1	0.7059317	0.000124723	1
TP9	0	0	7440360	Antimony	1	1.27E-05	2.24E-09	1
TP9	0	0	7440382	Arsenic	1	6.34E-06	1.12E-09	1
TP9	0	0	7440393	Barium	1	0.00395527	6.99E-07	1
TP9	0	0	7440417	Beryllium	1	3.80E-06	6.72E-10	1
TP9	0	0	7440439	Cadmium	1	6.34E-06	1.12E-09	1
TP9	0	0	7440473	Chromium	1	0.0001217	2.15E-08	1
TP9	0	0	7440484	Cobalt	1	3.25E-05	5.73E-09	1
TP9	0	0	7440508	Copper	1	7.10E-05	1.25E-08	1
TP9	0	0	7439921	Lead	1	6.34E-06	1.12E-09	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
TP9	0	0	7439976	Mercury	1	1.01E-06	1.79E-10	1
TP9	0	0	7440020	Nickel	1	0.00011663	2.06E-08	1
TP9	0	0	7782492	Selenium	1	1.27E-05	2.24E-09	1
TP9	0	0	7440224	Silver	1	6.34E-06	1.12E-09	1
TP9	0	0	7440280	Thallium	1	6.34E-06	1.12E-09	1
TP9	0	0	7440622	Vanadium	1	9.63E-05	1.70E-08	1
TP9	0	0	7440666	Zinc	1	0.00012677	2.24E-08	1
TP9	0	0	18540299	Cr(VI)	1	4.99E-07	8.81E-11	1
TP9	0	0	1175	Silica, Crystln	1	0.212976	3.76E-05	1
TP10	0	0	7440360	Antimony	1	2.93E-05	5.18E-09	1
TP10	0	0	7440382	Arsenic	1	1.47E-05	2.59E-09	1
TP10	0	0	7440393	Barium	1	0.00915489	1.62E-06	1
TP10	0	0	7440417	Beryllium	1	8.80E-06	1.56E-09	1
TP10	0	0	7440439	Cadmium	1	1.47E-05	2.59E-09	1
TP10	0	0	7440473	Chromium	1	0.00028169	4.98E-08	1
TP10	0	0	7440484	Cobalt	1	7.51E-05	1.33E-08	1
TP10	0	0	7440508	Copper	1	0.00016432	2.90E-08	1
TP10	0	0	7439921	Lead	1	1.47E-05	2.59E-09	1
TP10	0	0	7439976	Mercury	1	2.35E-06	4.15E-10	1
TP10	0	0	7440020	Nickel	1	0.00026995	4.77E-08	1
TP10	0	0	7782492	Selenium	1	2.93E-05	5.18E-09	1
TP10	0	0	7440224	Silver	1	1.47E-05	2.59E-09	1
TP10	0	0	7440280	Thallium	1	1.47E-05	2.59E-09	1
TP10	0	0	7440622	Vanadium	1	0.000223	3.94E-08	1
TP10	0	0	7440666	Zinc	1	0.00029343	5.18E-08	1
TP10	0	0	18540299	Cr(VI)	1	1.15E-06	2.04E-10	1
TP10	0	0	1175	Silica, Crystln	1	0.49295569	8.71E-05	1
TP11	0	0	7440360	Antimony	1	2.93E-05	5.18E-09	1
TP11	0	0	7440382	Arsenic	1	1.47E-05	2.59E-09	1
TP11	0	0	7440393	Barium	1	0.00915489	1.62E-06	1
TP11	0	0	7440417	Beryllium	1	8.80E-06	1.56E-09	1
TP11	0	0	7440439	Cadmium	1	1.47E-05	2.59E-09	1
TP11	0	0	7440473	Chromium	1	0.00028169	4.98E-08	1
TP11	0	0	7440484	Cobalt	1	7.51E-05	1.33E-08	1
TP11	0	0	7440508	Copper	1	0.00016432	2.90E-08	1
TP11	0	0	7439921	Lead	1	1.47E-05	2.59E-09	1
TP11	0	0	7439976	Mercury	1	2.35E-06	4.15E-10	1
TP11	0	0	7440020	Nickel	1	0.00026995	4.77E-08	1
TP11	0	0	7782492	Selenium	1	2.93E-05	5.18E-09	1
TP11	0	0	7440224	Silver	1	1.47E-05	2.59E-09	1
TP11	0	0	7440280	Thallium	1	1.47E-05	2.59E-09	1
TP11	0	0	7440622	Vanadium	1	0.000223	3.94E-08	1
TP11	0	0	7440666	Zinc	1	0.00029343	5.18E-08	1
TP11	0	0	18540299	Cr(VI)	1	1.15E-06	2.04E-10	1
TP11	0	0	1175	Silica, Crystln	1	0.49295569	8.71E-05	1
TP12	0	0	7440360	Antimony	1	7.12E-06	1.26E-09	1
TP12	0	0	7440382	Arsenic	1	3.56E-06	6.29E-10	1
TP12	0	0	7440393	Barium	1	0.00222206	3.93E-07	1
TP12	0	0	7440417	Beryllium	1	2.14E-06	3.77E-10	1
TP12	0	0	7440439	Cadmium	1	3.56E-06	6.29E-10	1
TP12	0	0	7440473	Chromium	1	6.84E-05	1.21E-08	1
TP12	0	0	7440484	Cobalt	1	1.82E-05	3.22E-09	1
TP12	0	0	7440508	Copper	1	3.99E-05	7.05E-09	1
TP12	0	0	7439921	Lead	1	3.56E-06	6.29E-10	1
TP12	0	0	7439976	Mercury	1	5.70E-07	1.01E-10	1
TP12	0	0	7440020	Nickel	1	6.55E-05	1.16E-08	1
TP12	0	0	7782492	Selenium	1	7.12E-06	1.26E-09	1
TP12	0	0	7440224	Silver	1	3.56E-06	6.29E-10	1
TP12	0	0	7440280	Thallium	1	3.56E-06	6.29E-10	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
TP12	0	0	7440622	Vanadium	1	5.41E-05	9.56E-09	1
TP12	0	0	7440666	Zinc	1	7.12E-05	1.26E-08	1
TP12	0	0	18540299	Cr(VI)	1	2.80E-07	4.95E-11	1
TP12	0	0	1175	Silica, Crystln	1	0.11964944	2.11E-05	1
TP13	0	0	7440360	Antimony	1	4.99E-06	8.81E-10	1
TP13	0	0	7440382	Arsenic	1	2.49E-06	4.40E-10	1
TP13	0	0	7440393	Barium	1	0.00155544	2.75E-07	1
TP13	0	0	7440417	Beryllium	1	1.50E-06	2.64E-10	1
TP13	0	0	7440439	Cadmium	1	2.49E-06	4.40E-10	1
TP13	0	0	7440473	Chromium	1	4.79E-05	8.46E-09	1
TP13	0	0	7440484	Cobalt	1	1.28E-05	2.25E-09	1
TP13	0	0	7440508	Copper	1	2.79E-05	4.93E-09	1
TP13	0	0	7439921	Lead	1	2.49E-06	4.40E-10	1
TP13	0	0	7439976	Mercury	1	3.99E-07	7.05E-11	1
TP13	0	0	7440020	Nickel	1	4.59E-05	8.10E-09	1
TP13	0	0	7782492	Selenium	1	4.99E-06	8.81E-10	1
TP13	0	0	7440224	Silver	1	2.49E-06	4.40E-10	1
TP13	0	0	7440280	Thallium	1	2.49E-06	4.40E-10	1
TP13	0	0	7440622	Vanadium	1	3.79E-05	6.69E-09	1
TP13	0	0	7440666	Zinc	1	4.99E-05	8.81E-09	1
TP13	0	0	18540299	Cr(VI)	1	1.96E-07	3.46E-11	1
TP13	0	0	1175	Silica, Crystln	1	0.08375461	1.48E-05	1
TP14	0	0	7440360	Antimony	1	5.98E-06	1.06E-09	1
TP14	0	0	7440382	Arsenic	1	2.99E-06	5.28E-10	1
TP14	0	0	7440393	Barium	1	0.00186653	3.30E-07	1
TP14	0	0	7440417	Beryllium	1	1.79E-06	3.17E-10	1
TP14	0	0	7440439	Cadmium	1	2.99E-06	5.28E-10	1
TP14	0	0	7440473	Chromium	1	5.74E-05	1.01E-08	1
TP14	0	0	7440484	Cobalt	1	1.53E-05	2.71E-09	1
TP14	0	0	7440508	Copper	1	3.35E-05	5.92E-09	1
TP14	0	0	7439921	Lead	1	2.99E-06	5.28E-10	1
TP14	0	0	7439976	Mercury	1	4.79E-07	8.46E-11	1
TP14	0	0	7440020	Nickel	1	5.50E-05	9.72E-09	1
TP14	0	0	7782492	Selenium	1	5.98E-06	1.06E-09	1
TP14	0	0	7440224	Silver	1	2.99E-06	5.28E-10	1
TP14	0	0	7440280	Thallium	1	2.99E-06	5.28E-10	1
TP14	0	0	7440622	Vanadium	1	4.55E-05	8.03E-09	1
TP14	0	0	7440666	Zinc	1	5.98E-05	1.06E-08	1
TP14	0	0	18540299	Cr(VI)	1	2.35E-07	4.16E-11	1
TP14	0	0	1175	Silica, Crystln	1	0.10050553	1.78E-05	1
TP15	0	0	7440360	Antimony	1	1.11E-05	1.96E-09	1
TP15	0	0	7440382	Arsenic	1	5.56E-06	9.81E-10	1
TP15	0	0	7440393	Barium	1	0.00346642	6.12E-07	1
TP15	0	0	7440417	Beryllium	1	3.33E-06	5.89E-10	1
TP15	0	0	7440439	Cadmium	1	5.56E-06	9.81E-10	1
TP15	0	0	7440473	Chromium	1	0.00010666	1.88E-08	1
TP15	0	0	7440484	Cobalt	1	2.84E-05	5.03E-09	1
TP15	0	0	7440508	Copper	1	6.22E-05	1.10E-08	1
TP15	0	0	7439921	Lead	1	5.56E-06	9.81E-10	1
TP15	0	0	7439976	Mercury	1	8.89E-07	1.57E-10	1
TP15	0	0	7440020	Nickel	1	0.00010222	1.81E-08	1
TP15	0	0	7782492	Selenium	1	1.11E-05	1.96E-09	1
TP15	0	0	7440224	Silver	1	5.56E-06	9.81E-10	1
TP15	0	0	7440280	Thallium	1	5.56E-06	9.81E-10	1
TP15	0	0	7440622	Vanadium	1	8.44E-05	1.49E-08	1
TP15	0	0	7440666	Zinc	1	0.0001111	1.96E-08	1
TP15	0	0	18540299	Cr(VI)	1	4.37E-07	7.72E-11	1
TP15	0	0	1175	Silica, Crystln	1	0.18665313	3.30E-05	1
VGRP1	0	0	7440360	Antimony	1	0.0003	8.92E-08	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
VGRP1	0	0	7440382	Arsenic	1	0.00094498	3.17E-07	1
VGRP1	0	0	7440393	Barium	1	0.26398861	0.000101619	1
VGRP1	0	0	7440417	Beryllium	1	0.00010193	1.44E-08	1
VGRP1	0	0	7440439	Cadmium	1	0.000189	5.84E-08	1
VGRP1	0	0	7440473	Chromium	1	0.01080048	2.33E-06	1
VGRP1	0	0	7440484	Cobalt	1	0.00259516	4.78E-07	1
VGRP1	0	0	7440508	Copper	1	0.01425005	4.21E-06	1
VGRP1	0	0	7439921	Lead	1	0.00021751	3.86E-08	1
VGRP1	0	0	7439976	Mercury	1	2.61E-05	7.43E-09	1
VGRP1	0	0	7440020	Nickel	1	0.01185058	2.45E-06	1
VGRP1	0	0	7782492	Selenium	1	0.0003	8.92E-08	1
VGRP1	0	0	7440224	Silver	1	3.75E-05	1.12E-08	1
VGRP1	0	0	7440280	Thallium	1	7.58E-05	2.24E-08	1
VGRP1	0	0	7440622	Vanadium	1	0.01755074	3.87E-06	1
VGRP1	0	0	7440666	Zinc	1	0.01140031	2.84E-06	1
VGRP1	0	0	18540299	Cr(VI)	1	0.00049429	6.71E-08	1
VGRP1	0	0	1175	Silica, Crystln	1	6.61444536	0.003064527	1
VGRP1	0	0	9901	DieselExhPM	1	6.41305684	0.004560354	1
VGRP2	0	0	7440360	Antimony	1	0.16917936	2.30E-05	1
VGRP2	0	0	7440382	Arsenic	1	0.18804675	3.49E-05	1
VGRP2	0	0	7440393	Barium	1	62.4753785	0.011748286	1
VGRP2	0	0	7440417	Beryllium	1	0.06564851	7.72E-06	1
VGRP2	0	0	7440439	Cadmium	1	0.08930409	1.26E-05	1
VGRP2	0	0	7440473	Chromium	1	3.65441097	0.000489103	1
VGRP2	0	0	7440484	Cobalt	1	0.97523992	0.000123372	1
VGRP2	0	0	7440508	Copper	1	3.06253274	0.000515677	1
VGRP2	0	0	7439921	Lead	1	0.11695452	1.43E-05	1
VGRP2	0	0	7439976	Mercury	1	0.01415085	1.91E-06	1
VGRP2	0	0	7440020	Nickel	1	3.93720938	0.000521341	1
VGRP2	0	0	7782492	Selenium	1	0.16917936	2.30E-05	1
VGRP2	0	0	7440224	Silver	1	0.06585856	8.04E-06	1
VGRP2	0	0	7440280	Thallium	1	0.07233834	9.22E-06	1
VGRP2	0	0	7440622	Vanadium	1	4.91786587	0.000682256	1
VGRP2	0	0	7440666	Zinc	1	3.53514526	0.00050363	1
VGRP2	0	0	18540299	Cr(VI)	1	0.15158335	1.80E-05	1
VGRP2	0	0	1175	Silica, Crystln	1	2217.14978	0.403295418	1
VGRP2	0	0	9901	DieselExhPM	1	490.448399	0.106656703	1
VGRP3	0	0	71432	Benzene	1	0.34915909	0.001254533	1
VGRP3	0	0	108883	Toluene	1	0.8081945	0.002177295	1
VGRP3	0	0	1330207	Xylenes	1	0.75435417	0.00211028	1
VGRP4	0	0	7440360	Antimony	1	0.00150838	3.40E-07	1
VGRP4	0	0	7440382	Arsenic	1	0.00088314	1.97E-07	1
VGRP4	0	0	7440393	Barium	1	0.4801569	0.000108034	1
VGRP4	0	0	7440417	Beryllium	1	0.00047379	1.06E-07	1
VGRP4	0	0	7440439	Cadmium	1	0.00075999	1.71E-07	1
VGRP4	0	0	7440473	Chromium	1	0.01721408	3.83E-06	1
VGRP4	0	0	7440484	Cobalt	1	0.00459902	1.02E-06	1
VGRP4	0	0	7440508	Copper	1	0.01118055	2.47E-06	1
VGRP4	0	0	7439921	Lead	1	0.00079932	1.79E-07	1
VGRP4	0	0	7439976	Mercury	1	0.00012151	2.74E-08	1
VGRP4	0	0	7440020	Nickel	1	0.01708782	3.79E-06	1
VGRP4	0	0	7782492	Selenium	1	0.00150838	3.40E-07	1
VGRP4	0	0	7440224	Silver	1	0.00073001	1.65E-07	1
VGRP4	0	0	7440280	Thallium	1	0.0007384	1.67E-07	1
VGRP4	0	0	7440622	Vanadium	1	0.01632489	3.59E-06	1
VGRP4	0	0	7440666	Zinc	1	0.01753375	3.90E-06	1
VGRP4	0	0	18540299	Cr(VI)	1	0.00025666	5.40E-08	1
VGRP4	0	0	1175	Silica, Crystln	1	24.3930701	0.005516061	1
VGRP4	0	0	9901	DieselExhPM	1	9.5135754	0.001256663	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
QTPC	0	0	7440360	Antimony	1	0.01247722	2.82E-06	1
QTPC	0	0	7440382	Arsenic	1	0.03119305	7.06E-06	1
QTPC	0	0	7440393	Barium	1	5.73952156	0.001298534	1
QTPC	0	0	7440417	Beryllium	1	0.00786065	1.78E-06	1
QTPC	0	0	7440439	Cadmium	1	0.00736156	1.67E-06	1
QTPC	0	0	7440473	Chromium	1	0.64881548	0.000146791	1
QTPC	0	0	7440484	Cobalt	1	0.17468109	3.95E-05	1
QTPC	0	0	7440508	Copper	1	0.60213126	0.000136229	1
QTPC	0	0	7439921	Lead	1	0.01497267	3.39E-06	1
QTPC	0	0	7439976	Mercury	1	0.00116038	2.63E-07	1
QTPC	0	0	7440020	Nickel	1	0.73938069	0.000167281	1
QTPC	0	0	7782492	Selenium	1	0.01247722	2.82E-06	1
QTPC	0	0	7440224	Silver	1	0.00155965	3.53E-07	1
QTPC	0	0	7440280	Thallium	1	0.00318169	7.20E-07	1
QTPC	0	0	7440622	Vanadium	1	1.03560933	0.000234301	1
QTPC	0	0	7440666	Zinc	1	0.5989066	0.000135499	1
QTPC	0	0	18540299	Cr(VI)	1	0.03867938	8.75E-06	1
QTPC	0	0	1175	Silica, Crystln	1	26.2021636	0.005928091	1
QTPC	0	0	9901	DieselExhPM	1	99.9955879	0.002557916	1
QTPC	0	0	95636	1,2,4TriMeBenze	1	1.35826718	0.0003073	1
QTPC	0	0	106990	1,3-Butadiene	1	0.89704264	0.000202951	1
QTPC	0	0	75070	Acetaldehyde	1	0.81105163	0.000183496	1
QTPC	0	0	107028	Acrolein	1	0.19445696	4.40E-05	1
QTPC	0	0	71432	Benzene	1	3.72302011	0.000842312	1
QTPC	0	0	7782505	Chlorine	1	0.44461264	1.01E-04	1
QTPC	0	0	100414	Ethyl Benzene	1	1.62210325	0.000366992	1
QTPC	0	0	50000	Formaldehyde	1	3.37123868	0.000762724	1
QTPC	0	0	110543	Hexane	1	1.41689742	0.000320565	1
QTPC	0	0	7439965	Manganese	1	0.00322466	7.30E-07	1
QTPC	0	0	67561	Methanol	1	0.75730724	0.000171336	1
QTPC	0	0	78933	MEK	1	0.06488413	1.47E-05	1
QTPC	0	0	1634044	Me t-ButylEther	1	2.0129715	0.000455423	1
QTPC	0	0	108383	m-Xylene	1	4.80767951	0.00108771	1
QTPC	0	0	91203	Naphthalene	1	0.14071257	3.18E-05	1
QTPC	0	0	95476	o-Xylene	1	1.67096178	0.000378046	1
QTPC	0	0	100425	Styrene	1	0.14071257	3.18E-05	1
QTPC	0	0	108883	Toluene	1	7.33855145	0.001660306	1
QTSP	0	0	7440360	Antimony	1	0.01960075	4.43E-06	1
QTSP	0	0	7440382	Arsenic	1	0.04900188	1.11E-05	1
QTSP	0	0	7440393	Barium	1	9.01634588	0.002039897	1
QTSP	0	0	7440417	Beryllium	1	0.01234847	2.79E-06	1
QTSP	0	0	7440439	Cadmium	1	0.01156444	2.62E-06	1
QTSP	0	0	7440473	Chromium	1	1.0192391	0.000230597	1
QTSP	0	0	7440484	Cobalt	1	0.27441053	0.0000621	1
QTSP	0	0	7440508	Copper	1	0.94590179	0.000214005	1
QTSP	0	0	7439921	Lead	1	0.0235209	5.32E-06	1
QTSP	0	0	7439976	Mercury	1	0.00182287	4.12E-07	1
QTSP	0	0	7440020	Nickel	1	1.16151006	0.000262785	1
QTSP	0	0	7782492	Selenium	1	0.01960075	4.43E-06	1
QTSP	0	0	7440224	Silver	1	0.00245009	5.54E-07	1
QTSP	0	0	7440280	Thallium	1	0.00499819	1.13E-06	1
QTSP	0	0	7440622	Vanadium	1	1.62686241	0.000368068	1
QTSP	0	0	7440666	Zinc	1	0.94083609	0.000212859	1
QTSP	0	0	18540299	Cr(VI)	1	0.06076233	1.37E-05	1
QTSP	0	0	1175	Silica, Crystln	1	41.161579	0.009312574	1
QTSP	0	0	9901	DieselExhPM	1	157.08536	0.004018289	1
QTSP	0	0	95636	1,2,4TriMeBenze	1	2.13373302	0.000482745	1
QTSP	0	0	106990	1,3-Butadiene	1	1.40918483	0.00031882	1
QTSP	0	0	75070	Acetaldehyde	1	1.27409958	0.000288258	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
QTSP	0	0	107028	Acrolein	1	0.30547689	6.91E-05	1
QTSP	0	0	71432	Benzene	1	5.84857757	0.001323208	1
QTSP	0	0	7782505	Chlorine	1	0.69845218	0.000158021	1
QTSP	0	0	100414	Ethyl Benzene	1	2.54819915	0.000576516	1
QTSP	0	0	50000	Formaldehyde	1	5.29595606	0.00119818	1
QTSP	0	0	110543	Hexane	1	2.22583661	0.000503583	1
QTSP	0	0	7439965	Manganese	1	0.0050657	1.15E-06	1
QTSP	0	0	67561	Methanol	1	1.18967129	0.000269156	1
QTSP	0	0	78933	MEK	1	0.10192797	2.31E-05	1
QTSP	0	0	1634044	Me t-ButylEther	1	3.16222304	0.000715435	1
QTSP	0	0	108383	m-Xylene	1	7.55249387	0.001708709	1
QTSP	0	0	91203	Naphthalene	1	0.2210486	5.00E-05	1
QTSP	0	0	95476	o-Xylene	1	2.62495214	0.000593881	1
QTSP	0	0	100425	Styrene	1	0.2210486	5.00E-05	1
QTSP	0	0	108883	Toluene	1	11.5282986	0.002608212	1
QTRP	0	0	7440360	Antimony	1	0.0036519	8.26E-07	1
QTRP	0	0	7440382	Arsenic	1	0.00912974	2.07E-06	1
QTRP	0	0	7440393	Barium	1	1.67987215	3.80E-04	1
QTRP	0	0	7440417	Beryllium	1	0.00230069	5.21E-07	1
QTRP	0	0	7440439	Cadmium	1	0.00215462	4.87E-07	1
QTRP	0	0	7440473	Chromium	1	0.18989859	4.30E-05	1
QTRP	0	0	7440484	Cobalt	1	0.05112654	1.16E-05	1
QTRP	0	0	7440508	Copper	1	0.17623482	3.99E-05	1
QTRP	0	0	7439921	Lead	1	0.00438228	9.91E-07	1
QTRP	0	0	7439976	Mercury	1	3.40E-04	7.68E-08	1
QTRP	0	0	7440020	Nickel	1	0.21640567	4.90E-05	1
QTRP	0	0	7782492	Selenium	1	0.0036519	8.26E-07	1
QTRP	0	0	7440224	Silver	1	4.56E-04	1.03E-07	1
QTRP	0	0	7440280	Thallium	1	9.31E-04	2.11E-07	1
QTRP	0	0	7440622	Vanadium	1	0.30310737	6.86E-05	1
QTRP	0	0	7440666	Zinc	1	0.17529101	3.97E-05	1
QTRP	0	0	18540299	Cr(VI)	1	0.01132088	2.56E-06	1
QTRP	0	0	1175	Silica, Crystln	1	7.66898154	0.001735064	1
QTRP	0	0	9901	DieselExhPM	1	29.2672135	7.49E-04	1
QTRP	0	0	95636	1,2,4TriMeBenze	1	0.3975445	8.99E-05	1
QTRP	0	0	106990	1,3-Butadiene	1	0.26255097	5.94E-05	1
QTRP	0	0	75070	Acetaldehyde	1	0.23738268	0.0000537	1
QTRP	0	0	107028	Acrolein	1	0.05691464	1.29E-05	1
QTRP	0	0	71432	Benzene	1	1.08967232	2.47E-04	1
QTRP	0	0	7782505	Chlorine	1	0.13013147	2.94E-05	1
QTRP	0	0	100414	Ethyl Benzene	1	0.47476537	1.07E-04	1
QTRP	0	0	50000	Formaldehyde	1	0.98671116	2.23E-04	1
QTRP	0	0	110543	Hexane	1	0.41470469	9.38E-05	1
QTRP	0	0	7439965	Manganese	1	0.00094381	2.14E-07	1
QTRP	0	0	67561	Methanol	1	0.22165251	5.01E-05	1
QTRP	0	0	78933	MEK	1	0.01899062	4.30E-06	1
QTRP	0	0	1634044	Me t-ButylEther	1	0.58916666	1.33E-04	1
QTRP	0	0	108383	m-Xylene	1	1.40713591	3.18E-04	1
QTRP	0	0	91203	Naphthalene	1	0.04118447	9.32E-06	1
QTRP	0	0	95476	o-Xylene	1	0.48906553	1.11E-04	1
QTRP	0	0	100425	Styrene	1	0.04118447	9.32E-06	1
QTRP	0	0	108883	Toluene	1	2.14788429	0.000485947	1
ITSA	0	0	7440360	Antimony	1	0.00025645	4.86E-08	1
ITSA	0	0	7440382	Arsenic	1	0.00064114	0.000000121	1
ITSA	0	0	7440393	Barium	1	0.11796876	2.23E-05	1
ITSA	0	0	7440417	Beryllium	1	0.00016157	3.06E-08	1
ITSA	0	0	7440439	Cadmium	1	0.00015131	2.87E-08	1
ITSA	0	0	7440473	Chromium	1	0.0133356	0.00000253	1
ITSA	0	0	7440484	Cobalt	1	0.00359035	6.80E-07	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
ITSA	0	0	7440508	Copper	1	0.01230978	0.00000233	1
ITSA	0	0	7439921	Lead	1	0.00030775	5.83E-08	1
ITSA	0	0	7439976	Mercury	1	0.0000239	4.52E-09	1
ITSA	0	0	7440020	Nickel	1	0.01513078	2.87E-06	1
ITSA	0	0	7782492	Selenium	1	0.00025645	4.86E-08	1
ITSA	0	0	7440224	Silver	1	0.0000321	6.07E-09	1
ITSA	0	0	7440280	Thallium	1	0.0000654	1.24E-08	1
ITSA	0	0	7440622	Vanadium	1	0.02128567	0.00000403	1
ITSA	0	0	7440666	Zinc	1	0.01230978	2.33E-06	1
ITSA	0	0	18540299	Cr(VI)	1	0.00079501	0.000000151	1
ITSA	0	0	1175	Silica, Crystln	1	0.53855305	1.02E-04	1
ITSA	0	0	9901	DieselExhPM	1	0.02103153	0.00000323	1
ITQP	0	0	7440360	Antimony	1	0.00403679	8.72E-07	1
ITQP	0	0	7440382	Arsenic	1	0.01009198	2.18E-06	1
ITQP	0	0	7440393	Barium	1	1.85692394	0.000401249	1
ITQP	0	0	7440417	Beryllium	1	0.00254318	5.50E-07	1
ITQP	0	0	7440439	Cadmium	1	0.00238171	5.15E-07	1
ITQP	0	0	7440473	Chromium	1	0.20991314	0.0000454	1
ITQP	0	0	7440484	Cobalt	1	0.05651508	1.22E-05	1
ITQP	0	0	7440508	Copper	1	0.19532359	4.22E-05	1
ITQP	0	0	7439921	Lead	1	0.00484415	1.05E-06	1
ITQP	0	0	7439976	Mercury	1	0.00037542	8.11E-08	1
ITQP	0	0	7440020	Nickel	1	0.23972829	0.0000518	1
ITQP	0	0	7782492	Selenium	1	0.00403679	8.72E-07	1
ITQP	0	0	7440224	Silver	1	0.0005046	1.09E-07	1
ITQP	0	0	7440280	Thallium	1	0.00102938	2.22E-07	1
ITQP	0	0	7440622	Vanadium	1	0.33505367	0.0000724	1
ITQP	0	0	7440666	Zinc	1	0.19376598	4.19E-05	1
ITQP	0	0	18540299	Cr(VI)	1	0.01251405	2.70E-06	1
ITQP	0	0	1175	Silica, Crystln	1	8.47726145	0.00183179	1
ITQP	0	0	9901	DieselExhPM	1	44.931101	0.000643182	1
ITQP	0	0	95636	1,2,4TriMeBenze	1	0.65608433	0.000148435	1
ITQP	0	0	106990	1,3-Butadiene	1	0.43329886	0.000098	1
ITQP	0	0	75070	Acetaldehyde	1	0.39176259	0.0000886	1
ITQP	0	0	107028	Acrolein	1	0.09392862	2.13E-05	1
ITQP	0	0	71432	Benzene	1	1.79833187	0.000406862	1
ITQP	0	0	7782505	Chlorine	1	0.21476142	4.86E-05	1
ITQP	0	0	100414	Ethyl Benzene	1	0.78352517	0.000177268	1
ITQP	0	0	50000	Formaldehyde	1	1.62841074	0.000368419	1
ITQP	0	0	110543	Hexane	1	0.68440452	0.000154843	1
ITQP	0	0	7439965	Manganese	1	0.00155761	3.52E-07	1
ITQP	0	0	67561	Methanol	1	0.36580241	0.0000828	1
ITQP	0	0	78933	MEK	1	0.03134101	7.09E-06	1
ITQP	0	0	1634044	Me t-ButylEther	1	0.97232642	0.000219983	1
ITQP	0	0	108383	m-Xylene	1	2.32225532	0.000525397	1
ITQP	0	0	91203	Naphthalene	1	0.06796845	1.54E-05	1
ITQP	0	0	95476	o-Xylene	1	0.80712533	0.000182608	1
ITQP	0	0	100425	Styrene	1	0.06796845	1.54E-05	1
ITQP	0	0	108883	Toluene	1	3.54474339	0.000801978	1
ITQU	0	0	7440360	Antimony	1	0.00896101	2.03E-06	1
ITQU	0	0	7440382	Arsenic	1	0.02240254	5.07E-06	1
ITQU	0	0	7440393	Barium	1	4.12206656	0.000932594	1
ITQU	0	0	7440417	Beryllium	1	0.00564544	1.28E-06	1
ITQU	0	0	7440439	Cadmium	1	0.005287	1.20E-06	1
ITQU	0	0	7440473	Chromium	1	0.46597274	1.05E-04	1
ITQU	0	0	7440484	Cobalt	1	0.1254542	2.84E-05	1
ITQU	0	0	7440508	Copper	1	0.43244461	9.78E-05	1
ITQU	0	0	7439921	Lead	1	0.01075322	2.43E-06	1
ITQU	0	0	7439976	Mercury	1	0.00083337	1.89E-07	1

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Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
ITQU	0	0	7440020	Nickel	1	0.53101576	0.000120139	1
ITQU	0	0	7782492	Selenium	1	0.00896101	2.03E-06	1
ITQU	0	0	7440224	Silver	1	0.00112013	2.53E-07	1
ITQU	0	0	7440280	Thallium	1	0.00228506	5.17E-07	1
ITQU	0	0	7440622	Vanadium	1	0.74376418	0.000168272	1
ITQU	0	0	7440666	Zinc	1	0.43012869	9.73E-05	1
ITQU	0	0	18540299	Cr(VI)	1	0.02777914	6.28E-06	1
ITQU	0	0	1175	Silica, Crystln	1	18.81813	0.004257495	1
ITQU	0	0	9901	DieselExhPM	1	71.8158239	0.00183707	1
ITQU	0	0	95636	1,2,4TriMeBenze	1	0.9754938	0.0002207	1
ITQU	0	0	106990	1,3-Butadiene	1	0.64424699	0.000145757	1
ITQU	0	0	75070	Acetaldehyde	1	0.58248911	0.000131785	1
ITQU	0	0	107028	Acrolein	1	0.13965703	3.16E-05	1
ITQU	0	0	71432	Benzene	1	2.67383554	0.00060494	1
ITQU	0	0	7782505	Chlorine	1	0.31931632	7.22E-05	1
ITQU	0	0	100414	Ethyl Benzene	1	1.16497821	0.00026357	1
ITQU	0	0	50000	Formaldehyde	1	2.42118966	0.00054778	1
ITQU	0	0	110543	Hexane	1	1.01760145	0.000230227	1
ITQU	0	0	7439965	Manganese	1	0.00231592	5.24E-07	1
ITQU	0	0	67561	Methanol	1	0.54389043	1.23E-04	1
ITQU	0	0	78933	MEK	1	0.04659913	1.05E-05	1
ITQU	0	0	1634044	Me t-ButylEther	1	1.44569585	0.000327081	1
ITQU	0	0	108383	m-Xylene	1	3.45282699	0.000781183	1
ITQU	0	0	91203	Naphthalene	1	0.10105835	2.29E-05	1
ITQU	0	0	95476	o-Xylene	1	1.20006792	0.000271509	1
ITQU	0	0	100425	Styrene	1	0.10105835	2.29E-05	1
ITQU	0	0	108883	Toluene	1	5.27047372	0.001192415	1
RPTC	0	0	7440360	Antimony	1	5.08E-05	1.21E-08	1
RPTC	0	0	7440382	Arsenic	1	0.00012706	3.04E-08	1
RPTC	0	0	7440393	Barium	1	0.02337871	5.59E-06	1
RPTC	0	0	7440417	Beryllium	1	3.20E-05	7.65E-09	1
RPTC	0	0	7440439	Cadmium	1	3.00E-05	7.17E-09	1
RPTC	0	0	7440473	Chromium	1	0.00264281	6.32E-07	1
RPTC	0	0	7440484	Cobalt	1	0.00071153	1.70E-07	1
RPTC	0	0	7440508	Copper	1	0.00243952	5.83E-07	1
RPTC	0	0	7439921	Lead	1	6.10E-05	1.46E-08	1
RPTC	0	0	7439976	Mercury	1	4.73E-06	1.13E-09	1
RPTC	0	0	7440020	Nickel	1	0.00299857	7.17E-07	1
RPTC	0	0	7782492	Selenium	1	5.08E-05	1.21E-08	1
RPTC	0	0	7440224	Silver	1	6.35E-06	1.52E-09	1
RPTC	0	0	7440280	Thallium	1	1.30E-05	3.10E-09	1
RPTC	0	0	7440622	Vanadium	1	0.00421833	1.01E-06	1
RPTC	0	0	7440666	Zinc	1	0.00243952	5.83E-07	1
RPTC	0	0	18540299	Cr(VI)	1	0.00015755	3.77E-08	1
RPTC	0	0	1175	Silica, Crystln	1	0.1067289	2.55E-05	1
RPTC	0	0	9901	DieselExhPM	1	2.57E-07	1.29E-07	1
GTBF	0	0	7440360	Antimony	1	0.03270456	7.40E-06	1
GTBF	0	0	7440382	Arsenic	1	0.0817614	1.85E-05	1
GTBF	0	0	7440393	Barium	1	15.0440983	0.003403642	1
GTBF	0	0	7440417	Beryllium	1	0.02060387	4.66E-06	1
GTBF	0	0	7440439	Cadmium	1	0.01929569	4.37E-06	1
GTBF	0	0	7440473	Chromium	1	1.7006372	0.00038476	1
GTBF	0	0	7440484	Cobalt	1	0.45786386	1.04E-04	1
GTBF	0	0	7440508	Copper	1	1.57827125	0.000357075	1
GTBF	0	0	7439921	Lead	1	0.03924547	8.88E-06	1
GTBF	0	0	7439976	Mercury	1	0.00304152	6.88E-07	1
GTBF	0	0	7440020	Nickel	1	1.93802143	0.000438466	1
GTBF	0	0	7782492	Selenium	1	0.03270456	7.40E-06	1
GTBF	0	0	7440224	Silver	1	0.00408807	9.25E-07	1

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Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
GTBF	0	0	7440280	Thallium	1	0.00833966	1.89E-06	1
GTBF	0	0	7440622	Vanadium	1	2.7144786	0.000614135	1
GTBF	0	0	7440666	Zinc	1	1.56981895	0.000355163	1
GTBF	0	0	18540299	Cr(VI)	1	0.10138414	2.29E-05	1
GTBF	0	0	1175	Silica, Crystln	1	68.6795791	0.015538366	1
GTBF	0	0	9901	DieselExhPM	1	262.102588	0.00670466	1
GTBF	0	0	95636	1,2,4TriMeBenze	1	3.5602105	0.000805477	1
GTBF	0	0	106990	1,3-Butadiene	1	2.35127571	0.000531963	1
GTBF	0	0	75070	Acetaldehyde	1	2.12588109	0.000480969	1
GTBF	0	0	107028	Acrolein	1	0.5096992	1.15E-04	1
GTBF	0	0	71432	Benzene	1	9.7585626	0.00220782	1
GTBF	0	0	7782505	Chlorine	1	1.16539265	0.000263663	1
GTBF	0	0	100414	Ethyl Benzene	1	4.25176218	0.000961937	1
GTBF	0	0	50000	Formaldehyde	1	8.8364937	0.001999207	1
GTBF	0	0	110543	Hexane	1	3.71388865	0.000840246	1
GTBF	0	0	7439965	Manganese	1	0.0084523	1.91E-06	1
GTBF	0	0	67561	Methanol	1	1.98500945	0.000449097	1
GTBF	0	0	78933	MEK	1	0.17007049	3.85E-05	1
GTBF	0	0	1634044	Me t-ButylEther	1	5.27628319	0.001193729	1
GTBF	0	0	108383	m-Xylene	1	12.6016084	0.002851043	1
GTBF	0	0	91203	Naphthalene	1	0.36882756	8.34E-05	1
GTBF	0	0	95476	o-Xylene	1	4.37982731	0.000990911	1
GTBF	0	0	100425	Styrene	1	0.36882756	8.34E-05	1
GTBF	0	0	108883	Toluene	1	19.2353819	0.004351896	1
COMM	0	0	7440360	Antimony	1	1.82E-05	3.96E-08	1
COMM	0	0	7440382	Arsenic	1	4.56E-05	9.91E-08	1
COMM	0	0	7440393	Barium	1	0.00838181	1.82E-05	1
COMM	0	0	7440417	Beryllium	1	1.15E-05	2.50E-08	1
COMM	0	0	7440439	Cadmium	1	1.08E-05	2.34E-08	1
COMM	0	0	7440473	Chromium	1	0.00094751	2.06E-06	1
COMM	0	0	7440484	Cobalt	1	0.0002551	5.55E-07	1
COMM	0	0	7440508	Copper	1	0.00087499	2.09E-06	1
COMM	0	0	7439921	Lead	1	2.19E-05	4.76E-08	1
COMM	0	0	7439976	Mercury	1	1.69E-06	3.69E-09	1
COMM	0	0	7440020	Nickel	1	0.00107543	2.52E-06	1
COMM	0	0	7782492	Selenium	1	1.82E-05	3.96E-08	1
COMM	0	0	7440224	Silver	1	2.28E-06	4.95E-09	1
COMM	0	0	7440280	Thallium	1	4.65E-06	1.01E-08	1
COMM	0	0	7440622	Vanadium	1	0.00151237	3.29E-06	1
COMM	0	0	7440666	Zinc	1	0.00087462	1.90E-06	1
COMM	0	0	18540299	Cr(VI)	1	5.65E-05	1.23E-07	1
COMM	0	0	1175	Silica, Crystln	1	0.03826479	8.32E-05	1
COMM	0	0	9901	DieselExhPM	1	2.57E-07	2.57E-07	1
COMM	0	0	95636	1,2,4TriMeBenze	1	0.00015568	0.00007784	1
COMM	0	0	106990	1,3-Butadiene	1	0.00010282	0.000051408	1
COMM	0	0	75070	Acetaldehyde	1	0.00009296	0.00004648	1
COMM	0	0	107028	Acrolein	1	2.2288E-05	0.000011144	1
COMM	0	0	71432	Benzene	1	0.00042672	0.00021336	1
COMM	0	0	7782505	Chlorine	1	0.00005096	0.00002548	1
COMM	0	0	100414	Ethyl Benzene	1	0.00018592	0.00009296	1
COMM	0	0	50000	Formaldehyde	1	0.0003864	0.0001932	1
COMM	0	0	110543	Hexane	1	0.0001624	0.0000812	1
COMM	0	0	7439965	Manganese	1	3.70E-07	1.85E-07	1
COMM	0	0	67561	Methanol	1	0.0000868	0.0000434	1
COMM	0	0	78933	MEK	1	7.44E-06	3.72E-06	1
COMM	0	0	1634044	Me t-ButylEther	1	0.00023072	0.00011536	1
COMM	0	0	108383	m-Xylene	1	0.00055104	0.00027552	1
COMM	0	0	91203	Naphthalene	1	1.6128E-05	0.000008064	1
COMM	0	0	95476	o-Xylene	1	0.00019152	0.00009576	1

HARP Emission Inventory - Proposed Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
COMM	0	0	100425	Styrene	1	1.6128E-05	0.000008064	1
COMM	0	0	108883	Toluene	1	0.00084112	0.00042056	1

HARP2 - HRACalc (dated 19044) 4/4/2019 10:39:15 AM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Resident
Scenario: All
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER

Start Age: -0.25
Total Exposure Duration: 30

Exposure Duration Bin Distribution
3rd Trimester Bin: 0.25
0<2 Years Bin: 2
2<9 Years Bin: 0
2<16 Years Bin: 14
16<30 Years Bin: 14
16 to 70 Years Bin: 0

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: True
Dermal: True
Mother's milk: True
Water: False
Fish: False
Homegrown crops: False
Beef: False
Dairy: False
Pig: False
Chicken: False
Egg: False

****
INHALATION

Daily breathing rate: LongTerm24HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
3rd Trimester to 16 years: OFF
16 years to 70 years: ON

****
SOIL & DERMAL PATHWAY SETTINGS

Deposition rate (m/s): 0.05
Soil mixing depth (m): 0.01
Dermal climate: Mixed

****
TIER 2 SETTINGS
Tier2 not used.

```
**********

Calculating cancer risk
Cancer risk breakdown by pollutant and receptor saved to:
C:\Users\MLombardo\Desktop\Lehigh Proposed v0.04 HARP\LEHIGH PROPOSED V0.04
HARP\hra\Resident_CancerRisk.csv
Cancer risk total by receptor saved to: C:\Users\MLombardo\Desktop\Lehigh
Proposed v0.04 HARP\LEHIGH PROPOSED V0.04
HARP\hra\Resident_CancerRiskSumByRec.csv
Calculating chronic risk
Chronic risk breakdown by pollutant and receptor saved to:
C:\Users\MLombardo\Desktop\Lehigh Proposed v0.04 HARP\LEHIGH PROPOSED V0.04
HARP\hra\Resident_NCChronicRisk.csv
Chronic risk total by receptor saved to: C:\Users\MLombardo\Desktop\Lehigh
Proposed v0.04 HARP\LEHIGH PROPOSED V0.04
HARP\hra\Resident_NCChronicRiskSumByRec.csv
Calculating acute risk
Acute risk breakdown by pollutant and receptor saved to:
C:\Users\MLombardo\Desktop\Lehigh Proposed v0.04 HARP\LEHIGH PROPOSED V0.04
HARP\hra\Resident_NCAcuteRisk.csv
Acute risk total by receptor saved to: C:\Users\MLombardo\Desktop\Lehigh
Proposed v0.04 HARP\LEHIGH PROPOSED V0.04
HARP\hra\Resident_NCAcuteRiskSumByRec.csv
HRA ran successfully
```

HARP Emission Inventory - Baseline Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
PUMP1	0	0	9901	Diesel PM	1	2966.47222	0.48598824	1
PUMP2	0	0	9901	Diesel PM	1	1436.25578	0.235297474	1
VGRP1	0	0	7440360	Antimony	1	0.15780775	1.82E-05	1
VGRP1	0	0	7440382	Arsenic	1	0.07949626	9.16E-06	1
VGRP1	0	0	7440393	Barium	1	49.3119362	0.005680419	1
VGRP1	0	0	7440417	Beryllium	1	0.04740578	5.46E-06	1
VGRP1	0	0	7440439	Cadmium	1	0.07893146	9.09E-06	1
VGRP1	0	0	7440473	Chromium	1	1.52494393	0.000175627	1
VGRP1	0	0	7440484	Cobalt	1	0.40659402	4.68E-05	1
VGRP1	0	0	7440508	Copper	1	0.89504999	0.000103128	1
VGRP1	0	0	7439921	Lead	1	0.07905061	9.10E-06	1
VGRP1	0	0	7439976	Mercury	1	0.01262759	1.45E-06	1
VGRP1	0	0	7440020	Nickel	1	1.46350324	0.00016855	1
VGRP1	0	0	7782492	Selenium	1	0.15780775	1.82E-05	1
VGRP1	0	0	7440224	Silver	1	0.07880332	9.08E-06	1
VGRP1	0	0	7440280	Thallium	1	0.07883796	9.08E-06	1
VGRP1	0	0	7440622	Vanadium	1	1.21744425	0.000140228	1
VGRP1	0	0	7440666	Zinc	1	1.58740473	0.000182832	1
VGRP1	0	0	18540299	Hexavalent Chromium	1	0.00690254	7.94E-07	1
VGRP1	0	0	1175	Crystalline Silica	1	2648.94935	0.305108089	1
VGRP1	0	0	9901	Diesel PM	1	241.272271	0.118047956	1
VGRP2	0	0	7440360	Antimony	1	0.15076817	2.08E-05	1
VGRP2	0	0	7440382	Arsenic	1	0.16752819	3.28E-05	1
VGRP2	0	0	7440393	Barium	1	55.4530997	0.010998393	1
VGRP2	0	0	7440417	Beryllium	1	0.05872968	6.88E-06	1
VGRP2	0	0	7440439	Cadmium	1	0.07957667	1.15E-05	1
VGRP2	0	0	7440473	Chromium	1	3.27312795	0.000445462	1
VGRP2	0	0	7440484	Cobalt	1	0.87414573	0.000111638	1
VGRP2	0	0	7440508	Copper	1	2.73652184	0.000481159	1
VGRP2	0	0	7439921	Lead	1	0.10462209	1.28E-05	1
VGRP2	0	0	7439976	Mercury	1	0.01261654	1.73E-06	1
VGRP2	0	0	7440020	Nickel	1	3.52843228	0.000474606	1
VGRP2	0	0	7782492	Selenium	1	0.15076817	2.08E-05	1
VGRP2	0	0	7440224	Silver	1	0.05862968	7.14E-06	1
VGRP2	0	0	7440280	Thallium	1	0.06442715	8.25E-06	1
VGRP2	0	0	7440622	Vanadium	1	4.40952945	0.00062546	1
VGRP2	0	0	7440666	Zinc	1	3.16257924	0.000461569	1
VGRP2	0	0	18540299	Hexavalent Chromium	1	0.13644735	1.63E-05	1
VGRP2	0	0	1175	Crystalline Silica	1	1961.68156	0.37475276	1
VGRP2	0	0	9901	Diesel PM	1	742.991271	0.378529543	1
VGRP3	0	0	71432	Benzene	1	0.00683091	2.55E-05	1
VGRP3	0	0	108883	Toluene	1	0.01312137	4.05E-05	1
VGRP3	0	0	1330207	Xylenes (mixed)	1	0.01253616	3.98E-05	1
VGRP4	0	0	7440360	Antimony	1	0.01922784	1.03E-05	1
VGRP4	0	0	7440382	Arsenic	1	0.00961392	5.14E-06	1
VGRP4	0	0	7440393	Barium	1	5.99908678	0.003206756	1
VGRP4	0	0	7440417	Beryllium	1	0.00576835	3.08E-06	1
VGRP4	0	0	7440439	Cadmium	1	0.00961392	5.14E-06	1
VGRP4	0	0	7440473	Chromium	1	0.18458729	9.87E-05	1
VGRP4	0	0	7440484	Cobalt	1	0.04922328	2.63E-05	1
VGRP4	0	0	7440508	Copper	1	0.10767592	5.76E-05	1
VGRP4	0	0	7439921	Lead	1	0.00961392	5.14E-06	1
VGRP4	0	0	7439976	Mercury	1	0.00153823	8.22E-07	1
VGRP4	0	0	7440020	Nickel	1	0.17689615	9.46E-05	1
VGRP4	0	0	7782492	Selenium	1	0.01922784	1.03E-05	1
VGRP4	0	0	7440224	Silver	1	0.00961392	5.14E-06	1
VGRP4	0	0	7440280	Thallium	1	0.00961392	5.14E-06	1
VGRP4	0	0	7440622	Vanadium	1	0.1461316	7.81E-05	1

HARP Emission Inventory - Baseline Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
VGRP4	0	0	7440666	Zinc	1	0.19227842	0.000102781	1
VGRP4	0	0	18540299	Hexavalent Chromium	1	0.0007563	4.04E-07	1
VGRP4	0	0	1175	Crystalline Silica	1	323.02775	0.172671491	1
QTPC	0	0	7440360	Antimony	1	0.03491339	9.49E-06	1
QTPC	0	0	7440382	Arsenic	1	0.08728347	2.37E-05	1
QTPC	0	0	7440393	Barium	1	16.0601578	0.004364173	1
QTPC	0	0	7440417	Beryllium	1	0.02199543	5.98E-06	1
QTPC	0	0	7440439	Cadmium	1	0.0205989	5.60E-06	1
QTPC	0	0	7440473	Chromium	1	1.81549609	0.000493341	1
QTPC	0	0	7440484	Cobalt	1	0.48878741	0.000132823	1
QTPC	0	0	7440508	Copper	1	1.69624415	0.000460936	1
QTPC	0	0	7439921	Lead	1	0.04189606	1.14E-05	1
QTPC	0	0	7439976	Mercury	1	0.00324695	8.82E-07	1
QTPC	0	0	7440020	Nickel	1	2.0802914	0.000565297	1
QTPC	0	0	7782492	Selenium	1	0.03491339	9.49E-06	1
QTPC	0	0	7440224	Silver	1	0.00436417	1.19E-06	1
QTPC	0	0	7440280	Thallium	1	0.00890291	2.42E-06	1
QTPC	0	0	7440622	Vanadium	1	2.89781107	0.000787449	1
QTPC	0	0	7440666	Zinc	1	1.67584255	0.000455392	1
QTPC	0	0	18540299	Hexavalent Chromium	1	0.1082315	2.94E-05	1
QTPC	0	0	1175	Crystalline Silica	1	73.3181115	0.0199234	1
QTPC	0	0	9901	Diesel PM	1	977.296207	0.267578214	1
QTPC	0	0	95636	1,2,4-Trimethylbenzene	1	8.59339996	0.002335163	1
QTPC	0	0	106990	1,3-Butadiene	1	5.67535336	0.001542216	1
QTPC	0	0	75070	Acetaldehyde	1	5.13131077	0.001394378	1
QTPC	0	0	107028	Acrolein	1	1.23027812	0.000334315	1
QTPC	0	0	71432	Benzene	1	23.5545711	0.006400699	1
QTPC	0	0	7782505	Chlorine	1	2.81294747	0.000764388	1
QTPC	0	0	100414	Ethyl benzene	1	10.2626215	0.002788756	1
QTPC	0	0	50000	Formaldehyde	1	21.3289424	0.005795908	1
QTPC	0	0	110543	Hexane	1	8.96433809	0.002435961	1
QTPC	0	0	7439965	Manganese	1	0.0204016	5.54E-06	1
QTPC	0	0	67561	Methanol	1	4.79128415	0.001301979	1
QTPC	0	0	78933	Methyl ethyl ketone {2-Butanone}	1	0.41050486	0.00011155	1
QTPC	0	0	1634044	Methyl tert-butyl ether	1	12.7355424	0.003460745	1
QTPC	0	0	108383	m-Xylene	1	30.4169265	0.008265469	1
QTPC	0	0	91203	Naphthalene	1	0.89025151	0.000241916	1
QTPC	0	0	95476	o-Xylene	1	10.5717366	0.002872755	1
QTPC	0	0	100425	Styrene	1	0.89025151	0.000241916	1
QTPC	0	0	108883	Toluene	1	46.429089	0.0126166	1
QTSP	0	0	7440360	Antimony	1	0.00620492	1.69E-06	1
QTSP	0	0	7440382	Arsenic	1	0.01551229	4.22E-06	1
QTSP	0	0	7440393	Barium	1	2.85426128	0.000775614	1
QTSP	0	0	7440417	Beryllium	1	0.0039091	1.06E-06	1
QTSP	0	0	7440439	Cadmium	1	0.0036609	9.95E-07	1
QTSP	0	0	7440473	Chromium	1	0.32265562	8.77E-05	1
QTSP	0	0	7440484	Cobalt	1	0.08686882	2.36E-05	1
QTSP	0	0	7440508	Copper	1	0.3014618	8.19E-05	1
QTSP	0	0	7439921	Lead	1	0.0074459	2.02E-06	1
QTSP	0	0	7439976	Mercury	1	0.00057706	1.57E-07	1
QTSP	0	0	7440020	Nickel	1	0.36971587	0.000100466	1
QTSP	0	0	7782492	Selenium	1	0.00620492	1.69E-06	1
QTSP	0	0	7440224	Silver	1	0.00077561	2.11E-07	1
QTSP	0	0	7440280	Thallium	1	0.00158225	4.30E-07	1
QTSP	0	0	7440622	Vanadium	1	0.51500801	0.000139948	1
QTSP	0	0	7440666	Zinc	1	0.29783596	8.09E-05	1
QTSP	0	0	18540299	Hexavalent Chromium	1	0.01923524	5.23E-06	1
QTSP	0	0	1175	Crystalline Silica	1	13.0303232	0.003540849	1

HARP Emission Inventory - Baseline Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
QTSP	0	0	9901	Diesel PM	1	173.688127	0.047554834	1
QTSP	0	0	95636	1,2,4-Trimethylbenzene	1	1.52724582	0.000415012	1
QTSP	0	0	106990	1,3-Butadiene	1	1.00864148	0.000274087	1
QTSP	0	0	75070	Acetaldehyde	1	0.91195254	0.000247813	1
QTSP	0	0	107028	Acrolein	1	0.21864886	5.94E-05	1
QTSP	0	0	71432	Benzene	1	4.18619178	0.001137552	1
QTSP	0	0	7782505	Chlorine	1	0.49992579	0.000135849	1
QTSP	0	0	100414	Ethyl benzene	1	1.82390508	0.000495626	1
QTSP	0	0	50000	Formaldehyde	1	3.7906461	0.001030067	1
QTSP	0	0	110543	Hexane	1	1.5931701	0.000432927	1
QTSP	0	0	7439965	Manganese	1	0.00362584	9.85E-07	1
QTSP	0	0	67561	Methanol	1	0.85152195	0.000231392	1
QTSP	0	0	78933	Methyl ethyl ketone {2-Butanone}	1	0.0729562	1.98E-05	1
QTSP	0	0	1634044	Methyl tert-butyl ether	1	2.26340028	0.000615054	1
QTSP	0	0	108383	m-Xylene	1	5.40579096	0.001468965	1
QTSP	0	0	91203	Naphthalene	1	0.15821827	4.30E-05	1
QTSP	0	0	95476	o-Xylene	1	1.87884198	0.000510555	1
QTSP	0	0	100425	Styrene	1	0.15821827	4.30E-05	1
QTSP	0	0	108883	Toluene	1	8.25152238	0.002242262	1
RPTC	0	0	9901	Diesel PM	1	0.00222431	0.001112155	1
GTWA	0	0	7440360	Antimony	1	0.03834411	1.04E-05	1
GTWA	0	0	7440382	Arsenic	1	0.09586028	2.60E-05	1
GTWA	0	0	7440393	Barium	1	17.6382908	0.004793014	1
GTWA	0	0	7440417	Beryllium	1	0.02415679	6.56E-06	1
GTWA	0	0	7440439	Cadmium	1	0.02262303	6.15E-06	1
GTWA	0	0	7440473	Chromium	1	1.99389374	0.000541819	1
GTWA	0	0	7440484	Cobalt	1	0.53681755	0.000145874	1
GTWA	0	0	7440508	Copper	1	1.86292364	0.000506229	1
GTWA	0	0	7439921	Lead	1	0.04601293	1.25E-05	1
GTWA	0	0	7439976	Mercury	1	0.003566	9.69E-07	1
GTWA	0	0	7440020	Nickel	1	2.28470885	0.000620845	1
GTWA	0	0	7782492	Selenium	1	0.03834411	1.04E-05	1
GTWA	0	0	7440224	Silver	1	0.00479301	1.30E-06	1
GTWA	0	0	7440280	Thallium	1	0.00977775	2.66E-06	1
GTWA	0	0	7440622	Vanadium	1	3.18256117	0.000864826	1
GTWA	0	0	7440666	Zinc	1	1.8405173	0.000500141	1
GTWA	0	0	18540299	Hexavalent Chromium	1	0.11886674	3.23E-05	1
GTWA	0	0	1175	Crystalline Silica	1	80.522632	0.02188115	1
GTWA	0	0	9901	Diesel PM	1	1073.3291	0.293871482	1
GTWA	0	0	95636	1,2,4-Trimethylbenzene	1	9.43782059	0.002564625	1
GTWA	0	0	106990	1,3-Butadiene	1	6.23303547	0.00169376	1
GTWA	0	0	75070	Acetaldehyde	1	5.63553316	0.001531395	1
GTWA	0	0	107028	Acrolein	1	1.35117	0.000367166	1
GTWA	0	0	71432	Benzene	1	25.8691342	0.007029656	1
GTWA	0	0	7782505	Chlorine	1	3.08935854	0.0008395	1
GTWA	0	0	100414	Ethyl benzene	1	11.2710663	0.00306279	1
GTWA	0	0	50000	Formaldehyde	1	23.4248065	0.006365437	1
GTWA	0	0	110543	Hexane	1	9.84520853	0.002675328	1
GTWA	0	0	7439965	Manganese	1	0.02240634	6.09E-06	1
GTWA	0	0	67561	Methanol	1	5.26209422	0.001429917	1
GTWA	0	0	78933	Methyl ethyl ketone {2-Butanone}	1	0.45084265	0.000122512	1
GTWA	0	0	1634044	Methyl tert-butyl ether	1	13.9869859	0.003800811	1
GTWA	0	0	108383	m-Xylene	1	33.405811	0.009077666	1
GTWA	0	0	91203	Naphthalene	1	0.97773105	0.000265688	1
GTWA	0	0	95476	o-Xylene	1	11.6105563	0.003155042	1
GTWA	0	0	100425	Styrene	1	0.97773105	0.000265688	1
GTWA	0	0	108883	Toluene	1	50.9913904	0.013856356	1
COMM	0	0	7440508	Copper	1	3.70E-07	1.85E-07	1

HARP Emission Inventory - Baseline Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
COMM	0	0	7440020	Nickel	1	3.70E-07	1.85E-07	1
COMM	0	0	95636	1,2,4-Trimethylbenzene	1	0.00015568	0.00007784	1
COMM	0	0	106990	1,3-Butadiene	1	0.00010282	0.000051408	1
COMM	0	0	75070	Acetaldehyde	1	0.00009296	0.00004648	1
COMM	0	0	107028	Acrolein	1	2.2288E-05	0.000011144	1
COMM	0	0	71432	Benzene	1	0.00042672	0.00021336	1
COMM	0	0	7782505	Chlorine	1	0.00005096	0.00002548	1
COMM	0	0	100414	Ethyl benzene	1	0.00018592	0.00009296	1
COMM	0	0	50000	Formaldehyde	1	0.0003864	0.0001932	1
COMM	0	0	110543	Hexane	1	0.0001624	0.0000812	1
COMM	0	0	7439965	Manganese	1	3.70E-07	1.85E-07	1
COMM	0	0	67561	Methanol	1	0.0000868	0.0000434	1
COMM	0	0	78933	Methyl ethyl ketone {2-Butanone}	1	7.44E-06	3.72E-06	1
COMM	0	0	1634044	Methyl tert-butyl ether	1	0.00023072	0.00011536	1
COMM	0	0	108383	m-Xylene	1	0.00055104	0.00027552	1
COMM	0	0	91203	Naphthalene	1	1.6128E-05	0.000008064	1
COMM	0	0	95476	o-Xylene	1	0.00019152	0.00009576	1
COMM	0	0	100425	Styrene	1	1.6128E-05	0.000008064	1
COMM	0	0	108883	Toluene	1	0.00084112	0.00042056	1
RPFP	0	0	7440360	Antimony	1	0.00025494	6.62E-08	1
RPFP	0	0	7440382	Arsenic	1	0.00063734	1.65E-07	1
RPFP	0	0	7440393	Barium	1	0.11727046	3.04E-05	1
RPFP	0	0	7440417	Beryllium	1	0.00016061	4.17E-08	1
RPFP	0	0	7440439	Cadmium	1	0.00015041	3.90E-08	1
RPFP	0	0	7440473	Chromium	1	0.01325666	3.44E-06	1
RPFP	0	0	7440484	Cobalt	1	0.0035691	9.26E-07	1
RPFP	0	0	7440508	Copper	1	0.01263082	3.28E-06	1
RPFP	0	0	7439921	Lead	1	0.00030592	7.94E-08	1
RPFP	0	0	7439976	Mercury	1	2.37E-05	6.15E-09	1
RPFP	0	0	7440020	Nickel	1	0.01543512	4.01E-06	1
RPFP	0	0	7782492	Selenium	1	0.00025494	6.62E-08	1
RPFP	0	0	7440224	Silver	1	3.19E-05	8.27E-09	1
RPFP	0	0	7440280	Thallium	1	6.50E-05	1.69E-08	1
RPFP	0	0	7440622	Vanadium	1	0.02115967	5.49E-06	1
RPFP	0	0	7440666	Zinc	1	0.01223692	3.18E-06	1
RPFP	0	0	18540299	Hexavalent Chromium	1	0.0007903	2.05E-07	1
RPFP	0	0	1175	Crystalline Silica	1	0.53536515	0.000138946	1
RPFP	0	0	9901	Diesel PM	1	18.8691176	0.005166258	1
RPFP	0	0	95636	1,2,4-Trimethylbenzene	1	0.16591682	4.51E-05	1
RPFP	0	0	106990	1,3-Butadiene	1	0.10957672	2.98E-05	1
RPFP	0	0	75070	Acetaldehyde	1	0.09907263	2.69E-05	1
RPFP	0	0	107028	Acrolein	1	0.02375356	6.45E-06	1
RPFP	0	0	71432	Benzene	1	0.45477918	0.000123581	1
RPFP	0	0	7782505	Chlorine	1	0.0543109	1.48E-05	1
RPFP	0	0	100414	Ethyl benzene	1	0.19814526	5.38E-05	1
RPFP	0	0	50000	Formaldehyde	1	0.41180792	0.000111904	1
RPFP	0	0	110543	Hexane	1	0.17307869	4.70E-05	1
RPFP	0	0	7439965	Manganese	1	0.0003939	1.07E-07	1
RPFP	0	0	67561	Methanol	1	0.09250758	2.51E-05	1
RPFP	0	0	78933	Methyl ethyl ketone {2-Butanone}	1	0.00792581	2.15E-06	1
RPFP	0	0	1634044	Methyl tert-butyl ether	1	0.24589111	6.68E-05	1
RPFP	0	0	108383	m-Xylene	1	0.58727391	0.000159585	1
RPFP	0	0	91203	Naphthalene	1	0.01718851	4.67E-06	1
RPFP	0	0	95476	o-Xylene	1	0.20411349	5.55E-05	1
RPFP	0	0	100425	Styrene	1	0.01718851	4.67E-06	1
RPFP	0	0	108883	Toluene	1	0.89642826	0.000243595	1
RPFU	0	0	7440360	Antimony	1	0.00170828	4.64E-07	1
RPFU	0	0	7440382	Arsenic	1	0.0042707	1.16E-06	1

HARP Emission Inventory - Baseline Scenario

Model ID	Device ID	Process ID	Pollutant ID	Pollutant Abbreviation	Multiplier	Annual Emissions (lb/yr)	Maximum Hourly Emissions (lb/hr)	MWAF
RPFU	0	0	7440393	Barium	1	0.78580838	0.000213535	1
RPFU	0	0	7440417	Beryllium	1	0.00107622	2.92E-07	1
RPFU	0	0	7440439	Cadmium	1	0.00100789	2.74E-07	1
RPFU	0	0	7440473	Chromium	1	0.08883051	2.41E-05	1
RPFU	0	0	7440484	Cobalt	1	0.02391591	6.50E-06	1
RPFU	0	0	7440508	Copper	1	0.08298734	2.26E-05	1
RPFU	0	0	7439921	Lead	1	0.00204994	5.57E-07	1
RPFU	0	0	7439976	Mercury	1	0.00015887	4.32E-08	1
RPFU	0	0	7440020	Nickel	1	0.10177841	2.77E-05	1
RPFU	0	0	7782492	Selenium	1	0.00170828	4.64E-07	1
RPFU	0	0	7440224	Silver	1	0.00021354	5.80E-08	1
RPFU	0	0	7440280	Thallium	1	0.00043561	1.18E-07	1
RPFU	0	0	7440622	Vanadium	1	0.14178716	3.85E-05	1
RPFU	0	0	7440666	Zinc	1	0.0819974	2.23E-05	1
RPFU	0	0	18540299	Hexavalent Chromium	1	0.00529567	1.44E-06	1
RPFU	0	0	1175	Crystalline Silica	1	3.58738608	0.000974833	1
RPFU	0	0	9901	Diesel PM	1	47.4210718	0.012983623	1
RPFU	0	0	95636	1,2,4-Trimethylbenzene	1	0.41697515	0.000113308	1
RPFU	0	0	106990	1,3-Butadiene	1	0.27538359	7.48E-05	1
RPFU	0	0	75070	Acetaldehyde	1	0.24898516	6.77E-05	1
RPFU	0	0	107028	Acrolein	1	0.05969644	1.62E-05	1
RPFU	0	0	71432	Benzene	1	1.1429319	0.000310579	1
RPFU	0	0	7782505	Chlorine	1	0.13649187	3.71E-05	1
RPFU	0	0	100414	Ethyl benzene	1	0.49797033	0.000135318	1
RPFU	0	0	50000	Formaldehyde	1	1.03493833	0.000281233	1
RPFU	0	0	110543	Hexane	1	0.43497408	0.000118199	1
RPFU	0	0	7439965	Manganese	1	0.00098994	2.69E-07	1
RPFU	0	0	67561	Methanol	1	0.23248615	6.32E-05	1
RPFU	0	0	78933	Methyl ethyl ketone {2-Butanone}	1	0.01991881	5.41E-06	1
RPFU	0	0	1634044	Methyl tert-butyl ether	1	0.61796318	0.000167925	1
RPFU	0	0	108383	m-Xylene	1	1.47591206	0.000401063	1
RPFU	0	0	91203	Naphthalene	1	0.04319743	1.17E-05	1
RPFU	0	0	95476	o-Xylene	1	0.51296943	0.000139394	1
RPFU	0	0	100425	Styrene	1	0.04319743	1.17E-05	1
RPFU	0	0	108883	Toluene	1	2.25286576	0.000612192	1

HARP2 - HRACalc (dated 19044) 3/21/2019 2:36:49 PM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Resident
Scenario: All
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER

Start Age: -0.25
Total Exposure Duration: 30

Exposure Duration Bin Distribution
3rd Trimester Bin: 0.25
0<2 Years Bin: 2
2<9 Years Bin: 0
2<16 Years Bin: 14
16<30 Years Bin: 14
16 to 70 Years Bin: 0

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: True
Dermal: True
Mother's milk: True
Water: False
Fish: False
Homegrown crops: False
Beef: False
Dairy: False
Pig: False
Chicken: False
Egg: False

****
INHALATION

Daily breathing rate: LongTerm24HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
3rd Trimester to 16 years: OFF
16 years to 70 years: ON

****
SOIL & DERMAL PATHWAY SETTINGS

Deposition rate (m/s): 0.05
Soil mixing depth (m): 0.01
Dermal climate: Mixed

****
TIER 2 SETTINGS
Tier2 not used.

****

Calculating cancer risk
Cancer risk breakdown by pollutant and receptor saved to: C:\Users\MLombardo\Desktop\LEHIGH BASELINE V0.02 HARP\hra\Resident_CancerRisk.csv
Cancer risk total by receptor saved to: C:\Users\MLombardo\Desktop\LEHIGH BASELINE V0.02 HARP\hra\Resident_CancerRiskSumByRec.csv
Calculating chronic risk
Chronic risk breakdown by pollutant and receptor saved to: C:\Users\MLombardo\Desktop\LEHIGH BASELINE V0.02 HARP\hra\Resident_NCChronicRisk.csv
Chronic risk total by receptor saved to: C:\Users\MLombardo\Desktop\LEHIGH BASELINE V0.02 HARP\hra\Resident_NCChronicRiskSumByRec.csv
Calculating acute risk
Acute risk breakdown by pollutant and receptor saved to: C:\Users\MLombardo\Desktop\LEHIGH BASELINE V0.02 HARP\hra\Resident_NCAcuteRisk.csv
Acute risk total by receptor saved to: C:\Users\MLombardo\Desktop\LEHIGH BASELINE V0.02 HARP\hra\Resident_NCAcuteRiskSumByRec.csv
HRA ran successfully

APPENDIX E: ELECTRONIC FILES

Biological Resources Report
Permanente Quarry
Reclamation Amendment
Rock Plant Reserve Component

Biological Resources Report

Permanente Quarry Reclamation Plan Amendment – Rock Plant Reserve Component



Prepared for:

Lehigh Southwest Cement Company

May 2019

GEI Consultants

Consulting Engineers and Scientists

Biological Resources Report

Permanente Quarry

Reclamation Plan Amendment – Rock Plant Reserve Component

Prepared for:

Lehigh Southwest Cement Company

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May 2019

GEI Project No. 1803658

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Appendices

Appendix A. Special-status Species Query Results
Appendix B. Representative Photos

Abbreviations and Acronyms

CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
County	Santa Clara County
CRPR	California Rare Plant Rank
CWA	Clean Water Act
FESA	Federal Endangered Species Act
FGC	California Fish and Game Code
GEI	GEI Consultants, Inc.
IPaC	Information for Planning and Conservation
Lehigh	Lehigh Southwest Cement Company
MBTA	Migratory Bird Treaty Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPPA	California Native Plant Protection Act
Quarry	Permanente Quarry
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
RWQCB	Regional Water Quality Control Board
Study Area	Rock Plant Reserve study area
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

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1. Introduction

Permanente Quarry (Quarry) is a limestone and aggregate mining operation located on the Permanente property in the Santa Clara County (County) foothills, west of Cupertino (**Figure 1**). Lehigh Southwest Cement Company (Lehigh) operates the Quarry, which is subject to a reclamation plan most recently amended and approved by the County in 2012 (2012 Reclamation Plan). Lehigh proposes to amend the 2012 reclamation plan and obtain related entitlements (Project). This report addresses potential biological resources impacts associated with reclamation of the Rock Plant Reserve. Mining the Rock Plant Reserve, in contrast, would be conducted pursuant to Lehigh's vested rights. Although mining is not a component of the proposed project, the effects of mining in the Rock Plant Reserve are addressed in this report for the purposes of disclosure.

This evaluation identifies that mining, and to a lesser extent reclamation, associated with the Rock Plant Reserve would create the potential for adverse impacts to special-status species and their habitats. However, this evaluation concludes that implementation of the recommendations in this report would avoid or reduce all such potential impacts to less-than-significant levels.

1.1 Study Area Location

The Rock Plant Reserve study area (Study Area) for this evaluation is an approximately 65-acre area located in the southern portion of the Permanente Quarry property, south of Permanente Creek (**Figure 2**). The Study Area includes the planned disturbance area (approximately 30 acres) and an additional 250-foot-wide buffer (approximately 35 acres) surrounding the disturbance area to account for potential indirect impacts. The Study Area is in Sections 20 and 21 of the U.S. Geological Survey (USGS) 7.5-minute Cupertino Quadrangle, Township 7 South, Range 3 West and Range 2 West; it is located within Assessor Parcel Numbers 351-10-033 and 351-11-001.

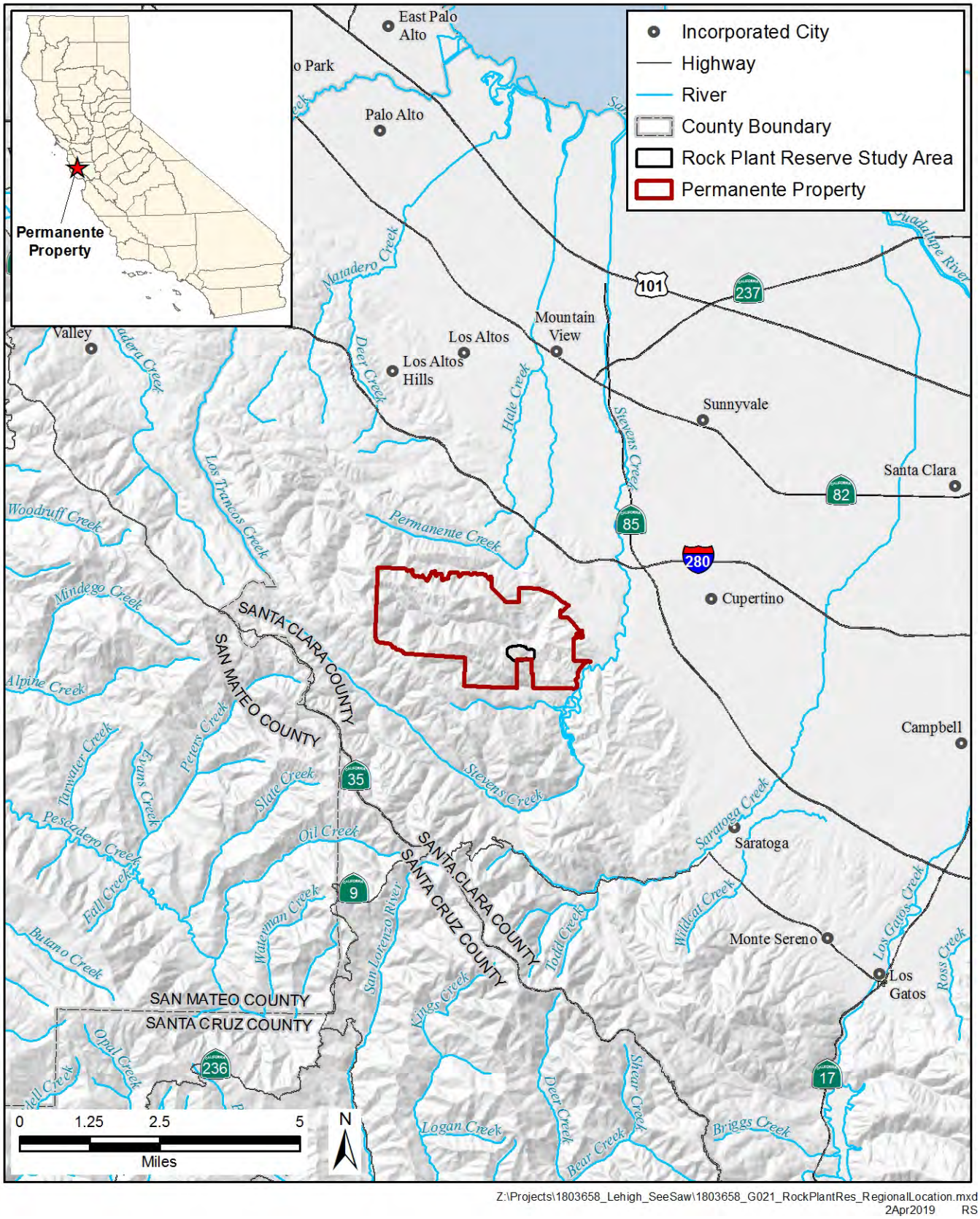
1.2 Project Summary

Lehigh operates the Quarry in accordance with the 2012 Reclamation Plan and pursuant to Lehigh's vested rights to engage in surface mining operations within certain parcels. Lehigh proposes to amend the 2012 Reclamation Plan and obtain related entitlements to accomplish the following primary components of the project:

1. Incorporate reclamation of the Rock Plant Reserve.
2. Regrade and mine the upper slopes of the north highwall to recover limestone, eliminate the need for a large fill buttress, and achieve long-term slope stability.
3. Reclaim the majority of the West Materials Storage Area in place.
4. Backfill the North Quarry using a combination of imported surplus construction soil that meets site-specific acceptance criteria and greenstone overburden to protect water quality.

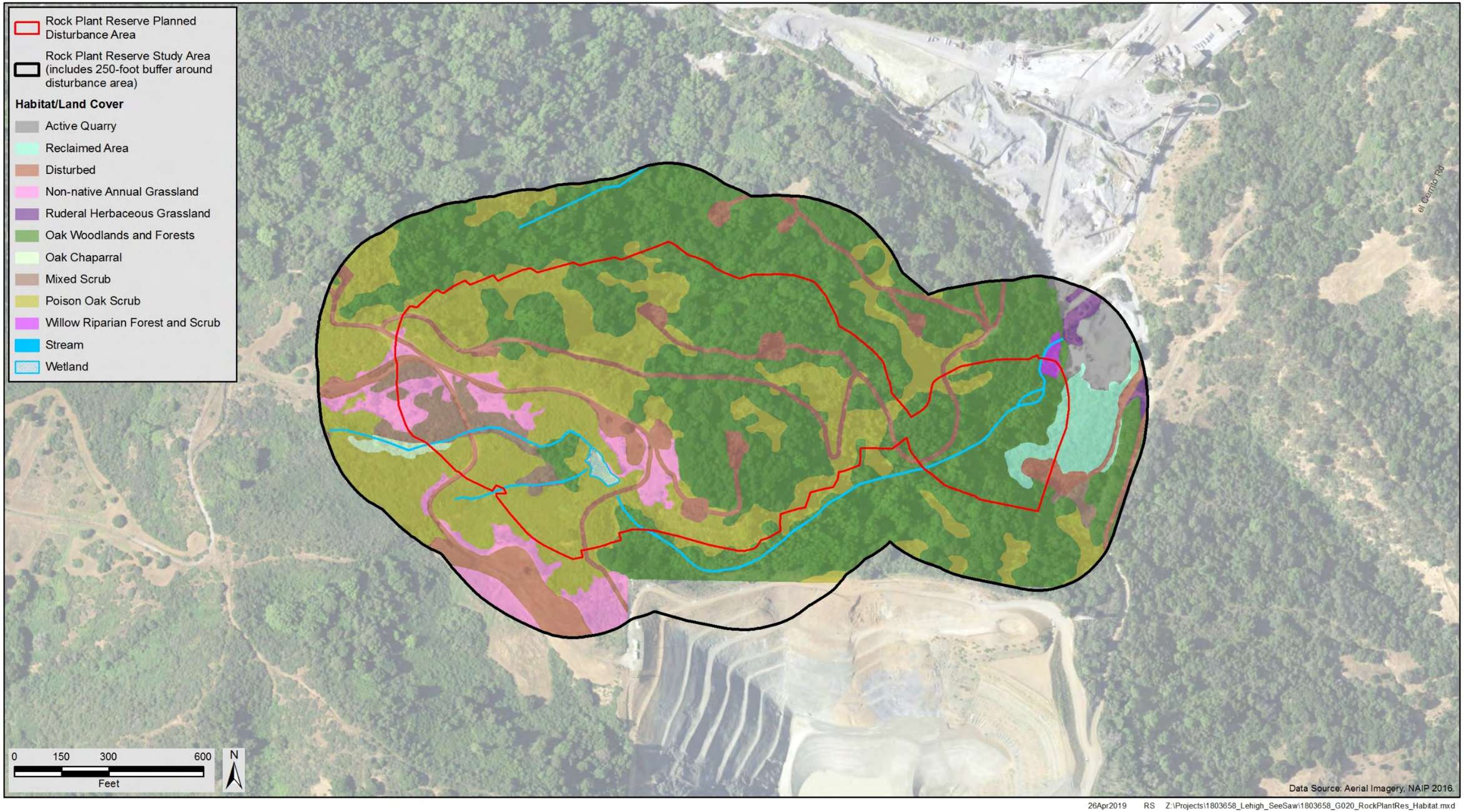
This Biological Resources Report evaluates potential biological resources impacts associated with reclamation of the Rock Plant Reserve. Final reclamation of the Rock Plant Reserve area under the proposed reclamation plan amendment would be initiated following the completion of mining and would require up to approximately 5 years. Topsoil and other amendments would be placed on the slopes and

Figure 1. Permanente Property and Rock Plant Reserve Study Area Location



Source: GEI Consultants, Inc. 2019

Figure 2. Habitat and Land Cover Types within the Rock Plant Reserve Study Area



Source: WRA 2011, adapted by GEI Consultants, Inc. in 2019

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vegetation planted in a manner consistent with the revegetation plan component of the proposed Reclamation Plan amendment. Stormwater would be managed such that all water naturally drains from the Rock Plant Reserve extraction area and does not create a standing lake or water feature.

Lehigh has a vested right to mine within the majority of the project site, including the Rock Plant Reserve. Therefore, biological resources effects that may be associated with mining disturbance and related activities within the Rock Plant Reserve area are not attributed to the Project. Nevertheless, this evaluation recognizes that vegetation removal and ground disturbance would occur as a result of mining the Rock Plant Reserve area and, for complete disclosure, discusses the potential effects of those activities.

2. Biological Resources Assessment Methods

This biological resource assessment is based on review of documents addressing biological resources that were prepared to support the 2012 Reclamation Plan and other applicable documents and sources that address biological resources in the region, as well as observations made during a field survey of the Study Area conducted by a GEI Consultants, Inc. (GEI) wetland ecologist and a GEI biologist on February 22 and 23, 2018. The field survey focused on identifying and delineating potential Waters of the United States and Waters of the State. Observations during the field surveys also provide information necessary to evaluate potential for special-status species to occur in the Study Area. Daytime temperatures were in the low-50 degrees Fahrenheit; skies were generally overcast on February 22 and clear the following day.

2012 Reclamation Plan documents that were reviewed and are incorporated by reference include:

- *Biological Resources Assessment Lehigh Permanente Quarry* (WRA 2011)
- *Lehigh Permanente Quarry Reclamation Plan Amendment Environmental Impact Report* (Santa Clara County 2011a)
- *Reclamation Plan Amendment for Permanente Quarry* (EnviroMine, Inc. 2011)
- *Final Conditions of Approval* for the Reclamation Plan (Santa Clara County 2012)

GEI biologists reviewed the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) (CDFW 2018) and the California Native Plant Society (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2018) for occurrences of special-status plants and wildlife in or near the Study Area. These reviews were centered on the Cupertino USGS 7.5- minute quadrangle and included the eight surrounding quadrangles. A list of sensitive resources that could occur on or near the Study Area was obtained from the USFWS Information for Planning and Conservation (IPaC) website (USFWS 2018a), and the USFWS online map of critical habitat for Federally threatened and endangered species (USFWS 2018b) was reviewed. Results of the CNDDB and CNPS Inventory queries and the IPaC resource list are provided in **Appendix A**. The *Soil Survey of Santa Clara Area, California, Western Part* (NRCS 2017) was also reviewed.

3. Environmental Setting

The Study Area is located on the eastern slope of the Santa Cruz Mountains, within the Permanente Creek-Frontal San Francisco Bay Estuaries watershed. Mean annual precipitation in the vicinity is approximately 28 inches (Santa Clara County 2007). Topography in the Study Area slopes toward the northeast and can exceed 30 percent slope. Elevations range from approximately 700 feet above mean sea level at the northeastern boundary to approximately 1,300 feet at the southwestern boundary. Representative photographs of the Study Area are provided in **Appendix B**.

3.1 Habitat and Land Cover Types

Figure 2 shows habitat and land cover types present in the Study Area, and **Table 1** indicates the amount of each type. Figure 2 and the habitat descriptions provided below are based on information compiled for the 2012 Reclamation Plan (WRA 2011) and augmented by observations made during the GEI field surveys conducted in 2018 (GEI 2018).

Table 1. Habitat and Land Cover Types in the Rock Plant Reserve Study Area

Habitat/Land Cover Type	Acres in Disturbance Area	Acres in Buffer Area	Total Acres in Study Area
Oak Woodland and Forest	13.62	18.66	32.28
Poison Oak Scrub	10.64	7.91	18.55
Disturbed	3.03	3.17	6.20
Mixed Scrub	1.24	0.38	1.62
Nonnative Annual Grassland	1.25	1.76	3.01
Reclaimed	0.42	1.13	1.55
Wetland	0.13	-	0.13
Stream	0.09	0.13	0.22
Willow Riparian	0.06	0.08	0.14
Oak Chaparral	0.03	0.24	0.27
Quarry	<0.01	1.10	1.10
Ruderal Herbaceous Grassland	-	0.33	0.33
Total	**30.51**	**34.89**	**65.40**

Source: WRA 2011, adapted by GEI Consultants, Inc. in 2019

Oak Woodland and Forest. Several oak woodland community types are described in detail in Holland (1986). These community types can be generally categorized as oak woodland/forest on the Permanente property, because typically there is not a dominant oak species. Within the Study Area, coast live oak (*Quercus agrifolia*) is the dominant species and California bay (*Umbellularia californica*) is co-dominant. Secondary tree species include occasional big leaf maple (*Acer macrophyllum*) and Pacific madrone (*Arbutus menziesii*). Shrubs are prevalent, particularly at the higher elevations where more light penetrates the tree canopy. Commonly encountered shrubs include poison oak (*Toxicodendron diversilobum*), California blackberry (*Rubus ursinus*), creeping snowberry (*Symphoricarpos mollis*), and ocean spray (*Holodiscus discolor*). Forbs are generally sparse, but hedge parsley (*Torilis arvensis*) and

western bracken fern (*Pteridium aquilinum*) are common in shaded areas, and Indian paintbrush (*Castilleja affinis*) is common under canopy openings. Oak woodland/forest is the most extensive community in vegetated portions of the Study Area, including the Rock Plant Reserve disturbance area.

Poison oak scrub. Briefly described in Holland (1986), poison oak scrub is a shrub-dominated community dominated by poison oak. Poison oak scrub occurs throughout the Study Area but is most prevalent in the western portion.

Disturbed. Areas identified as disturbed have been disturbed by non-quarry activities, such as plowing for fuel breaks and construction and maintenance of dirt roads. Disturbed areas generally have highly compacted soils and support little, if any vegetation. In the Study Area, these areas are primarily associated with a network of dirt access roads and adjacent cleared areas.

Mixed scrub. Mixed scrub includes shrub-dominated communities dominated by coyote brush (*Baccharis pilularis*), California sagebrush (*Artemisia californica*), and California buckwheat (*Eriogonum fasciculatum*) partially described as Diablan Sage Scrub by Holland (1986). This community occurs on shallow rocky soils, typically on hot southern exposures. Mixed scrub on the Permanente property is characterized by dense to moderately open stands up to 1.5 meters tall and with little to no understory vegetation. Associated species include sticky monkey flower (*Mimulus auranticaus*), poison oak, deerweed (*Lotus scoparius*), black sage (*Salvia mellifera*), golden yarrow (*Eriophyllum confertiflora*), and California cudweed (*Gnaphalium californica*). Mixed scrub occurs in several patches in the relatively flat and open higher elevations of the western portion of the Study Area, primarily adjacent to non-native annual grassland.

Non-native annual grassland. Non-native annual grassland is described in Holland (1986) as a dense to sparse cover of annual grasses and herbs 0.2 to 0.5 meters tall. Within the Study Area, this community is dominated by ripgut brome (*Bromus diandrus*), soft chess (*B. hordeaceus*), Italian ryegrass (*Festuca perennis*), six-week rattail grass (*F. myuros*), wall barley (*Hordeum murinum*), wild oat (*Avena fatua*), and silver hair grass (*Aira caryophyllea*). Commonly encountered forbs include shamrock clover (*Trifolium dubium*), broadleaf filaree (*Erodium botrys*), and common vetch (*Vicia sativa* ssp. *nigra*). Several large areas of non-native annual grassland are present at higher elevations in the southwestern portion of the study area, primarily adjacent to roadways and other disturbed areas.

Reclaimed. Areas classified as reclaimed include historically disturbed slopes that have been reclaimed by grading to a final contour and planted with grass species and/or a low to moderate density native shrubs and trees including coyote brush, chamise, and oaks. Generally, these areas are dominated by grass species, including wild oat, brome grasses, and Italian ryegrass. One reclaimed area is present in the eastern portion of the Study Area, adjacent to active Quarry facilities.

Wetland. A seasonal wetland feature is present in the southwestern portion of the Rock Plant Reserve disturbance area, near the summit of the hillslope. This feature is a topographic depression sparsely vegetated with rough cocklebur (*Xanthium strumarium*). It is an isolated wetland that lacks a connection to other downstream wetlands and drainage features. The location and extent of this feature shown on Figure 2 are based on field surveys and delineations conducted by GEI on February 22 and 23, 2018.

Stream. Four ephemeral drainages are present in the Study Area. The northwestern portion of the Study Area contains an ephemeral drainage, approximately 1 meter wide, that originates on the steep hillslope and is a tributary to Permanente Creek. This feature's bed and bank are unvegetated, and the overstory is dominated by California bay. Two narrow ephemeral drainages originate at the top of the local

watershed and contribute precipitation runoff to the seasonal wetland, and the southeastern portion of the Study Area contains an ephemeral drainage that flows into an off-site sedimentation basin. The location and extent of these features shown on Figure 2 are based on field surveys and delineations conducted by GEI on February 22 and 23, 2018.

Willow riparian. Willow riparian forest and scrub is not described in Holland (1986) but is characterized as a riparian community dominated by various willow species (*Salix* spp.). Species typical of this community type include arroyo willow (*Salix lasiolepis*), red willow (*S. laevigata*), and black willow (*S. gooddingii*). The overstory ranges from dense to open, and heights range from 1 to 6 meters. Associated understory species include stinging nettle (*Urtica dioica*), poison oak, California blackberry, and western creek dogwood (*Cornus sericea* ssp. *occidentalis*). A small patch of willow riparian occurs near the northeastern corner of the Study Area.

Oak chaparral. Oak chaparral includes plant communities described in Holland (1986) as scrub oak chaparral and undescribed plant communities dominated by canyon live oak (*Q. chrysolepis*) less than 4 meters tall. Oak chaparral is a dense, evergreen chaparral dominated by oak shrubs. Species typical of this community include scrub oak (*Q. berberidifolia*), bush interior live oak (*Q. wislizeni* var. *frutescens*), coffeeberry (*Rhamnus californicus*), madrone, and poison oak. An area of chaparral occurs in the eastern portion of the Study Area, adjacent to mixed scrub and poison oak scrub.

Active Quarry. Areas identified as active quarry have been disturbed by quarry activities and in some locations host a limited amount of weedy plant species, such as yellow star thistle (*Centaurea solstitialis*), wild oat, sweet fennel (*Foeniculum vulgare*), and field mustard (*Brassica rapa*). Generally, plant cover in these areas is very sparse due to the lack of topsoil. The northeastern corner of the Study Area overlaps the adjacent active Quarry area.

Ruderal herbaceous grassland. Ruderal herbaceous grassland is not described by Holland (1986) but includes previously disturbed and/or reclaimed areas that have been inactive long enough to recruit a plant community dominated by herbaceous weeds and non-native grasses. Species typical of this community on the Permanente property include Italian thistle (*Carduus pycnocephalus*), field mustard, lupine (*Lupinus* sp.), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), yellow star thistle, and slender wild oat (*A. barbata*). Several areas of ruderal herbaceous grassland are present in the eastern portion of the Study Area, adjacent to active Quarry and other disturbed areas.

3.2 Special-status Species

Special-status species are plants and animals that fall into any of the following categories:

- species officially listed by the Federal government or the State of California as endangered, threatened, or rare;
- candidate species for Federal or State listing as endangered or threatened;
- species proposed for Federal or State listing as endangered or threatened;
- taxa (i.e., taxonomic categories or groups) that meet the criteria for listing;
- wildlife species identified by CDFW as species of special concern and plant taxa considered by CDFW to be “rare, threatened, or endangered in California;”
- species listed as Fully Protected under the California Fish and Game Code; or
- species afforded protection under local or regional planning documents.

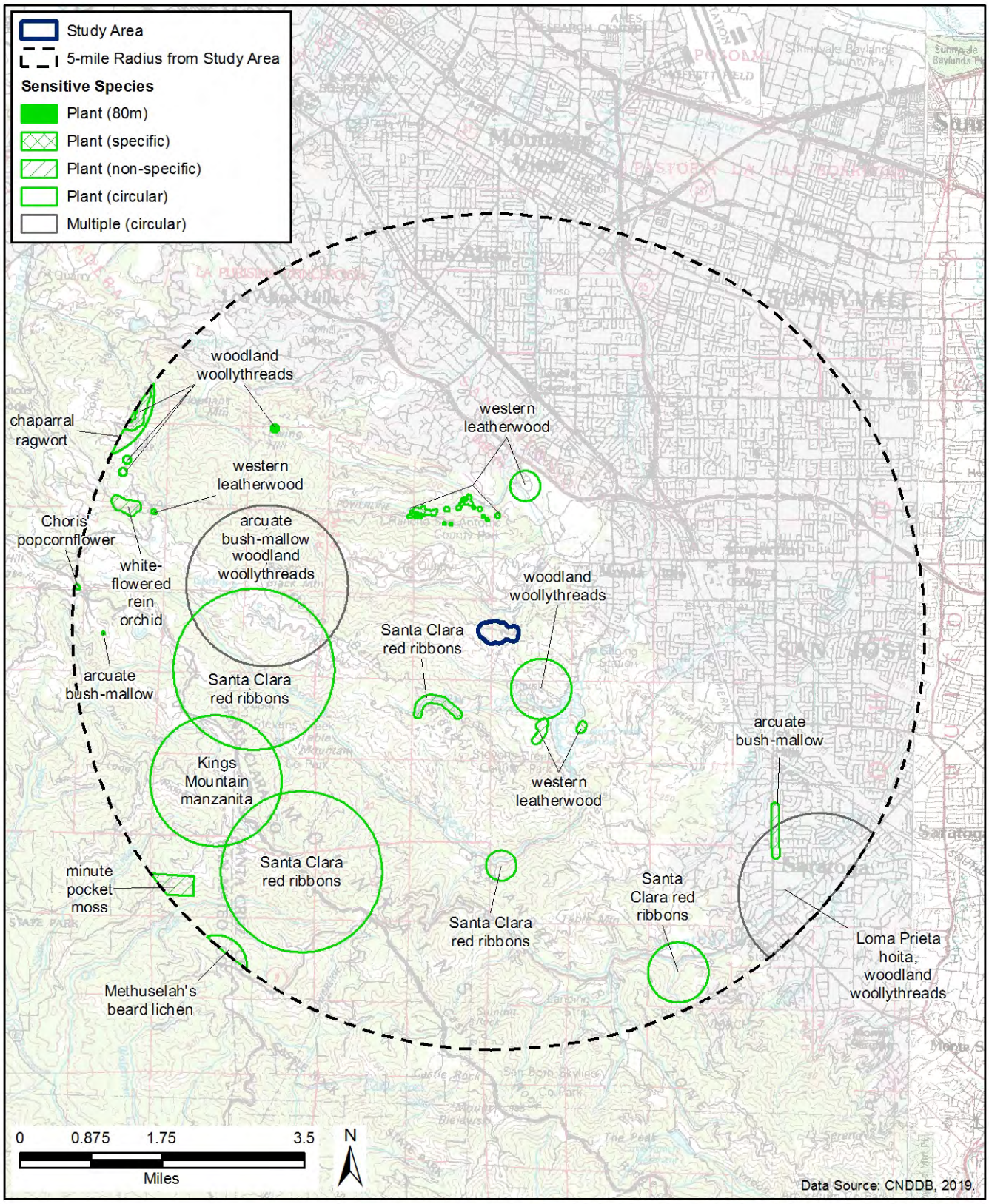
As indicated above, only plant taxa considered by CDFW to be "rare, threatened, or endangered in California" (i.e., CRPR 1B and 2B plants) are considered special-status in this analysis.

GEI biologists reviewed current results of the CNDDB and CNPS USGS 9-quadrangle searches (see Appendix A). The CNDDB includes occurrences of eight special-status plants and nine special-status animals documented within 5 miles of the Study Area, as shown in **Figure 3** and **Figure 4**. (Note: Not all species tracked in the CNDDB and shown in Figures 3 and 4 meet the special-status definition described above.)

Table 2 provides information on 18 special-status plants included in the current CNDDB and CNPS search results and evaluated by GEI for potential to occur in the Study Area. Based on observations made during the GEI field survey for this current evaluation, habitat for these plants was not observed and is not present in the Study Area, and none of these plants is considered to have potential to occur in the Study Area.

Table 3 provides information on 15 special-status animals included in the current CNDDB and CNPS search results and evaluated by GEI for potential to occur in the Study Area. Based on the review of existing documentation and observations made during the field survey, thirteen special-status wildlife species have at least moderate potential to occur within the Study Area: Santa Cruz black salamander (*Aneides flavipunctatus niger*), California giant salamander (*Dicamptodon ensatus*), red-bellied newt (*Taricha rivularis*), California red-legged frog (*Rana draytonii*), long-eared owl (*Asio otus*), white-tailed kite (*Elanus leucurus*), olive-sided flycatcher (*Contopus cooperi*), loggerhead shrike (*Lanius ludovicianus*), yellow warbler (*Dendroica petechia*), grasshopper sparrow (*Ammodramus savannarum*), San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), pallid bat (*Antrozous pallidus*), and western red bat (*Lasiurus blossevillii*). None of these species were detected during the GEI survey. California red-legged frog, white-tailed kite, olive-sided flycatcher, yellow warbler, grasshopper sparrow, and San Francisco dusky-footed woodrat were documented on the Permanente property during WRA surveys (WRA 2011).

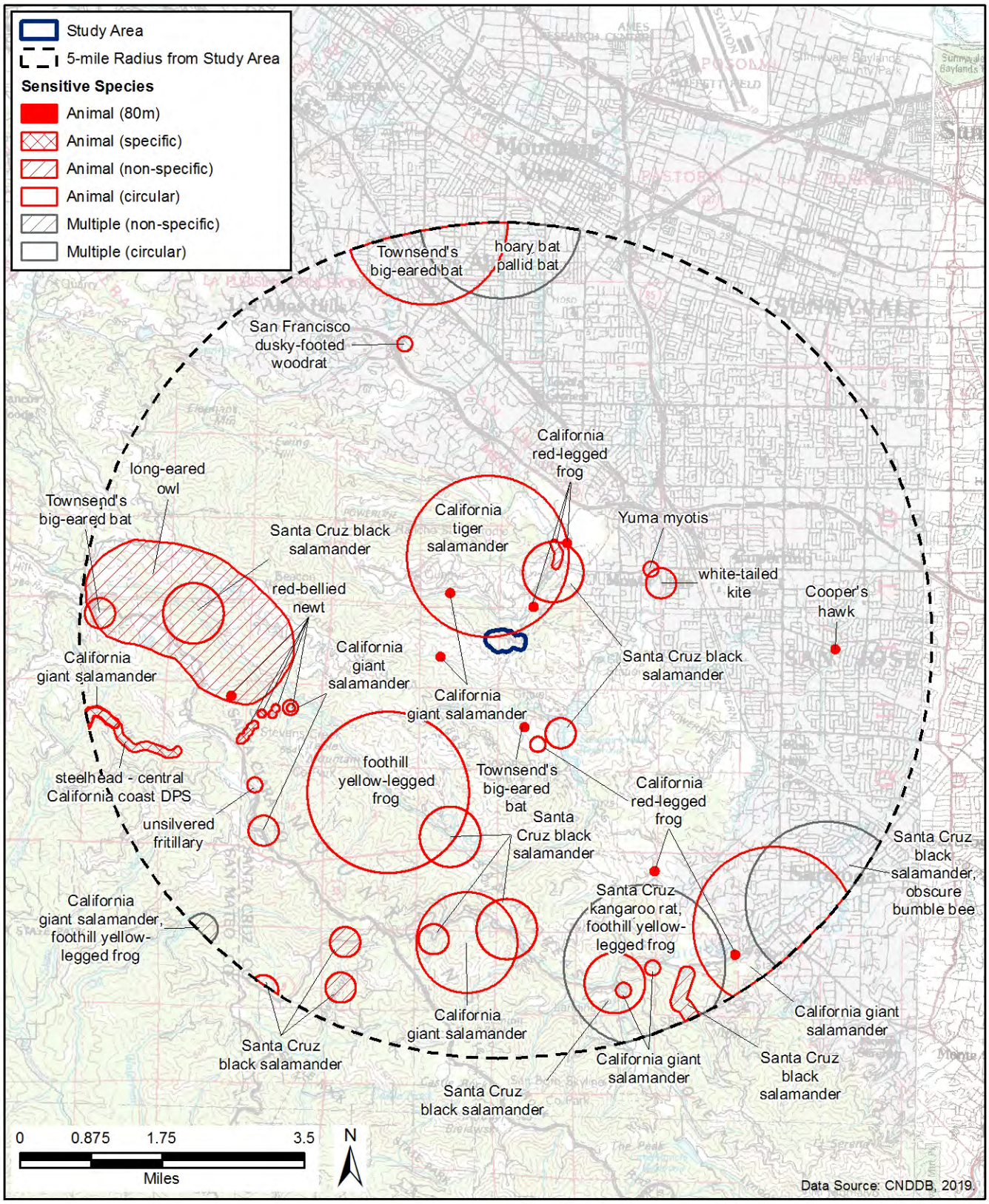
Figure 3. California Natural Diversity Database Occurrences of Special-status Plants within 5 Miles of the Rock Plant Reserve Study Area



Z:\Projects\1803658_Lehigh_SeeSaw\1803658_G022_RockPlantRes_CNDDB_Plants.mxd
29Mar2019 RS

Source: CDFW 2018, adapted by GEI Consultants, Inc. 2018

Figure 4. California Natural Diversity Database Occurrences of Special-status Animals within 5 Miles of the Rock Plant Reserve Study Area



Z:\Projects\1803658_Lehigh_SeeSaw\1803658_G023_RockPlantRes_CNDDB_Animals.mxd
29Mar2019 RS

Source: CDFW 2018, adapted by GEI Consultants, Inc. 2018

Table 2. Special-status Plants Evaluated for Potential to Occur in the Rock Plant Reserve Study Area

Species	Blooming Period	Status[1]		Habitat Associations	Potential to Occur in The Study Area
		Federal	State		
Ohlone manzanita *Arctostaphylos ohloneana*	February–March	–	1B.1	Siliceous shale soils in closed-cone coniferous forest and coastal scrub	None; no suitable habitat is present in the Study Area; none observed during surveys.
Lesser saltscale *Atriplex minuscula*	May–October	–	1B.1	Alkaline sandy soils in chenopod scrub, valley and foothill grassland, and playas	None; no suitable habitat is present in the Study Area; none observed during surveys.
Condon's tarplant *Centromadia parryi* ssp.*congdonii*	May–October	–	1B.1	Alkaline soils on valley and foothill grassland	None; no suitable habitat is present in the Study Area; none observed during surveys.
Ben Lomond spineflower *Chorizanthe pungens* var. *hartwegiana*	April–July	E	1B.1	Lower mountain coniferous forest; known only from sandhill parklands in the Santa Cruz Mountains	None; no suitable habitat is present in the Study Area; none observed during surveys.
Robust spineflower *Chorizanthe robusta* var. *robusta*	April–September	E	1B.1	Sandy or gravelly substrate in maritime chaparral, openings in cismontane woodland, coastal dunes, or coastal scrub; known only from six extant populations	None; no suitable habitat is present in the Study Area; none observed during surveys.
Jepson's coyote thistle *Eryngium jepsonii*	April–August	–	1B.2	Clay soils in vernal and foothill vernal pool grasslands	None; no suitable habitat is present in the Study Area; none observed during surveys.
Minute pocket moss *Fissidens pauperculus*	none	–	1B.2	Moist North Coast coniferous forest soils	None; no suitable habitat is present in the Study Area; none observed during surveys.
Toren's grimmia *Grimmia torenii*	none	–	1B.3	Openings in chaparral, cismontane woodland, and lower coniferous forest on carbonate or volcanic rock	None; no suitable habitat is present in the Study Area; none observed during surveys.
Vaginulate grimmia *Grimmia vaginulata*	none	–	1B.1	Openings in chaparral habitat on carbonate sandstone substrate	None; no suitable habitat is present in the Study Area; none observed during surveys.
Santa Cruz cypress *Hesperocyparis abramsiana* var. *abramsiana*	none	T	E, 1B.2	Closed-cone coniferous forest, chaparral, and lower coniferous forest on sandstone or granitic substrate; known only from the Santa Cruz Mountains	None; no suitable habitat is present in the Study Area; none observed during surveys.
Butano Ridge cypress *Hesperocyparis abramisana* var. butanoensis	October	T	E, 1B.1	Closed-cone coniferous forest, chaparral, and lower coniferous forest on sandstone or granitic substrate; known only from the Butano Ridge of the Santa Cruz Mountains	None; no suitable habitat is present in the Study Area; none observed during surveys.

Table 2. Special-status Plants Evaluated for Potential to Occur in the Rock Plant Reserve Study Area

Species	Blooming Period	Status[1]		Habitat Associations	Potential to Occur in The Study Area
		Federal	State		
Woodland woolythreads *Monolopia gracilens*	March–July	–	1B.2	Serpentine soil in openings of broadleaf upland forest, chaparral, cismontane woodland, North Coast coniferous forest, and valley and foothill grassland	None; no suitable habitat is present in the Study Area; none observed during surveys.
Kellman's bristle moss *Orthotrichum kellmanii*	none	–	1B.2	Sandstone and carbonate substrate in chaparral and cismontane woodland	None; no suitable habitat is present in the Study Area; none observed during surveys.
Choris' popcornflower *Plagiobothrys chorisianus* var. *chorisianus*	March–June	–	1B.2	Mesic soils in chaparral, coastal prairie, and coastal scrub	None; no suitable habitat is present in the Study Area; none observed during surveys.
California alkali grass *Puccinellia simplex*	March–May	–	1B.2	Alkaline soils in wet areas, lake margins, meadows and seeps, vernal pools, chenopod scrub, vernal pools, and valley and foothill grassland	None; no suitable habitat is present in the Study Area; none observed during surveys.
Slender-leaved pondweed *Stuckenia filiformis* ssp.*alpina*	May–July	–	2B.2	Marshes and swamps	None; no suitable habitat is present in the Study Area; none observed during surveys.
Santa Cruz clover *Trifolium buckwestiorum*	April–October	–	1B.1	Gravelly soils along the margins of broadleaf upland forest, cismontane woodland, and coastal prairie	None; no suitable habitat is present in the Study Area; none observed during surveys.
Saline clover *Trifolium hydrophilum*	April–June	–	1B.2	Alkaline soils in marshes and swamps, mesic valley and foothill grassland, and vernal pools	None; no suitable habitat is present in the Study Area; none observed during surveys.

[1] Status Definitions

Legal Status
E = Listed as Endangered under the Federal or California Endangered Species Act
T = Listed as Threatened under the Federal Endangered Species Act

California Rare Plant Ranks
1B = Plant species considered rare or endangered in California and elsewhere (but not legally protected under the Federal or California Endangered Species Acts)
2B = Plant species considered rare or endangered in California but more common elsewhere (but not legally protected under the Federal or California Endangered Species Acts)

California Rare Plant Rank Extensions
.1 = Seriously endangered in California (greater than 80 percent of occurrences are threatened and/or have a high degree and immediacy of threat)
.2 = Fairly endangered in California (20 to 80 percent of occurrences are threatened and/or have a moderate degree and immediacy of threat)
– = no status

Sources: CDFW 2018; CNPS 2018; GEI data 2018; USFWS 2018a

Table 3. Special-status Wildlife Evaluated for Potential to Occur in the Rock Plant Reserve Study Area

Species	Status		Habitat Associations	Potential to Occur in the Study Area
	Federal	State		
Amphibians				
Santa Cruz black salamander *Aneides flavipunctatus niger*	–	SSC	Rocks, talus, and damp woody debris in mixed deciduous and coniferous woodlands and coastal grasslands	Moderate; oak woodland/forest provides potentially suitable habitat, particularly more moist areas at lower elevations on the north-facing hillslope and along the tributary to Permanente Creek; nearest known occurrence is from Saratoga Creek, approximately 4 miles south of the site (CDFW 2018) none observed during surveys.
California giant salamander *Dicamptodon ensatus*	–	SSC	Wet coastal forests near streams and seeps; breed in cold, clear streams, occasionally in lakes and ponds; adults also occur in wet forests, under rocks and logs near streams and lakes	Moderate; oak woodland/forest provides potentially suitable habitat, particularly more moist areas at lower elevations on the north-facing hillslope and along the tributary to Permanente Creek; adult and larvae were recently documented in Permanente Creek (CDFW 2018) none observed during surveys.
Red-bellied newt *Taricha rivularis*	–	SSC	Moist terrestrial habitats; typically breed in streams with moderate flow and rocky substrate	Moderate; oak woodland/forest provides potentially suitable habitat, particularly more moist areas at lower elevations on the north-facing hillslope and along the tributary to Permanente Creek; known from Upper Stevens Creek County Park, approximately 3 miles southeast of the Study Area (CDFW 2018) none observed during surveys.
California red-legged frog *Rana draytonii*	T	SSC	Perennial to intermittent ponds, stream pools and wetlands. Prefers shorelines with extensive vegetation. Documented to disperse through upland habitats after rains.	Moderate; known to occur on the Permanente property, along Permanente Creek and in ponds away from the creek; seasonal wetland may provide suitable breeding habitat in some years; ephemeral drainages may provide non-breeding aquatic habitat and dispersal habitat when water is present none observed during surveys.
Birds				
White-tailed kite *Elanus leucurus*	–	FP	Nests in woodlands and isolated trees and forages in grasslands, pasture, and agricultural fields	Moderate; oak woodland/forest on and adjacent to the Study Area provides potentially suitable nest trees, and grassland and scrub provide suitable foraging habitat; nearest documented nest site is along Stevens Creek, approximately 2 miles east of the Study Area (CDFW 2018), but this species has been regularly observed foraging on the Permanente property (WRA 2011).
Bald eagle *Haliaeetus leucocephalus*	–	E, FP	Ocean shore, lake margins, and rivers; nests in large, live trees with open branches, typically within 1 mile of permanent water	Low; no suitable nesting or foraging habitat is present on or adjacent to the Study Area; nearest known active nest site is at Felt Reservoir, approximately 7 miles northwest of the Study Area (CDFW 2018).

Table 3. Special-status Wildlife Evaluated for Potential to Occur in the Rock Plant Reserve Study Area

Species	Status		Habitat Associations	Potential to Occur in the Study Area
	Federal	State		
Long-eared owl *Asio otus*	–	SSC	Nests in mature riparian and oak woodland, typically along streams; forages in open habitats.	Moderate; Study Area provides potentially suitable nesting and foraging habitat, but this species is considered rare in Santa Clara County and is an irregular breeder (Bousman 2005); nearest known occurrence is from the Monte Bello Open Space Preserve, several miles west of the Study Area (CDFW 2018); none detected during surveys.
Purple martin *Progne subis*	–	SSC	Deciduous woodland and low elevation coniferous forest; typically nests in old woodpecker cavities in tall, isolated tree or snag; also nests in human-made structures	Low; oak woodland/forest provides potentially suitable nesting habitat; nearest known recently active nest colony is at Mount Umunhum, approximately 15 miles southwest of the Study Area (CDFW 2018); none detected during surveys.
Olive-sided flycatcher *Contopus cooperi*	–	SSC	Nests primarily in late-successional coniferous forest with open canopies.	Moderate; unlikely to nest, because the Study Area does not provide preferred nesting habitat; foraging individuals could occur during migration has been observed on the Permanente property (WRA 2011).
Loggerhead shrike *Lanius ludovicianus*	–	SSC	Open habitats with sparse shrubs, trees, posts, and other suitable perches; nests in shrubs and small trees.	Moderate; Study Area provides suitable foraging and nesting habitat; nearest known nesting occurrence is from open grassland/ agricultural habitat in Coyote Valley, approximately 20 miles southeast of the site (CDFW 2018); none detected during surveys.
Yellow warbler *Dendroica petechia*	–	SSC	Riparian, typically prefers willows, cottonwoods, sycamores, and alders for nesting and foraging.	Moderate; potential to forage but unlikely to nest in the Study Area; has been regularly observed on the Permanente property during migration and the breeding season (WRA 2011).
Grasshopper sparrow *Ammodramus savannarum*	–	SSC	Dense grassland on rolling hills, low plains, lower mountain slopes, and in valleys; prefers native grasslands with mix of grasses, forbs and scattered shrubs.	Moderate; Study Area provides suitable foraging and nesting habitat; nearest known nesting occurrence is from serpentine grassland on Coyote Ridge, approximately 20 miles southeast of the Study Area; has been observed in sparsely vegetated areas of the Permanente property (WRA 2011).
Mammals				
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	–	SSC	Forest with moderate canopy and moderate to dense understory; require adequate materials for constructing and maintaining nests of sticks, shredded grass, leaves, and other material.	High; known to occur in various woodland/forest and scrub habitats on the Permanente property (WRA 2011).

Table 3. Special-status Wildlife Evaluated for Potential to Occur in the Rock Plant Reserve Study Area

Species	Status		Habitat Associations	Potential to Occur in the Study Area
	Federal	State		
Pallid bat *Antrozous pallidus*	–	SSC	Most common in open, dry habitats with rocky areas for roosting; roosts in caves, crevices, mines, and occasionally in hollow trees and buildings; very sensitive to disturbance of roosting sites	Moderate; oak woodland/forest may provide suitable roost sites; if roost sites are present in the Study Area or nearby, individuals could forage onsite; nearest known and presumed extant occurrence in the past 30 years is from nearly 20 miles south of the Study Area (CDFW 2018); none detected during surveys.
Western red bat *Lasiurus blossevillii*	–	SSC	Deciduous and coniferous woodland and forest; roosts primarily in trees; prefers riparian vegetation, habitat edges and mosaics with open areas for foraging	Moderate; Study Area may provide suitable roost trees, and individuals from other nearby roosting habitat could forage over the Study Area; nearest known recent roost site is from Golden Gate Park (CDFW 2018); none detected during surveys.

[1] **Status Definitions**

E = Listed as Endangered under the Federal or State Endangered Species Act
T = Listed as Threatened under the Federal or State Endangered Species Act
FP = Fully Protected under the California Fish and Game Code
SSC = California Species of Special Concern

Sources: CDFW 2018; GEI data 2018; USFWS 2018a

The four special-status amphibians listed in Table 3 could occur within portions the Study Area that support seasonal aquatic habitat and/or moist terrestrial habitat where they can seek shelter under moist vegetation, leaf litter, rocks and woody debris. The CNDDB includes an 1893 occurrence of California tiger salamander (*Ambystoma californiense*) on the Permanente Property (see Figure 4). However, the validity of this occurrence is questioned, because of its age and likely misidentification (WRA 2011) and the lack of any subsequent identification of California tiger salamander on the site during the past 125 years; therefore, California tiger salamander is not addressed in this report. In some years, the seasonal wetland may remain ponded long enough to provide potentially suitable breeding habitat for California red-legged frog, although this potential breeding habitat would only be marginally suitable, poor in quality compared known and potential breeding ponds associated with Permanente Creek, and is not contiguous to other areas known to support red-legged frog. Santa Cruz black salamander could breed in oak woodland/forest in the Study Area. California giant salamander and red-bellied newt, however, are unlikely to breed in the Study Area, because of the ephemeral nature of the drainages and unsuitable conditions of the seasonal wetland. However, the ephemeral drainages and seasonal wetland could be used by non-breeding and/or dispersing California red-legged frog, California giant salamander, and red-bellied newt, when water is present.

All the special-status bird species listed in Table 3 could occur in the Study Area, and most of them have moderate potential to at least forage in the Study Area. Olive-sided flycatcher and yellow warbler are unlikely to nest in the Study Area, because the forest is not typical of their preferred nesting habitat, but they could forage in the Study Area; yellow warblers could nest in nearby riparian habitat along Permanente Creek, which is approximately 500 north of and outside the Study Area. Trees on and adjacent to the Study Area could provide suitable nest sites for white-tailed kite and short-eared owl, and these species could forage in grassland and scrub habitats in the Study Area. Grassland and adjacent scrub habitat margins also provide suitable foraging and nesting habitat for loggerhead shrike and grasshopper sparrow. Purple martin (*Progne subis*) has low potential to occur in the study area, because

the habitat is only marginally suitable, and nest colonies are rare and localized in Santa Clara County; bald eagle (*Haliaeetus leucocephalus*) has low potential to occur, because the Study Area does not provide suitable nesting or foraging habitat.

San Francisco dusky-footed woodrat has high potential to occur in oak woodland and forest, scrub, and oak chaparral habitats in the Study Area. These rodents are locally abundant in forest, woodland, and scrub habitats. No woodrat nests were documented during the GEI survey, but their nests were commonly found in nearly every upland habitat during surveys conducted for the 2012 Reclamation Plan (WRA 2011); thus, it is assumed that they may be present in Study Area. Pallid and western red bat could forage in the Study Area. There is limited potential for these species to roost in trees in oak woodland/forest areas, although this is not the preferred roosting habitat/conditions for either species.

3.3 Sensitive Habitats

Sensitive habitats include those that are of special concern to resource agencies or are afforded specific consideration through the California Environmental Quality Act (CEQA), Federal Endangered Species Act (FESA), Section 1602 of the California Fish and Game Code (FGC), Sections 404 or 401 of the Federal Clean Water Act (CWA), and/or Porter-Cologne Water Quality Control Act (Porter-Cologne Act). Sensitive habitats may be of special concern for a variety of reasons, including their locally or regionally declining status, or because they provide important habitat for special-status species.

3.3.1 Critical Habitat

No critical habitat designated or proposed for designation by USFWS or National Marine Fisheries Service (NMFS) is present on or adjacent to the Study Area. Designated critical habitat for Central California Coastal steelhead (*Oncorhynchus mykiss*) occurs in Stevens Creek, approximately 4 miles downstream of the Permanente property. No designated critical habitat for California red-legged frog occurs in the Study Area.

3.3.2 Jurisdictional Waters and other Habitats

Under CWA Section 404, the U.S. Army Corps of Engineers (USACE) previously asserted jurisdiction over the downstream portion of the ephemeral drainage in the northern portion of the Study Area (USACE File No. 2015-00162S), as a tributary to Permanente Creek. USACE confirmed that the seasonal wetland and the ephemeral drainage that flows to the sedimentation pond are not subject to their jurisdiction. Because the remaining two ephemeral drainages lack a connection to other regulated waters of the United States, they are likely not subject to USACE jurisdiction under CWA Section 404. These drainages and seasonal wetland that are not anticipated to be subject to USACE jurisdiction are, however, subject to San Francisco Bay RWQCB jurisdiction, because they meet the definition of waters of the State, and the RWQCBs assert jurisdiction over non-Federal waters (under the Porter-Cologne Act). All onsite ephemeral drainages may also be subject to CDFW jurisdiction under FGC Section 1602, which requires a Lake or Streambed Alteration Agreement if a project would result in substantial diversion or obstruction of the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. CDFW typically asserts jurisdiction over ephemeral drainages, such as those in the Study Area.

3.3.3 Natural Communities of Special Concern

The eastern edge of the Study Area supports a small patch (0.14 acre) of willow forest/scrub, which could qualify as a natural community of special concern considered by CDFW to be highly imperiled.

3.3.4 Oak Woodland

The Study Area includes approximately 32 acres of oak woodland and forest, 13.62 acres of which are in the Rock Plant Reserve mining disturbance area. Oak woodlands are protected by the Oak Woodlands Conservation Act.

4. Regulatory Setting

This subsection briefly describes federal, state, and local regulations, permits, and policies pertaining to biological resources and wetlands that were considered for applicability to the Rock Plant Reserve Project component.

4.1 Special-Status Species and Sensitive Communities

4.1.1 Federal Endangered Species Act

USFWS, which has jurisdiction over plants, wildlife, and most freshwater fish, and NMFS, which has jurisdiction over anadromous fish, marine fish, and marine mammals, oversee implementation of FESA to ensure that federal agencies' actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. A federal agency is required to consult with USFWS and NMFS if it determines that its decision may affect a listed species under the agency's jurisdiction. FESA prohibits the "take"[1] of any fish or wildlife species listed as threatened or endangered, including the destruction of habitat that could hinder species recovery.

FESA Section 9 take prohibition applies only to wildlife and fish species that are listed as threatened or endangered. Candidate species and species that are proposed for listing or are under petition for listing receive no protection under Section 9. Section 9 also prohibits the removal, possession, damage or destruction of any endangered plant from federal land, as well as acts to remove, cut, dig up, damage, or destroy an endangered plant species in nonfederal areas in knowing violation of any state law or in the course of criminal trespass.

FESA Section 10 requires the issuance of an "incidental take" permit before any public or private action may be taken that would potentially harm, harass, injure, kill, capture, collect, or otherwise hurt (i.e., take) any individual of an endangered or threatened species. The permit requires preparation and implementation of a habitat conservation plan that would offset the take of individuals that may occur

[1] "Take" is broadly defined in Section 9 of the federal Endangered Species Act to include intentional or accidental "harassment" or "harm" to wildlife. "Harass" is further defined by the U.S. Fish and Wildlife Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering. "Harm" is defined as an act which actually kills or injures wildlife. This may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

incidental to implementation of otherwise lawful activities, by providing for the overall preservation of the affected species through specific conservation measures.

Under FESA, the Secretary of the Interior (or the Secretary of Commerce, as appropriate) formally designates critical habitat for certain federally listed species and publishes these designations in the Federal Register. Critical habitat is not automatically designated for all federally listed species; thus, many do not have designated critical habitat.

Critical habitat is defined as the specific areas that are essential to the conservation of a federally listed species, and that may require special management consideration or protection. Critical habitat is determined using the best available scientific information about the physical and biological needs of the species. These needs, or primary constituent elements, include: space for individual and population growth and for normal behavior; food, water, light, air, minerals, or other nutritional or physiological needs; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitat that is protected from disturbance or is representative of the historical geographic and ecological distribution of a species.

4.1.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC, §703, Supplement I, 1989) prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs. An April 11, 2018 USFWS memorandum indicates that the MBTA's prohibitions on take apply when the purpose of an action is to take migratory birds, their eggs, or their nests. Therefore, take occurring as the result of an activity, the purpose of which is not to take birds, eggs or nests, is not prohibited by the MBTA.

4.2 Surface Mining and Reclamation Act

Regulations implementing the Surface Mining and Reclamation Act require that the reclamation of mined lands be implemented in conformance with specified standards (14 CCR §3700 et seq.). Standards regarding wildlife habitat and stream protection are outlined below.

Wildlife and wildlife habitat shall be protected in accordance with the following standards:

> (a) Rare, threatened or endangered species as listed by [CDFW], (14 CCR, §§670.2 - 670.5) or the U.S. Fish and Wildlife Service, (50 CFR 17.11 and 17.12) or species of special concern as listed by [CDFW] in the Special Animals List, Natural Diversity Data Base, and their respective habitat, shall be conserved as prescribed by [FESA] and the California Endangered Species Act, Fish and Game Code §2050 et seq. If avoidance cannot be achieved through the available alternatives, mitigation shall be proposed in accordance with the provisions of the California Endangered Species Act, Fish and Game Code §2050 et seq., and the [FESA].
>
> (b) Wildlife habitat shall be established on disturbed land in a condition at least as good as that which existed before the lands were disturbed by surface mining operations, unless the proposed end use precludes its use as wildlife habitat or the approved reclamation plan establishes a different habitat type than that which existed prior to mining.

(c) Wetland habitat shall be avoided. Any wetland habitat impacted as a consequence of surface mining operations shall be mitigated at a minimum of one to one ratio for wetland habitat acreage and wetland habitat value.

Streams, including surface water and groundwater, shall be protected in accordance with the following standards:

(a) Surface and groundwater shall be protected from siltation and pollutants which may diminish water quality as required by Federal Clean Water Act §301 et seq. (33 U.S.C. §1311) and §404 et seq. (33 U.S.C. §1344), the Porter-Cologne Water Quality Control Act §13000 et seq., County anti-siltation ordinances, the Regional Water Quality Control Board or the State Water Resources Control Board.

(b) In-stream surface mining operations shall be conducted in compliance with Section 16000 et seq. of the California Fish and Game Code, §404 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. §403).

(c) Extraction of sand and gravel from river channels shall be regulated to control channel degradation in order to prevent undermining of bridge supports, exposure of pipelines or other structures buried within the channel, loss of spawning habitat, lowering of ground water levels, destruction of riparian vegetation, and increased stream bank erosion (exceptions may be specified in the approved reclamation plan). Changes in channel elevations and bank erosion shall be evaluated annually using records of annual extraction quantities and benchmarked annual cross sections and/or sequential aerial photographs to determine appropriate extraction locations and rates.

(d) In accordance with requirements of the California Fish and Game Code §1600 et seq., instream mining activities shall not cause fish to become entrapped in pools or in off-channel pits, nor shall they restrict spawning or migratory activities.

4.3 California Environmental Quality Act

The intent of CEQA is to maintain "high-quality ecological systems and the general welfare of the people of the State." It is the policy of the State to "prevent the elimination of fish or wildlife species due to man's activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities and examples of the major periods of California history." CEQA forbids agencies from approving projects with significant adverse impacts when feasible alternatives or feasible mitigation measures can substantially reduce such impacts.[2]

CEQA Guidelines Section 15065(a) indicates that impacts to state- and federally listed rare, threatened, or endangered plants or animals are significant if they significantly reduce the number or restrict the range of an endangered, rare, or threatened species. Under CEQA Guidelines Section 15380, impacts to other species ("special status species") that meet certain criteria (i.e., it can be shown that the species' survival in the wild is in jeopardy or it is at risk of becoming endangered in the near future) but are not officially listed also may be considered significant by the lead agency under CEQA, depending on the

[2] The California Environmental Quality Act also provides that a project might be approved in spite of residual, unmitigated significant impacts, by adoption of a statement of overriding social and economic considerations in situations where mitigation or alternatives are deemed infeasible.

applicability of other laws (e.g., MBTA) and the discretion of the lead agency. For example, CDFW interprets Lists 1A, 1B, and 2 of the CNPS Inventory of Rare and Endangered Vascular Plants of California to consist of plants that, in a majority of cases, would qualify for listing as rare, threatened, or endangered. However, the determination of whether an impact is significant is a function of the lead agency, absent the protection of other laws. Projects subject to CEQA review must specifically address potential impacts to listed species and provide mitigation measures if the impact is significant.

4.3.1 California Oak Woodlands Conservation Act

California Senate Bill 1334, the Oak Woodlands Conservation Act, became law on January 1, 2005 and was added to CEQA as Public Resources Code Section 21083.4. This law protects oak woodlands that are not protected under the Z'Berg-Nejedly Forest Practice Act (Pub. Res. Code §§4511-4628). This Act requires a county to determine whether or not a project would result in a significant impact on oak woodlands and, when a project would result in a significant impact on oak woodlands, to implement mitigation measures as prescribed under the Public Resources Code to reduce or compensate for the loss of oak woodlands.

4.3.2 California Environmental Quality Act Guidelines Section 15380

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines Section 15380(b) provides that a species not included on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the FESA definition and the FGC section that addresses rare or endangered plants or animals. This section was included in the CEQA Guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a "candidate species" that has not yet been listed by either USFWS or CDFW. Thus, CEQA provides a CEQA lead agency with the ability to protect a species from a project's potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

4.4 California Fish and Game Code

4.4.1 California Endangered Species Act

Under the California Endangered Species Act (CESA) (FGC §2070 et seq.), CDFW has the responsibility for maintaining a list of threatened and endangered species. CDFW also maintains a list of "candidate species," which are species formally noticed as being under review for addition to either the list of endangered species or the list of threatened species. In addition, CDFW maintains lists of "species of special concern," which serve as "watch lists." Pursuant CESA requirements, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species could be present in the area affected by the project and determine whether the proposed project could have a potentially significant impact on such species. In addition, CDFW encourages informal consultation on any proposed project that may affect a candidate species.

4.4.2 California Native Plant Protection Act

State listing of plant species began in 1977 with the passage of the California Native Plant Protection Act (NPPA), which directed CDFW (then California Department of Fish and Game) to carry out the legislature's intent to "preserve, protect, and enhance endangered plants in this State." The NPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare

and to require permits for collecting, transporting, or selling such plants. CESA expanded upon the original NPPA and enhanced legal protection for plants. CESA established threatened and endangered species categories and grandfathered all rare animals—but not rare plants—into the act as threatened species. Thus, there are three listing categories for plants in California: rare, threatened, and endangered.

4.4.3 Nesting Birds

Under FGC Section 3503, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. In turn, Section 3503.3 prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs.

4.4.4 Fully Protected Species

The FGC also allows the designation of a species as Fully Protected (see §3511 regarding birds, §4700 regarding mammals, §5050 regarding reptiles and amphibians, and §5515 regarding fish). This designation provides a greater level of protection than is afforded by CESA, and until recently, fully protected species could not be taken at any time. On October 18, 2011, Senate Bill 618 was signed into law, which permits take of fully protected species where a Natural Communities Conservation Plan has been approved and is being implemented to ensure protection of those species.

4.4.5 Sensitive Natural Communities

Sensitive natural communities are identified as such by CDFW's Natural Heritage Division and include those that are naturally rare and those whose extent has been greatly diminished through changes in land use. The CNDDB tracks 135 such natural communities in the same way that it tracks occurrences of special-status species: information is maintained on each site's location, extent, habitat quality, level of disturbance, and current protection measures. CDFW is mandated to seek the long-term perpetuation of the areas in which these communities occur. While there is no statewide law that requires protection of all sensitive natural communities, CEQA requires consideration of a project's potential impacts on biological resources of statewide or regional significance.

4.5 Wetlands and Jurisdictional Waters

4.5.1 U.S. Army Corps of Engineers

Wetlands and other waters (e.g., rivers, streams, and natural ponds) are a subset of waters of the United States and receive protection under CWA Section 404. The term "waters of the United States," as defined in the Code of Federal Regulations (33 CFR 328.3[a]; 40 CFR 230.3[s]), includes: (1) all waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; (2) all interstate waters, including interstate wetlands; (3) territorial seas; (4) all impoundments of waters otherwise identified as waters of the United States under this section; (5) all tributaries of waters identified in (1) through (3); (6) all waters adjacent to a water identified in (1) through (5), including wetlands, ponds, lakes, oxbows, impoundments, and similar waters; (7) all prairie potholes, Carolina bays and Delmrva bays, pocosins, western vernal pools, and Texas coastal prairie wetlands where they are determined, on a case-specific basis, to have a significant nexus to a water identified in (1) through (3); and (8) all waters located within the 100-year floodplain of a water identified in (1) through (3) and all waters located within 4,000 feet of the high tide line or ordinary high water mark of a water identified in (1) through (5) where they

are determined on a case-specific basis to have a significant nexus to a water identified in (1) through (3).

USACE has primary federal responsibility for administering regulations that concern waters of the United States. In this regard, the USACE acts under two statutory authorities: Rivers and Harbors Act (§§9, 10), which governs specified activities in "navigable waters,"[3] and CWA (§404), which governs specified activities in waters of the United States, including wetlands. USACE requires a permit if a project proposes placement of structures within navigable waters and/or alteration of waters of the United States. Some classes of fill activities may be authorized under Regional General or Nationwide permits if specific conditions are met. The Nationwide permit outlines general conditions and may specify project-specific conditions as required by USACE during the Section 404 permitting process. When a project's activities do not meet the conditions for a Nationwide Permit, USACE may issue an Individual Permit or Letter of Permission. USACE has a policy of no net loss of wetlands and typically requires mitigation for all impacts to wetlands before it will issue a permit under CWA Section 404. U.S. Environmental Protection Agency has the ultimate authority for designating dredge and fill material disposal sites and can veto the USACE's issuance of a permit to fill jurisdictional waters of the United States.

The federal government also supports a policy of minimizing "the destruction, loss, or degradation of wetlands." Executive Order 11990 (May 24, 1977) requires that each federal agency take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

4.5.2 San Francisco Bay Regional Water Quality Control Board

The San Francisco Bay RWQCB regulates waters of San Francisco Bay under the Porter-Cologne Act (Water Code §13000 et seq.). Dredging, filling, or excavation of isolated waters constitutes a discharge of waste to waters of the State. Under the Porter-Cologne Act, anyone who discharges waste or proposes to discharge waste within any region that could affect the quality of the waters of the state must file a "report of waste discharge" with the applicable RWQCB. The RWQCB then issues a permit (called "waste discharge requirements" or WDRs) implementing relevant water quality control plans and taking into consideration the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, and the need to prevent nuisances (Water Code §13263).

In addition, California has been delegated CWA Section 402 permit authority for the National Pollutant Discharge Elimination System permit program including stormwater permits. Although the issuance of Section 404 permits remains the responsibility of the USACE, the State actively uses its CWA Section 401 water quality certification authority to ensure that Section 404 permits protect state water quality standards. The RWQCB has a policy of no net loss of wetlands and typically requires mitigation for all impacts to wetlands before it will issue a water quality certification under CWA Section 401.

4.5.3 California Department of Fish and Wildlife

Under FGC Sections 1600–1616, CDFW regulates activities that would substantially divert, obstruct the natural flow of, or substantially change rivers, streams, and lakes. The jurisdictional limits are defined in Section 1602 as the "bed, channel, or bank of any river, stream, or lake." In practice, CDFW may exert authority over activities near such features that adversely affect fish and wildlife resources associated

[3] Navigable waters are defined as those waters that are subject to the ebb and flow of the tide or that are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

with them. Activities that would "deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake" are prohibited by CDFW unless a streambed alteration agreement is issued.

4.6 Local Plans and Policies

4.6.1 Santa Clara County General Plan

Several policies and goals in the Santa Clara County General Plan (1994) provide for the protection of biotic resources. Relevant Resource Conservation Policies and Implementation Measures include:

C-RC 2. The County shall provide leadership in efforts to protect or restore valuable natural resources, such as wetlands, riparian areas, and woodlands, and others:

a. for County-owned lands; and

b. through multi-jurisdictional endeavors.

R-RC 19. Habitat types and biodiversity within Santa Clara County and the region should be maintained and enhanced for their ecological, functional, aesthetic, educational, medicinal, and recreational importance.

R-RC 20. Strategies and policies for maintaining and enhancing habitat and biodiversity should include the following:

1. Improve current knowledge and awareness of habitats and natural areas.

2. Protect the biological integrity of critical habitat areas.

3. Encourage habitat restoration wherever possible.

4. Evaluate the effectiveness of project mitigations as required under CEQA.

R-RC 31. Natural streams, riparian areas, and freshwater marshes shall be left in their natural state providing for percolation and water quality, fisheries, wildlife habitat, aesthetic relief, and educational or recreational uses that are environmentally compatible. Streams which may still provide spawning areas for anadromous fish species should be protected from pollution and development impacts which would degrade the quality of the stream environment.

R-RC 32. Riparian and freshwater habitats shall be protected through the following general means: a. setback of development from the top of the bank; b. regulation of tree and vegetation removal; c. reducing or eliminating use of herbicides, pesticides, and fertilizers by public agencies; d. control and design of grading, road construction, and bridges to minimize environmental impacts and avoid alteration of the streambed and stream banks (freespan bridges and arch culverts, for example); and e. protection of endemic, native vegetation.

R-RC 37. Lands near creeks, streams, and freshwater marshes shall be considered to be in a protected buffer area, consisting of the following: 1. 150 feet from the top bank on both sides where the creek or stream is predominantly in its natural state; 2. 100 feet from the top bank on both sides of the waterway where the creek or stream has had major alterations; and 3. In the case that neither (1) nor

(2) are applicable, an area sufficient to protect the stream environment from adverse impacts of adjacent development, including impacts upon habitat, from sedimentation, biochemical, thermal and aesthetic impacts.

R-RC 38. Within the aforementioned buffer areas, the following restrictions and requirements shall apply to public projects, residential subdivisions, and other private nonresidential development: a. No building, structure or parking lots are allowed, exceptions being those minor structures required as part of flood control projects. b. No despoiling or polluting actions shall be allowed, including grubbing, clearing, unrestricted grazing, tree cutting, grading, or debris or organic waste disposal, except for actions such as those necessary for fire suppression, maintenance of flood control channels, or removal of dead or diseased vegetation, so long as it will not adversely impact habitat value. c. Endangered plant and animal species shall be protected within the area.

R-RC 43. Large scale grading and clearing of land should not be allowed if it will significantly degrade valuable habitat or impair surface water quality.

R-RC 49. Retention and planting of native plant species shall be encouraged, especially for landscape uses.

R-RC 53. Restoration of habitats should be encouraged and utilized wherever feasible, especially in cases where habitat preservation and flood control, water quality, or other objectives can be successfully combined. Implementation of the Project would be consistent with these policies and goals.

4.6.2 Santa Clara County Oak Woodlands Impact Guidelines

In accordance with the Oak Woodlands Conservation Act, the County created the *Guide to Evaluating Oak Woodlands Impacts* (Santa Clara County 2011b). According to the County's guidelines, a land development project is considered to have a significant direct impact on oak woodlands if the project will result in a decrease of 0.5 acre or more of native oak canopy within oak woodland on the project site. The County specifies mitigation measures for significant impacts to oak woodlands, which are based on the mitigation measures required under Public Resources Code Section 21083.4.

5. Impact Evaluation

Lehigh has a vested right to mine the Rock Plant Reserve. Therefore, biological resources effects that may be associated with mining disturbance and related activities within the Rock Plant Reserve are not attributed to the project. Nevertheless, to fully disclose environmental impacts of mining in the Rock Plant Reserve area, this evaluation recognizes that mining-related vegetation removal and ground disturbance would occur, and this report discusses the potential effects of these activities.

Mining of the Rock Plant Reserve pursuant to Lehigh's vested rights would result in removal of all vegetation and habitat features within the approximately 30-acre disturbance area. Habitat removal would impact plant and animal species in the affected area. In addition, mining-related activities could affect water quality and other characteristics of downstream portions of the ephemeral drainages, and noise and vibration could indirectly affect areas surrounding the disturbance area.

Reclamation of the Rock Plant Reserve, pursuant to the project, would include placing soil on quarry benches and the quarry floor, grading benches and other areas for drainage and in preparation for revegetation, and installing plantings on the quarry benches and other disturbed areas in accordance with the proposed revegetation plan component of the proposed reclamation plan amendment. No new areas of undisturbed vegetation would be removed as part of the reclamation process. Portions of the Rock Plant Reserve existing at the time of reclamation will be comprised of a step-like series of flat benches and walls with slopes ranging from approximately 1H:1V (horizontal:vertical) to 2H:1V. While the near vertical slopes would not be planted, the highwall benches would be revegetated. The majority of the highwall bench soil treatment area can support scrub and chaparral communities; however, some areas are appropriate for pine or oak woodland communities. Bench areas would be revegetated using "soil islands" to concentrate topsoil/planting media. Upon reclamation, no limestone is anticipated to be present on the exposed highwalls of the Rock Plant Reserve and there will be positive drainage from the area to eliminate ponding.

Consistent with the County's Environmental Checklist and Appendix G of the CEQA Guidelines (as amended in December 2018), reclamation of the Rock Plant Reserve would have a significant impact on biological resources if it would:

(a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.

(b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW or USFWS.

(c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

(d) Have a substantial adverse effect on oak woodland habitat as defined by Oak Woodlands Conservation Law (conservation/loss of oak woodlands) – Pub. Res. Code §21083.4.

(e) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

(f) Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan.

(g) Conflict with any local policies or ordinances protecting biological resources:

    i. Tree Preservation Ordinance [Section C16]

    ii. Wetland Habitat [GP Policy, R-RC 25-30]

    iii. Riparian Habitat [GP Policy, R-RC 31-41]

CEQA Guidelines Section 15382 identifies a significant effect on the environment as a "…substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by

the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance."

CEQA Guidelines Section 15065 directs lead agencies to find that a project may have a significant effect if it has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish and wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or wildlife community, or reduce the number or restrict the range of an endangered, rare, or threatened species.

CEQA Guidelines Section 15380 further provides that a plant or wildlife species, even if not on one of the official lists, may be treated as "rare or endangered" if, for example, it is likely to become endangered in the foreseeable future.

In addition to the above, the CDFW and USFWS consider a project to have a significant impact if it were to cause a change in species composition or result in the measurable degradation of sensitive habitats, such as wetlands.

The impact discussions below focus on resources determined to have potential to be affected by mining and/or reclamation in the Rock Plant Reserve area. Special-status species that are not expected to occur in the Study Area (because no suitable habitat is present or the site is outside the species' current range), including special-status and migratory bird species that are unlikely to nest in the Study Area, would not be adversely affected and are therefore not addressed further.

5.1 Impacts and Mitigation Measures

The sections below address potential impacts associated with each of the criteria listed above, based on the County's Environmental Checklist and Appendix G of the CEQA Guidelines. Each impact discussion separately addresses effects associated with mining and effects associated with reclamation. As discussed previously, Lehigh has a vested right to mine the Rock Plant Reserve, and, therefore, although the effects of mining are discussed in this report for disclosure purposes, the effects of mining are not attributable to the Project. For each potentially significant impact, recommendations are provided that would avoid or reduce the impact to less than significant.

(a) Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS?

Impact 1: Mining and reclamation activities associated with the Rock Plant Reserve could result in adverse effects on special-status and migratory birds.

Effects of Mining

Potentially suitable foraging and/or nesting habitat for several special-status birds is present throughout oak woodland/forest, scrub, chaparral, and grassland communities in the Study Area. Based on the habitat conditions, white-tailed kite, long-eared owl, olive-sided flycatcher, loggerhead shrike, yellow warbler, and grasshopper sparrow have moderate potential to occur in the Study Area; white-tailed kite, long-eared owl, loggerhead shrike, and grasshopper sparrow also have moderate potential to nest in the Study Area. 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 MBTA and FGC. Many common bird species are likely to occur and could nest in the Study Area. Vegetation removal and grading associated with initial site preparation and mining activities could directly impact nesting birds by damaging or destroying active nests, causing adults to abandon nests, and/or directly killing or injuring nesting birds and their eggs or young. Additionally, elevated sound levels from heavy equipment use during initial site preparation and mining could cause birds nesting nearby to abandon nests, particularly raptors and other species that are less tolerant of disturbance. Based on current USFWS guidance, loss of migratory birds that could result from initial site preparation and mining activities would not violate the MBTA, because it would not be considered intentional take. However, loss of migratory birds, including destruction of certain nests or eggs, could be considered a violation of FGC Section 3503 and 3503.5.

Because extensive areas of oak woodland/forest, scrub, chaparral, and grassland habitats are present on other portions of the Permanente property and in adjacent and nearby undeveloped lands, habitat loss associated with mining in the Rock Plant Reserve is not anticipated to have a substantial adverse effect on the overall populations or distribution of any bird species. However, if active nests of special-status birds are present when vegetation removal and other initial ground disturbance and activities associated with mining occur, these activities could directly destroy active nests and/or disturb nesting birds to an extent that results in nest failure or reduced nest success. Mining activities that directly or indirectly cause such effects to special-status bird species could be considered a significant effect of mining.

Effects of Reclamation

Activities associated with reclamation of the Rock Plant Reserve would include soil placement and revegetation of benched areas and the floor of the mined area. No new areas of vegetation clearing would be required for reclamation, and reclamation would reestablish vegetation, including grasses, shrubs, and trees that would mature over time and provide nesting and foraging opportunities for special-status and migratory bird species. Although reclamation activities pose no direct impacts to special-status and migratory birds, the impact of reclamation activities is considered potentially significant because of the potential for reclamation activities to disturb special-status nesting birds and cause nest failure or reduce nest success.

Recommended Measures for Impact 1

Initial tree removal and vegetation clearing in preparation for mining should be conducted either during the non-nesting season or during the nesting season only after preconstruction surveys confirm the absence of special-status and migratory bird species. If such species are identified in areas where they could be disturbed from initial tree removal and vegetation clearing, buffers sufficient to avoid adverse effects should be established in coordination with CDFW. Measures similar to those established in 2012 Conditions of Approval 46 and 47 would ensure potential impacts to special-status and migratory bird species are sufficiently mitigated.

Impact 2: Mining and reclamation activities associated with the Rock Plant Reserve could result in adverse effects on special-status bats.

Effects of Mining

Habitats within the Study Area have the potential to support roosting western red bat and pallid bat, both of which are California species of concern. These bats 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 in the Study Area contains marginally suitable roost sites for these bats.

Tree removal associated with initial site preparation and mining could directly impact roosting bats, and elevated sound levels from heavy equipment could cause adult bats to abandon maternity roosts. In addition, increase in night lighting associated with mining activities could disturb bat movement.

Because extensive areas of woodland and forest habitat are present in other portions of the Permanente property and in adjacent and nearby undeveloped lands, habitat loss or abandonment associated with mining in the Rock Plant Reserve area is not anticipated to have a substantial adverse effect on the overall populations or distribution of western red bat or pallid bat. However, potential mortality of individuals at active roosts or maternity roost abandonment could have a substantial adverse effect, and mining activities that directly or indirectly cause roost mortality or maternity roost abandonment would be considered a significant effect of mining.

Effects of Reclamation

Activities associated with reclamation of the Rock Plant Reserve would include soil placement and revegetation of benched areas and the floor of the mined area. No new areas of vegetation clearing would be required for reclamation, and reclamation would reestablish vegetation, including trees that would mature over time and provide and provide potential bat roosting habitat. The impact of reclamation activities is considered potentially significant because of the potential for reclamation activities to cause maternity roost abandonment.

Recommended Measures for Impact 2

Initial tree removal and vegetation clearing in preparation for mining should be conducted either during the non-roosting and non-hibernation seasons or during these seasons only after preconstruction surveys confirm the absence of special-status bat species. If such species are identified in areas where they could be disturbed from initial tree removal and vegetation clearing, buffers sufficient to avoid adverse effects should be established in coordination with CDFW. Felled trees determined to be potential roosting habitat should not be chipped or otherwise disturbed for 48 hours to allow escape. Additionally, any special-status bat species roosts destroyed during site preparation should be replaced with a suitable roost. Measures similar to those established in 2012 Conditions of Approval 48 through 52 would ensure potential impacts to special-status bat species are sufficiently mitigated.

Impact 3: Mining and reclamation activities associated with the Rock Plant Reserve could result in adverse effects on the San Francisco dusky-footed woodrat.

Effects of Mining

San Francisco dusky-footed woodrat, a California species of special concern, is known to nest in vegetated areas of the Permanente property and has potential to nest or otherwise occur in oak/woodland forest, scrub, and chaparral habitats in the Study Area. Vegetation removal and grading associated with initial site preparation and mining activities in wooded and scrub/chaparral habitats could directly impact dusky-footed woodrats. Direct impacts associated with mining could include injury or mortality of adults or young, as well as destruction of woodrat stick nests. Indirect impacts to dusky-footed woodrat associated with mining could include increased night time lighting, noise or other mining-related disturbances that result in nest abandonment.

Because extensive areas of oak woodland/forest, scrub, and chaparral habitats are present on other portions of the Permanente property and in adjacent and nearby undeveloped lands, habitat loss associated with mining in the Rock Plant Reserve area is not anticipated to have a substantial adverse effect on the overall population or distribution of San Francisco dusky-footed woodrat. However, potential mortality of adults and young could have a substantial adverse effect, and mining activities that directly or indirectly cause mortality would be considered a significant effect of mining.

Effects of Reclamation

Activities associated with reclamation of the Rock Plant Reserve would include soil placement and revegetation of benched areas and the floor of the mined area. No new areas of vegetation clearing would be required for reclamation, and reclamation would reestablish vegetation, including shrubs and trees that would mature over time and provide potential habitat for dusky-footed woodrat. The impact of reclamation activities is considered potentially significant because of the potential for reclamation activities to cause woodrat mortality.

Recommended Measures for Impact 3

Preconstruction surveys in suitable habitat should be conducted to identify the presence of any dusky-footed woodrat stick nests and, if identified, such nests should be relocated under supervision of a qualified biologist. In the event that young woodrats are identified within the nests, the nest should be left undisturbed to allow sufficient time (up to approximately 3 weeks) for young to mature and leave the nest. Measures similar to those established in 2012 Conditions of Approval 53 and 54 would ensure potential impacts to San Francisco dusky-footed woodrat are sufficiently mitigated.

Impact 4: Mining and reclamation activities associated with the Rock Plant Reserve could result in adverse effects on special-status amphibians.

Effects of Mining

Four special-status amphibian species have the potential to occur within the Study Area: Santa Cruz black salamander, California giant salamander, red-bellied newt, and California red-legged frog. All of these species are California species of special concern, and California red-legged frog is federally listed as threatened. All four species have moderate potential to occur in moist oak woodland/forest and aquatic habitats in the Study Area, but Santa Cruz black salamander is the only species with moderate potential to breed in the Study Area. The seasonal wetland could provide marginally suitable breeding habitat for California red-legged frog and low potential for this species to breed in the Study Area in years of high rainfall. California giant salamander and red-bellied newt are unlikely to breed in the Study Area.

Mining oak woodland/forest areas of the Rock Plant Reserve that are sufficiently moist to provide suitable habitat for Santa Cruz black salamander, California giant salamander, red-bellied newt, and California red-legged frog would reduce the amount of habitat available for these species. If any of these species is present in the disturbance area when vegetation removal and other initial ground disturbance activities occur, they could be injured or killed by these activities without appropriate protections. In addition, potential indirect effects on water quality in downstream aquatic habitat and disturbance of adjacent upland habitats (e.g., noise and vibration) could impact the health and behavior of these four species. Because extensive areas of similar woodland/forest habitat and more suitable aquatic habitat are present in other portions of the Permanente property, as well as adjacent and nearby undeveloped lands

(primarily to the west), loss of potentially suitable upland and ephemeral aquatic habitat in the Study Area for Santa Cruz black salamander, California giant salamander, red-bellied newt, and California red-legged frog is not anticipated to have a substantial adverse effect on their local populations. Because Santa Cruz black salamanders do not breed colonially (i.e., within groups), and California giant salamander and red-bellied newt are unlikely to breed in the Study Area, relatively few individuals of these species are anticipated to be affected by mining operations, and their local populations are not anticipated to be substantially affected. However, because California red-legged frog is more imperiled, impacts to even a small number of individuals of this species would be considered a significant effect of mining.

Effects of Reclamation

Activities associated with reclamation of the Rock Plant Reserve would include soil placement and revegetation of benched areas and the floor of the mined area. No new areas of vegetation clearing would be required for reclamation, and reclamation would reestablish vegetation. The previously disturbed areas would not provide suitable breeding habitat or adequately moist habitat for regular use by Santa Cruz black salamander, California giant salamander, red-bellied newt, and these species are very unlikely to occur in the disturbance area and be affected by reclamation activities. California red-legged frog is also unlikely to occur in the reclamation area, but this potential cannot be entirely ruled out, because the species has been found in sedimentation ponds surrounded by seemingly unsuitable habitat elsewhere on the Permanente property. Although potential to impact California red-legged frog would be substantially less during active reclamation than mining, the impact of reclamation activities is considered potentially significant, because of the potential to adversely affect California red-legged frog.

Recommended Measures for Impact 4

To minimize disturbance to dispersing or foraging California red-legged frog, initial site preparation should be conducted during the dry season, generally between May 1 and October 15, and should not occur during rain events. Pre-construction surveys for California red-legged frog should be conducted and exclusion fencing should be installed before initial site preparation in aquatic habitat and immediately adjacent upland habitat. If California red-legged frog are observed in the disturbance area, they should be removed from the area by a USFWS-permitted biologist and relocated to nearby suitable habitat outside the disturbance area. Exclusion fencing should be maintained throughout mining and reclamation activities as necessary to ensure California red-legged frog do not entire active work areas.

Impact 5: Mining and reclamation activities associated with the Rock Plant Reserve could result in selenium-burdened runoff reaching aquatic habitats and, thereby, in deleterious effects to aquatic organisms and their prey base.

Effects of Mining

Selenium is a bio-accumulative pollutant and potential aquatic species exposure to selenium is primarily through their diet. Risks stem from aquatic life eating food that is contaminated with selenium, rather than from direct exposure to selenium in the water. Although selenium accumulates in tissues of aquatic organisms, concentrations of selenium do not increase significantly in animals at each level of the food chain. For aquatic life, the toxic effects with the lowest thresholds are effects on the growth and survival of juvenile fish and effects on larval offspring of adult fish that were exposed to excessive selenium. In the latter case, besides reducing survival, selenium causes skeletal deformities. Selenium can also be a risk to birds that eat aquatic organisms that have been exposed to selenium.

If certain types of limestone are exposed to air and precipitation, selenium could be released and contained in runoff from mined surfaces. If stormwater runoff or groundwater seepage runoff containing selenium discharges to adjacent drainages, it would create the potential for significant adverse impacts to aquatic habitat. Potential indirect effects to amphibian species associated with stormwater runoff quality from exposed limestone areas during mining could occur if such runoff were to be discharged without appropriate treatment. Mining within the Rock Plant Reserve would span approximately 10 years. During that time, active ground disturbance would occur as a result of excavation and could expose stormwater runoff to exposed limestone. Stormwater runoff or groundwater seepage runoff within the Rock Plant Reserve area could contain elevated levels of selenium, however, all such runoff will be directed to collect at the quarry floor and conveyed to onsite treatment facilities. Lehigh has installed and operates a water treatment system to treat runoff water prior to discharge to Permanente Creek. The treatment system reduces concentrations of selenium discharged to levels below the surface water quality standard of 5 µg/L (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) and below the more stringent discharge requirements set forth in the Permanente Quarry individual National Pollutant Discharge Elimination System (NPDES) permit (Golder, 2019). Groundwater seepage and storm water runoff from the Rock Plant Reserve during operations will be managed and treated as process water in the existing water treatment system. This water will be returned to Permanente Creek only after being treated, eliminating the potential for water quality effects on aquatic resources associated with potential selenium runoff during mining.

Effects of Reclamation

Inflows to the Rock Plant Reserve during and following reclamation will include direct precipitation and groundwater inflow. Storm water from the upper portion of the drainage will be diverted from entering the Rock Plant Reserve reclamation area. The Rock Plant Reserve slopes will be primarily comprised of greenstone and, thus, would have lower potential for mobilization of sulfide minerals and sulfide oxidation weathering products (source of sulfate and metals, including selenium) following reclamation. As the surfaces of the Rock Plant Reserve are reclaimed, the quality of surface runoff from storm water and groundwater is expected to improve to level which meet water quality objectives (e.g., selenium less than 5 µg/L) (Golder 2019). The water will continue to be managed and treated under an NPDES permit prior to discharging to Permanente Creek until water quality objectives are met and active treatment is no longer required, eliminating the potential for water quality effects on aquatic resources associated with potential selenium runoff under reclaimed conditions.

Recommended Measures for Impact 5

Impact 5 is considered less than significant, and no mitigation is required.

(b) Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations by the CDFW or USFWS?

Potential effects on sensitive natural communities identified by CDFW and oak woodland protected by County policy are discussed below. Potential impacts to wetlands are considered under **(c)**.

Impact 6: Mining and reclamation activities associated with the Rock Plant Reserve could result in the loss of willow riparian forest/scrub.

Effects of Mining

As shown in Figure 2 and presented in Table 1, a small (0.14-acre) area of willow forest/scrub habitat is present at the eastern edge of the Study Area, adjacent to existing active Quarry operations. Initial site preparation and mining could remove less than half of this small habitat patch (0.06 acre), which is within the Rock Plant Reserve disturbance area. It is important to note that this loss of willow forest/scrub would result from mining in an area within which Lehigh has a vested right to mine. In addition, the Lehigh property supports more than 25 acres of riparian habitat, and loss of this very small fraction of existing riparian habitat during mining activities would not have a substantial adverse effect on the overall riparian habitat availability or quality of the Permanente property or larger surrounding area.

Effects of Reclamation

Activities associated with reclamation of the Rock Plant Reserve would include soil placement and revegetation of benched areas and the floor of the mined area. No new areas of vegetation clearing would be required for reclamation. Therefore, no loss of willow riparian habitat would occur during reclamation, and this impact would be less than significant.

Recommended Measures for Impact 6

Impact 6 is considered less than significant, and no mitigation is required.

Impact 7: Mining and reclamation activities associated with the Rock Plant Reserve could result in the loss of native oak woodland.

Effects of Mining

As shown in Figure 2 and presented in Table 1, approximately 32 acres of oak woodland/forest is present in the Study Area. Site preparation and mining would remove approximately 14 acres of oak woodland/forest habitat within the planned disturbance area.[4]

In addition to the direct loss of oak woodland/forest, vegetation clearing and soil movement associated with mining in the Rock Plant Reserve area could introduce non-native plant species that outcompete native oak trees or introduce Sudden Oak Death into adjacent or other oak woodland/forest. Sudden Oak Death is caused by *Phytophthora ramorum*, an invasive water mold of unknown origin. This pathogen produces small sacs (sporangia) of swimming spores that readily break off and can spread in rain splash, drip, stem flow, wind, and by contaminated materials. Sudden Oak Death has killed millions of trees since it first became evident in the mid-1990s, and has resulted in reduced ecosystem functions, increased fire and safety hazards, and reduced property values in developed areas (BLM 2009). Focused surveys for sudden oak death have not been conducted on the Permanente property; however, sudden oak death is assumed to occur on the property, due to the close proximity of known infected areas (WRA 2011). Humans and construction equipment working in areas that are infected with Sudden Oak Death could spread this disease to non-infected areas on the Permanente property and surrounding areas. Common host species known or with potential to occur on or near the Study Area include coast live oak, madrone, and manzanita. Introduction of non-native species or Sudden Oak Death into healthy oak

[4] The County's *Guide to Evaluating Oak Woodlands Impacts* is a guide for compliance with CEQA as relates to oak woodlands impacts. Since mining the Rock Plant Reserve is not a component of the project to be evaluated under CEQA, the guide requirements do not apply to oak impacts associated with mining the Rock Plant Reserve.

woodland as a result of contaminated site preparation or mining equipment would have a substantial adverse effect on oak woodland and is considered a potentially significant impact associated with mining.

Effects of Reclamation

Activities associated with reclamation of the Rock Plant Reserve would include soil placement and revegetation of benched areas and the floor of the mined area. No oak tree removal would be required for reclamation, and reclamation would reestablish vegetation, including oak trees that would mature over time. Oak tree plantings in the Rock Plant Reserve area would comprise approximately 3 acres of the revegetation area. Further, reclamation of the Permanente Quarry site under the proposed reclamation plan amendment and associated revegetation plan would establish over 27 acres of oak woodland with oak trees planted at densities of 200 to 470 trees per acre depending on soils conditions. Although no oak trees would be removed, reclamation would have potential to introduce non-native species or Sudden Oak Death into adjacent oak woodland/forest or to oak trees planted in the Rock Plant Reserve area as part of the reclamation process. Such introduction during reclamation could have a substantial adverse effect on oak woodland and is considered a potentially significant impact.

Recommended Measures for Impact 7

Measures should be implemented to minimize the potential for import, export, or onsite movement of any vegetation or soils having the potential to introduce or spread *Phytophthora ramorum* spores. Measures similar to those established in 2012 Conditions of Approval 55 and 56 would ensure potential impacts associated with Sudden Oak Death are sufficiently mitigated.

(c) Would the Project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Impact 8: Project activities could result in substantial adverse effects on wetlands and jurisdictional waters associated with Permanente Creek through direct removal, filling, hydrological interruption, or other means.

Effects of Mining

Direct Impacts

As shown in Figure 2, four ephemeral drainages and one isolated seasonal wetland are present in the Study Area. The ephemeral drainage in the northern portion of the Study Area is a federally protected water of the United States; however, this feature does not overlap the disturbance area and would not be directly impacted. The remaining three drainages and the seasonal wetland are state-protected waters of the State, and CDFW is anticipated to assert jurisdiction over the drainages under FGC Section 1602. The entire seasonal wetland and portions of the three ephemeral drainages are within the disturbance area and would be removed by mining activities. It is important to note that this loss of state-protected features would result from mining in an area within which Lehigh has a vested right to mine. Thus, while the loss of state-protected features associated with mining the Rock Plant Reserve area is noted here for the purposes of full disclosure, both the authority to impose mitigation requirements and the need for such mitigation are outside the scope of the Biological Resources Report and should be

addressed separately through discussions between Lehigh and the San Francisco Bay RWQCB and CDFW.

Indirect Impacts

Impacts to water quality or alterations to flow as a result of mining activities could adversely affect state-protected waters downstream of the Rock Plant Reserve area. Impacts could include fluctuations in groundwater flows and water quality degradation resulting from discharge and surface water runoff. It is important to note that these potential impacts would result from mining in an area within which Lehigh has a vested right to mine. Thus, while potential for indirect impact on state-protected features associated with mining the Rock Plant Reserve area is noted here for the purposes of full disclosure, both the authority to impose mitigation requirements and the need for such mitigation are outside the scope of the Biological Resources Report and should be addressed separately through discussions between Lehigh and the San Francisco Bay RWQCB and CDFW.

Effects of Reclamation

Activities associated with reclamation of the Rock Plant Reserve would include soil placement and revegetation of benched areas and the floor of the mined area. No removal, fill, or hydrologic interruption of state or federally protected wetlands would occur during reclamation. However, material placement and other potential ground disturbance could result in discharge and surface water runoff that degrades protected waters located downstream. Such water quality degradation during reclamation could result in adverse indirect effects on jurisdictional waters. However, as discussed at Impact 5, runoff from the Rock Plant Reserve area will be captured and treated during reclamation activities. As the surfaces of the Rock Plant Reserve are reclaimed, the quality of surface runoff from storm water and groundwater is expected to improve to levels which meet water quality objectives (Golder 2019). The water will continue to be managed and treated under an NPDES permit prior to discharging to Permanente Creek until water quality objectives are met, eliminating the potential for water quality effects on jurisdiction waters under reclaimed conditions. Therefore, this impact is considered less than significant.

Recommended Measures for Impact 8

Impact 8 is considered less than significant, and no mitigation is required.

(d) Would the Project have a substantial adverse effect on oak woodland habitat as defined by Oak Woodlands Conservation Law (conservation/loss of oak woodlands) – Pub. Res. Code §21083.4?

See discussion under **(b)**, **Impact 7**.

(e) Would the Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The Study Area does not specifically serve as a wildlife corridor, although terrestrial wildlife is likely to travel through the area. Aquatic animals may travel along the ephemeral drainages when water is present, but these features are not major migratory corridors or fish movement corridors. Potential effects of mining and reclamation on terrestrial wildlife movement through the Study Area are discussed

below. Potential impacts to nursery sites associated with nesting birds and bat maternity roosts are considered under **(a)**, **Impact 1** and **Impact 2.**

Impact 9: Mining and reclamation activities would not interfere substantially with fish or wildlife movement.

Effects of Mining

The Study Area is part of a much larger extent of woodland/forest, scrub, and chaparral habitats and does not serve as an established corridor or other primary route for wildlife movement. Animals are likely to travel through the Study Area, and movement may be somewhat concentrated along the ephemeral drainages, but these features are not major migratory corridors and do not support fish movement. Therefore, although initial site preparation for mining within the Rock Plant Reserve area would remove habitat through which animals may currently travel, abundant and equally suitable habitat is immediately adjacent to the disturbance area and larger study area, and such modifications would not substantially interfere with the movement of any wildlife species or with use of an established wildlife corridor.

Effects of Reclamation

Activities associated with reclamation of the Rock Plant Reserve would include soil placement and revegetation of benched areas and the floor of the mined area. Compared to mining activities, these reclamation activities would be less intensive in terms of equipment operation, materials movement, etc. No new areas of vegetation clearing would be required for reclamation, and reclamation would reestablish vegetation, including shrubs and trees that would mature over time and provide cover for wildlife movement. In a broader context, habitats on the Permanente property (both existing and to be established with reclamation of other Quarry areas) provide large amounts of forest/woodland, scrub, chaparral, and other habitats that serve as a general corridor for wildlife travel. Localized and small reductions in vegetation cover during mining of the Rock Plant Reserve would be compensated for by the substantial increases in wildlife habitat upon final reclamation of this and other areas of the Permanente Quarry, which would greatly increase wildlife movement opportunities within and through the Permanente property. Therefore, this impact would be less than significant.

Recommended Measures for Impact 9

Impact 9 is considered less than significant, and no mitigation is required.

f) Would the Project conflict with the provisions of any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Impact 10: Mining and reclamation activities would not conflict with the provisions of any adopted habitat conservation plan.

The Rock Plant Reserve is not within an area covered by an adopted Habitat Conservation Plan or Natural Community Conservation Plan. The northwest boundary of the Santa Clara Valley Habitat Plan study area/permit area is several miles east of the Permanente property. Neither mining nor reclamation of the Rock Plant reserve would conflict with any provisions, guidelines, goals, or objectives related to the plan.

g) Would the Project conflict with local Santa Clara County policies protecting biological resources?

This evaluation does not identify inconsistencies with Santa Clara County General Plan policies, including those listed the Regulatory Setting section above. General Plan consistency is ultimately a determination to be made by County decision makers.

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Appendix A. Special-status Species Query Results

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Cupertino (3712231) OR Mindego Hill (3712232) OR Palo Alto (3712242) OR Big Basin (3712222) OR Castle Rock Ridge (3712221) OR Los Gatos (3712128) OR San Jose West (3712138) OR Milpitas (3712148) OR Mountain View (3712241))
 AND Elevation IS greater than OR equal to "300"

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Allium peninsulare var. franciscanum Franciscan onion	PMLIL021R1	None	None	G5T2	S2	1B.2
Ambystoma californiense California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3	WL
Amsinckia lunaris bent-flowered fiddleneck	PDBOR01070	None	None	G3	S3	1B.2
Aneides flavipunctatus niger Santa Cruz black salamander	AAAAD01070	None	None	G3	S3	SSC
Antrozous pallidus pallid bat	AMACC10010	None	None	G5	S3	SSC
Aquila chrysaetos golden eagle	ABNKC22010	None	None	G5	S3	FP
Arctostaphylos andersonii Anderson's manzanita	PDERI04030	None	None	G2	S2	1B.2
Arctostaphylos glutinosa Schreiber's manzanita	PDERI040G0	None	None	G1	S1	1B.2
Arctostaphylos ohloneana Ohlone manzanita	PDERI042Y0	None	None	G1	S1	1B.1
Arctostaphylos regismontana Kings Mountain manzanita	PDERI041C0	None	None	G2	S2	1B.2
Arctostaphylos silvicola Bonny Doon manzanita	PDERI041F0	None	None	G1	S1	1B.2
Asio otus long-eared owl	ABNSB13010	None	None	G5	S3?	SSC
Bombus caliginosus obscure bumble bee	IIHYM24380	None	None	G4?	S1S2	
Bombus occidentalis western bumble bee	IIHYM24250	None	None	G2G3	S1	
Brachyramphus marmoratus marbled murrelet	ABNNN06010	Threatened	Endangered	G3G4	S1	
Calasellus californicus An isopod	ICMAL34010	None	None	G2	S2	
Calyptridium parryi var. hesseae Santa Cruz Mountains pussypaws	PDPOR09052	None	None	G3G4T2	S2	1B.1
Chorizanthe pungens var. hartwegiana Ben Lomond spineflower	PDPGN040M1	Endangered	None	G2T1	S1	1B.1

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Chorizanthe robusta var. robusta robust spineflower	PDPGN040Q2	Endangered	None	G2T1	S1	1B.1
Cirsium fontinale var. campylon Mt. Hamilton fountain thistle	PDAST2E163	None	None	G2T2	S2	1B.2
Cirsium fontinale var. fontinale Crystal Springs fountain thistle	PDAST2E161	Endangered	Endangered	G2T1	S1	1B.1
Clarkia concinna ssp. automixa Santa Clara red ribbons	PDONA050A1	None	None	G5?T3	S3	4.3
Corynorhinus townsendii Townsend's big-eared bat	AMACC08010	None	None	G3G4	S2	SSC
Dicamptodon ensatus California giant salamander	AAAAH01020	None	None	G3	S2S3	SSC
Dipodomys venustus venustus Santa Cruz kangaroo rat	AMAFD03042	None	None	G4T1	S1	
Dirca occidentalis western leatherwood	PDTHY03010	None	None	G2	S2	1B.2
Dudleya abramsii ssp. setchellii Santa Clara Valley dudleya	PDCRA040Z0	Endangered	None	G4T2	S2	1B.1
Elanus leucurus white-tailed kite	ABNKC06010	None	None	G5	S3S4	FP
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Erethizon dorsatum North American porcupine	AMAFJ01010	None	None	G5	S3	
Eriophyllum latilobum San Mateo woolly sunflower	PDAST3N060	Endangered	Endangered	G1	S1	1B.1
Eryngium jepsonii Jepson's coyote-thistle	PDAPI0Z130	None	None	G2	S2	1B.2
Euphydryas editha bayensis Bay checkerspot butterfly	IILEPK4055	Threatened	None	G5T1	S1	
Falco peregrinus anatum American peregrine falcon	ABNKD06071	Delisted	Delisted	G4T4	S3S4	FP
Fritillaria liliacea fragrant fritillary	PMLIL0V0C0	None	None	G2	S2	1B.2
Geothlypis trichas sinuosa saltmarsh common yellowthroat	ABPBX1201A	None	None	G5T3	S3	SSC
Grimmia torenii Toren's grimmia	NBMUS32330	None	None	G2	S2	1B.3
Grimmia vaginulata vaginulate grimmia	NBMUS32340	None	None	G2G3	S1	1B.1
Haliaeetus leucocephalus bald eagle	ABNKC10010	Delisted	Endangered	G5	S3	FP

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Hesperevax sparsiflora var. brevifolia short-leaved evax	PDASTE5011	None	None	G4T3	S2	1B.2
Hesperocyparis abramsiana var. abramsiana Santa Cruz cypress	PGCUP04081	Threatened	Endangered	G1T1	S1	1B.2
Hesperocyparis abramsiana var. butanoensis Butano Ridge cypress	PGCUP04082	Threatened	Endangered	G1T1	S1	1B.2
Hesperolinon congestum Marin western flax	PDLIN01060	Threatened	Threatened	G1	S1	1B.1
Hoita strobilina Loma Prieta hoita	PDFAB5Z030	None	None	G2?	S2?	1B.1
Legenere limosa legenere	PDCAM0C010	None	None	G2	S2	1B.1
Lessingia micradenia var. glabrata smooth lessingia	PDAST5S062	None	None	G2T2	S2	1B.2
Malacothamnus arcuatus arcuate bush-mallow	PDMAL0Q0E0	None	None	G2Q	S2	1B.2
Monolopia gracilens woodland woollythreads	PDAST6G010	None	None	G3	S3	1B.2
Myotis yumanensis Yuma myotis	AMACC01020	None	None	G5	S4	
North Central Coast Drainage Sacramento Sucker/Roach River North Central Coast Drainage Sacramento Sucker/Roach River	CARA2623CA	None	None	GNR	SNR	
Northern Interior Cypress Forest Northern Interior Cypress Forest	CTT83220CA	None	None	G2	S2.2	
Oncorhynchus kisutch pop. 4 coho salmon - central California coast ESU	AFCHA02034	Endangered	Endangered	G4	S2?	
Oncorhynchus mykiss irideus pop. 8 steelhead - central California coast DPS	AFCHA0209G	Threatened	None	G5T2T3Q	S2S3	
Orthotrichum kellmanii Kellman's bristle moss	NBMUS56190	None	None	G2	S2	1B.2
Pandion haliaetus osprey	ABNKC01010	None	None	G5	S4	WL
Pedicularis dudleyi Dudley's lousewort	PDSCR1K0D0	None	Rare	G2	S2	1B.2
Penstemon rattanii var. kleei Santa Cruz Mountains beardtongue	PDSCR1L5B1	None	None	G4T2	S2	1B.2
Pentachaeta bellidiflora white-rayed pentachaeta	PDAST6X030	Endangered	Endangered	G1	S1	1B.1
Piperia candida white-flowered rein orchid	PMORC1X050	None	None	G3	S3	1B.2
Plagiobothrys chorisianus var. chorisianus Choris' popcornflower	PDBOR0V061	None	None	G3T1Q	S1	1B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Plagiobothrys glaber hairless popcornflower	PDBOR0V0B0	None	None	GH	SH	1A
Progne subis purple martin	ABPAU01010	None	None	G5	S3	SSC
Rana boylii foothill yellow-legged frog	AAABH01050	None	Candidate Threatened	G3	S3	SSC
Rana draytonii California red-legged frog	AAABH01022	Threatened	None	G2G3	S2S3	SSC
Senecio aphanactis chaparral ragwort	PDAST8H060	None	None	G3	S2	2B.2
Serpentine Bunchgrass Serpentine Bunchgrass	CTT42130CA	None	None	G2	S2.2	
Speyeria adiaste adiaste unsilvered fritillary	IILEPJ6143	None	None	G1G2T1	S1	
Streptanthus albidus ssp. peramoenus most beautiful jewelflower	PDBRA2G012	None	None	G2T2	S2	1B.2
Taricha rivularis red-bellied newt	AAAAF02020	None	None	G4	S2	SSC
Thamnophis sirtalis tetrataenia San Francisco gartersnake	ARADB3613B	Endangered	Endangered	G5T2Q	S2	FP
Trifolium buckwestiorum Santa Cruz clover	PDFAB402W0	None	None	G2	S2	1B.1
Trimerotropis infantilis Zayante band-winged grasshopper	IIORT36030	Endangered	None	G1	S1	
Usnea longissima Methuselah's beard lichen	NLLEC5P420	None	None	G4	S4	4.2

Record Count: 73

CNPS California Native Plant Society

Plant List

Inventory of Rare and Endangered Plants

75 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3712242, 3712241, 3712148, 3712232, 3712231, 3712138, 3712222, 3712221 and 3712128; Elevation is above 300 feet

Modify Search Criteria | Export to Excel | Modify Columns | Modify Sort | Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Acanthomintha duttonii	San Mateo thorn-mint	Lamiaceae	annual herb	Apr-Jun	1B.1	S1	G1
Allium peninsulare var. franciscanum	Franciscan onion	Alliaceae	perennial bulbiferous herb	(Apr)May-Jun	1B.2	S1	G5T1
Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	annual herb	Mar-Jun	1B.2	S2S3	G2G3
Androsace elongata ssp. acuta	California androsace	Primulaceae	annual herb	Mar-Jun	4.2	S3S4	G5? T3T4
Anomobryum julaceum	slender silver moss	Bryaceae	moss		4.2	S2	G5?
Arabis blepharophylla	coast rockcress	Brassicaceae	perennial herb	Feb-May	4.3	S4	G4
Arctostaphylos andersonii	Anderson's manzanita	Ericaceae	perennial evergreen shrub	Nov-May	1B.2	S2	G2
Arctostaphylos glutinosa	Schreiber's manzanita	Ericaceae	perennial evergreen shrub	(Nov)Mar-Apr	1B.2	S1	G1
Arctostaphylos ohloneana	Ohlone manzanita	Ericaceae	evergreen shrub	Feb-Mar	1B.1	S1	G1
Arctostaphylos regismontana	Kings Mountain manzanita	Ericaceae	perennial evergreen shrub	Dec-Apr	1B.2	S2	G2
Arctostaphylos silvicola	Bonny Doon manzanita	Ericaceae	perennial evergreen shrub	Jan-Mar	1B.2	S1	G1
Atriplex depressa	brittlescale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
Atriplex minuscula	lesser saltscale	Chenopodiaceae	annual herb	May-Oct	1B.1	S2	G2
Calandrinia breweri	Brewer's calandrinia	Montiaceae	annual herb	(Jan)Mar-Jun	4.2	S4	G4
Calyptridium parryi var. hesseae	Santa Cruz Mountains pussypaws	Montiaceae	annual herb	May-Aug	1B.1	S2	G3G4T2
Centromadia parryi ssp. congdonii	Congdon's tarplant	Asteraceae	annual herb	May-Oct(Nov)	1B.1	S2	G3T2
Chorizanthe pungens var. hartwegiana	Ben Lomond spineflower	Polygonaceae	annual herb	Apr-Jul	1B.1	S1	G2T1
Chorizanthe robusta var. robusta	robust spineflower	Polygonaceae	annual herb	Apr-Sep	1B.1	S1	G2T1
	Mt. Hamilton fountain	Asteraceae	perennial herb	(Feb)Apr-	1B.2	S2	G2T2

Cirsium fontinale var. campylon	thistle			Oct			
Cirsium fontinale var. fontinale	Crystal Springs fountain thistle	Asteraceae	perennial herb	(Apr)May-Oct	1B.1	S1	G2T1
Cirsium praeteriens	lost thistle	Asteraceae	perennial herb	Jun-Jul	1A	SX	GX
Clarkia breweri	Brewer's clarkia	Onagraceae	annual herb	Apr-Jun	4.2	S4	G4
Clarkia concinna ssp. automixa	Santa Clara red ribbons	Onagraceae	annual herb	(Apr)May-Jun(Jul)	4.3	S3	G5?T3
Clarkia lewisii	Lewis' clarkia	Onagraceae	annual herb	May-Jul	4.3	S4	G4
Collinsia multicolor	San Francisco collinsia	Plantaginaceae	annual herb	(Feb)Mar-May	1B.2	S2	G2
Cypripedium fasciculatum	clustered lady's-slipper	Orchidaceae	perennial rhizomatous herb	Mar-Aug	4.2	S4	G4
Dirca occidentalis	western leatherwood	Thymelaeaceae	perennial deciduous shrub	Jan-Mar(Apr)	1B.2	S2	G2
Dudleya abramsii ssp. setchellii	Santa Clara Valley dudleya	Crassulaceae	perennial herb	Apr-Oct	1B.1	S2	G4T2
Eriogonum nudum var. decurrens	Ben Lomond buckwheat	Polygonaceae	perennial herb	Jun-Oct	1B.1	S1	G5T1
Eriophyllum latilobum	San Mateo woolly sunflower	Asteraceae	perennial herb	May-Jun	1B.1	S1	G1
Eryngium jepsonii	Jepson's coyote thistle	Apiaceae	perennial herb	Apr-Aug	1B.2	S2?	G2?
Extriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
Fissidens pauperculus	minute pocket moss	Fissidentaceae	moss		1B.2	S2	G3?
Fritillaria liliacea	fragrant fritillary	Liliaceae	perennial bulbiferous herb	Feb-Apr	1B.2	S2	G2
Galium andrewsii ssp. gatense	phlox-leaf serpentine bedstraw	Rubiaceae	perennial herb	Apr-Jul	4.2	S3	G5T3
Grimmia torenii	Toren's grimmia	Grimmiaceae	moss		1B.3	S2	G2
Grimmia vaginulata	vaginulate grimmia	Grimmiaceae	moss		1B.1	S1	G2G3
Hesperevax sparsiflora var. brevifolia	short-leaved evax	Asteraceae	annual herb	Mar-Jun	1B.2	S2	G4T3
Hesperocyparis abramsiana var. abramsiana	Santa Cruz cypress	Cupressaceae	perennial evergreen tree		1B.2	S1	G1T1
Hesperocyparis abramsiana var. butanoensis	Butano Ridge cypress	Cupressaceae	perennial evergreen tree	Oct	1B.2	S1	G1T1
Hesperolinon congestum	Marin western flax	Linaceae	annual herb	Apr-Jul	1B.1	S1	G1
Hoita strobilina	Loma Prieta hoita	Fabaceae	perennial herb	May-Jul(Aug-Oct)	1B.1	S2	G2
Iris longipetala	coast iris	Iridaceae	perennial rhizomatous herb	Mar-May	4.2	S3	G3
Lasthenia conjugens	Contra Costa goldfields	Asteraceae	annual herb	Mar-Jun	1B.1	S1	G1
Legenere limosa	legenere	Campanulaceae	annual herb	Apr-Jun	1B.1	S2	G2
Leptosiphon ambiguus	serpentine	Polemoniaceae	annual herb	Mar-Jun	4.2	S4	G4

	leptosiphon						
Lessingia hololeuca	woolly-headed lessingia	Asteraceae	annual herb	Jun-Oct	3	S3?	G3?
Lessingia micradenia var. glabrata	smooth lessingia	Asteraceae	annual herb	(Apr-Jun)Jul-Nov	1B.2	S2	G2T2
Malacothamnus arcuatus	arcuate bush-mallow	Malvaceae	perennial evergreen shrub	Apr-Sep	1B.2	S2	G2Q
Malacothamnus davidsonii	Davidson's bush-mallow	Malvaceae	perennial deciduous shrub	Jun-Jan	1B.2	S2	G2
Malacothamnus hallii	Hall's bush-mallow	Malvaceae	perennial evergreen shrub	(Apr)May-Sep(Oct)	1B.2	S2	G2
Micropus amphibolus	Mt. Diablo cottonweed	Asteraceae	annual herb	Mar-May	3.2	S3S4	G3G4
Monolopia gracilens	woodland woolythreads	Asteraceae	annual herb	(Feb)Mar-Jul	1B.2	S3	G3
Navarretia prostrata	prostrate vernal pool navarretia	Polemoniaceae	annual herb	Apr-Jul	1B.1	S2	G2
Orthotrichum kellmanii	Kellman's bristle moss	Orthotrichaceae	moss	Jan-Feb	1B.2	S2	G2
Pedicularis dudleyi	Dudley's lousewort	Orobanchaceae	perennial herb	Apr-Jun	1B.2	S2	G2
Penstemon rattanii var. kleei	Santa Cruz Mountains beardtongue	Plantaginaceae	perennial herb	May-Jun	1B.2	S2	G4T2
Pentachaeta bellidiflora	white-rayed pentachaeta	Asteraceae	annual herb	Mar-May	1B.1	S1	G1
Piperia candida	white-flowered rein orchid	Orchidaceae	perennial herb	(Mar)May-Sep	1B.2	S3	G3
Plagiobothrys chorisianus var. chorisianus	Choris' popcornflower	Boraginaceae	annual herb	Mar-Jun	1B.2	S2	G3T2Q
Plagiobothrys chorisianus var. hickmanii	Hickman's popcornflower	Boraginaceae	annual herb	Apr-Jun	4.2	S3	G3T3Q
Plagiobothrys glaber	hairless popcornflower	Boraginaceae	annual herb	Mar-May	1A	SH	GH
Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3
Ranunculus lobbii	Lobb's aquatic buttercup	Ranunculaceae	annual herb (aquatic)	Feb-May	4.2	S3	G4
Senecio aphanactis	chaparral ragwort	Asteraceae	annual herb	Jan-Apr(May)	2B.2	S2	G3
Silene verecunda ssp. verecunda	San Francisco campion	Caryophyllaceae	perennial herb	(Feb)Mar-Jun(Aug)	1B.2	S1	G5T1
Stebbinsoseris decipiens	Santa Cruz microseris	Asteraceae	annual herb	Apr-May	1B.2	S2	G2
Streptanthus albidus ssp. albidus	Metcalf Canyon jewelflower	Brassicaceae	annual herb	Apr-Jul	1B.1	S1	G2T1
Streptanthus albidus ssp. peramoenus	most beautiful jewelflower	Brassicaceae	annual herb	(Mar)Apr-Sep(Oct)	1B.2	S2	G2T2
Stuckenia filiformis ssp. alpina	slender-leaved pondweed	Potamogetonaceae	perennial rhizomatous herb (aquatic)	May-Jul	2B.2	S3	G5T5
Trifolium amoenum	two-fork clover	Fabaceae	annual herb	Apr-Jun	1B.1	S1	G1
Trifolium buckwestiorum	Santa Cruz clover	Fabaceae	annual herb	Apr-Oct	1B.1	S2	G2

Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	1B.2	S2	G2
Tropidocarpum capparideum	caper-fruited tropidocarpum	Brassicaceae	annual herb	Mar-Apr	1B.1	S1	G1
Usnea longissima	Methuselah's beard lichen	Parmeliaceae	fruticose lichen (epiphytic)		4.2	S4	G4

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IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Santa Clara County, California



Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS

California Clapper Rail Rallus longirostris obsoletus — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/4240

California Least Tern Sterna antillarum browni — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/8104

Marbled Murrelet Brachyramphus marmoratus — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/4467

Amphibians

NAME	STATUS

California Red-legged Frog Rana draytonii — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/2891

California Tiger Salamander Ambystoma californiense — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/2076

Fishes

NAME	STATUS

Delta Smelt Hypomesus transpacificus — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/321

Insects

NAME	STATUS

Bay Checkerspot Butterfly Euphydryas editha bayensis — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/2320

San Bruno Elfin Butterfly Callophrys mossii bayensis — Endangered
There is **proposed** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/3394

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Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

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BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Allen's Hummingbird Selasphorus sasin — Breeds Feb 1 to Jul 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9637

Bald Eagle Haliaeetus leucocephalus — Breeds Jan 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Black Skimmer Rynchops niger — Breeds May 20 to Sep 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5234

Black Swift Cypseloides niger — Breeds Jun 15 to Sep 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8878

Burrowing Owl Athene cunicularia — Breeds Mar 15 to Aug 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9737

Clark's Grebe Aechmophorus clarkii — Breeds Jan 1 to Dec 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

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Common Yellowthroat Geothlypis trichas sinuosa — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Lawrence's Goldfinch Carduelis lawrencei — Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Lewis's Woodpecker Melanerpes lewis — Breeds Apr 20 to Sep 30
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9408

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

Rufous Hummingbird selasphorus rufus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Song Sparrow Melospiza melodia — Breeds Feb 20 to Sep 5
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Spotted Towhee Pipilo maculatus clementae — Breeds Apr 15 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/4243

NOT FOR CONSULTATION

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910

Wrentit Chamaea fasciata — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

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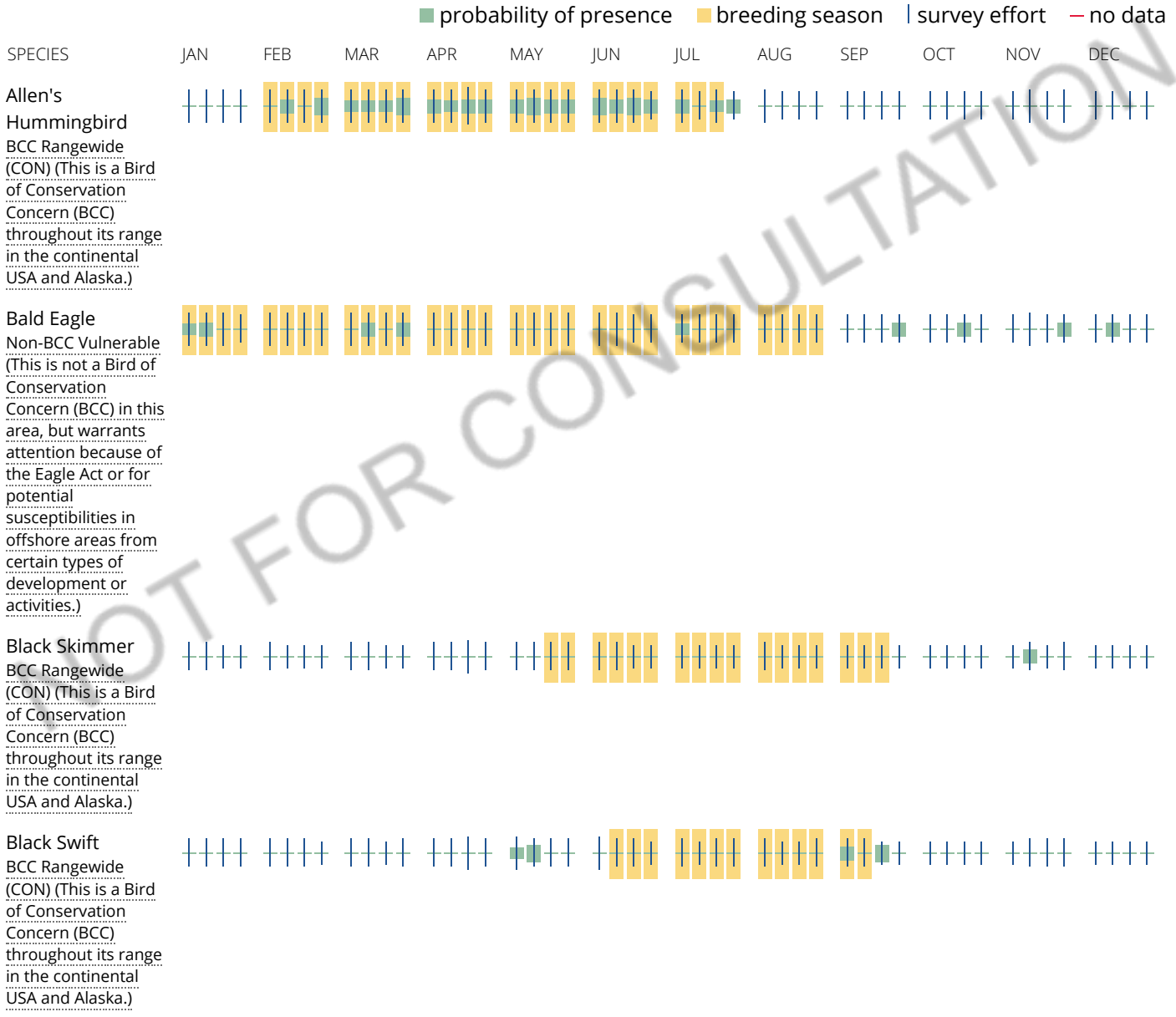
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

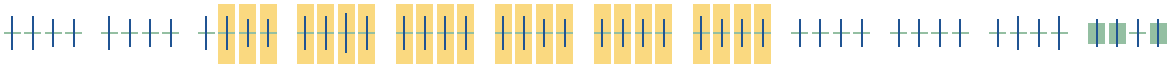
No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

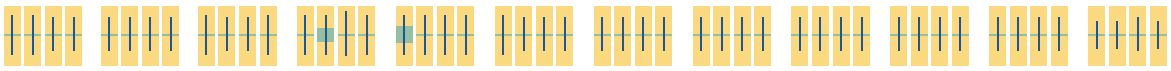


NOT FOR CONSULTATION

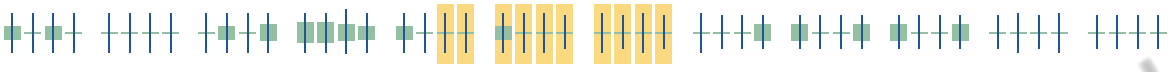
Burrowing Owl
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



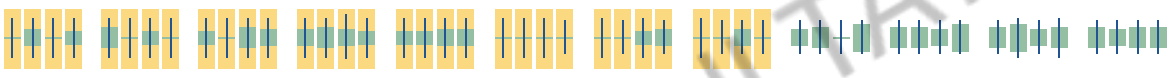
Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



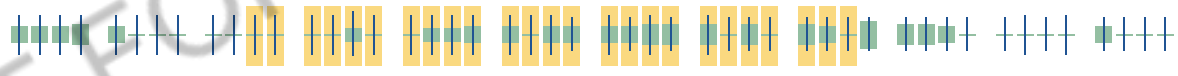
Common Yellowthroat
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



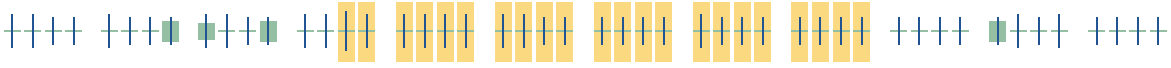
Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Lawrence's Goldfinch
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Lewis's Woodpecker
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Nuttall's Woodpecker
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



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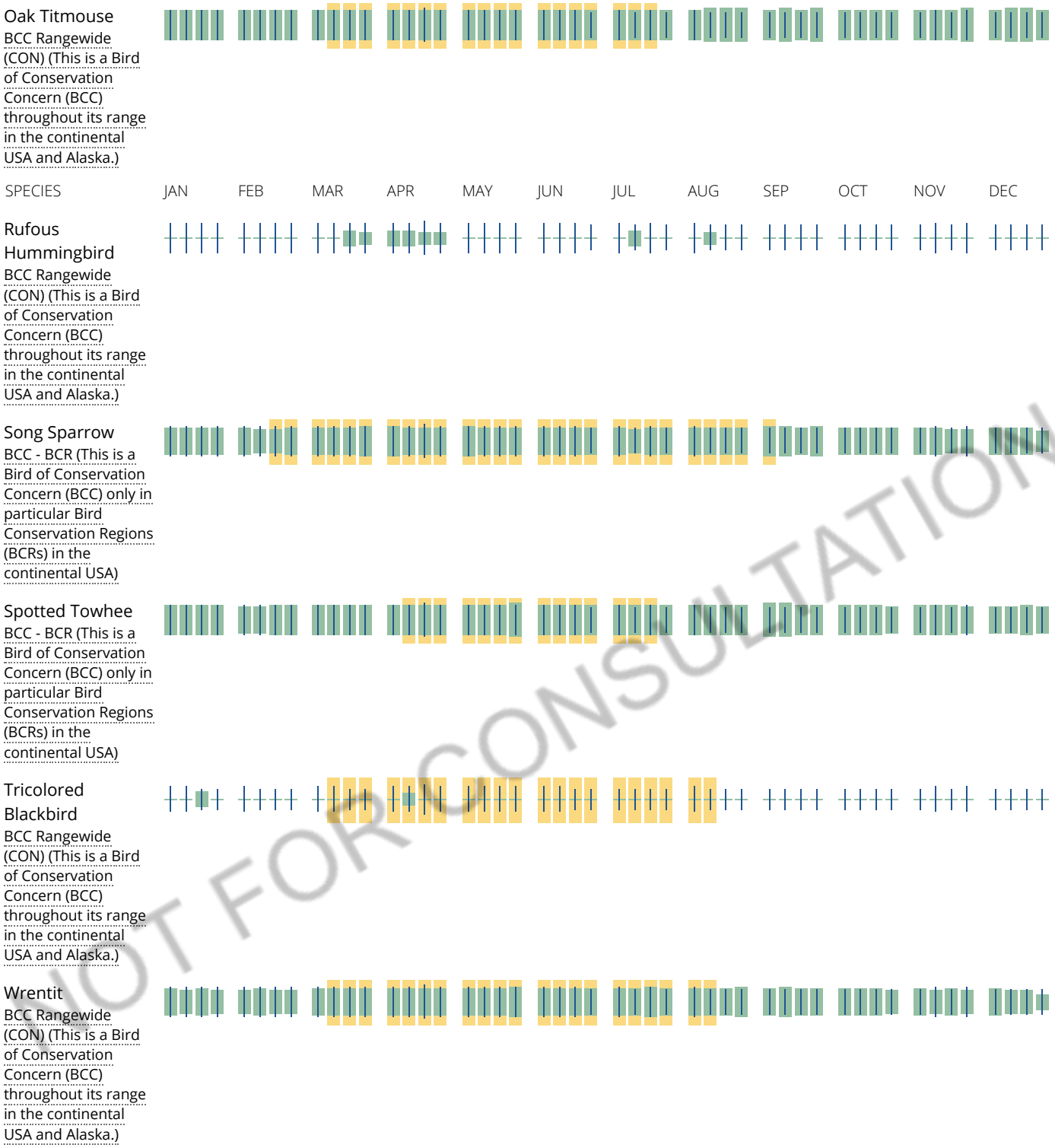

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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review.

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Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER FORESTED/SHRUB WETLAND

- PSSAx
- PSSCx
- PFOAx
- PSSA
- PFOA

FRESHWATER POND

- PUBHx
- PUSCx
- PUBFh
- PUBHh

RIVERINE

- R4SBA
- R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website

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Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged

aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Appendix B. Representative Photos



View of oak woodland/forest. Poison oak dominates the understory of this habitat.



View of nonnative annual grassland habitat at the south end of the Study Area, high on the hillslope.



View of scrub habitat typical of the Study Area.



View of scrub habitat, facing north with the North Quarry in the background.



View of isolated seasonal wetland, dominated by rough cocklebur.



View of downstream portion of the ephemeral drainage near its confluence with Permanente Creek, outside the Study Area. The drainage begins in the northern portion of the Study Area.



View of non-jurisdictional ephemeral drainage in the southwestern portion of the Study Area; this feature is tributary to the isolated seasonal wetland.



View of non-jurisdictional ephemeral drainage in the southeastern portion of the Study Area; this feature is tributary to a sedimentation pond outside the Study Area.

Biological Resources Report
Permanente Quarry
Reclamation Amendment
North Highwall Lay-Back Component

Biological Resources Report

Permanente Quarry Reclamation Plan Amendment – North Highwall Lay-Back Component



Prepared for:

Lehigh Southwest Cement Company

May 2019

GEI Consultants

Consulting Engineers and Scientists

Biological Resources Report

Permanente Quarry Reclamation Plan Amendment – North Highwall Lay-Back Component

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May 2019

GEI Project No. 1803658

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Appendices

Appendix A. Special-status Species Query Results
Appendix B. Representative Photos

Abbreviations and Acronyms

CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
County	Santa Clara County
CRPR	California Rare Plant Rank
CWA	Clean Water Act
FESA	Federal Endangered Species Act
FGC	California Fish and Game Code
GEI	GEI Consultants, Inc.
IPaC	Information for Planning and Conservation
Lehigh	Lehigh Southwest Cement Company
MBTA	Migratory Bird Treaty Act
msl	mean sea level
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPPA	California Native Plant Protection Act
quarry	Permanente Quarry
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
RWQCB	Regional Water Quality Control Board
Study Area	North Highwall Lay-Back study area
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

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1. Introduction

Permanente Quarry (Quarry) is a limestone and aggregate mining operation located on the Permanente property in the Santa Clara County (County) foothills, west of Cupertino (**Figure 1**). Lehigh Southwest Cement Company (Lehigh) operates the Quarry, which is subject to a reclamation plan most recently amended and approved by the County in 2012 (2012 Reclamation Plan). Lehigh proposes to amend the 2012 Reclamation Plan and obtain related entitlements (Project). This report addresses potential biological resources impacts associated with the North Highwall Lay-Back component of the Project.

This evaluation identifies that the North Highwall Lay-Back component of the Project would create the potential for adverse impacts to special-status species and their habitats. However, this evaluation concludes that implementation of the recommendations in this report would avoid or reduce all such potential impacts to less-than-significant levels.

1.1 Study Area Location

The North Highwall Lay-Back study area (Study Area) for this evaluation is an approximately 73-acre area located above and along the North Highwall of the North Quarry, along the northern boundary of the Permanente property (**Figure 2**). The Study Area includes the lay-back disturbance area (approximately 20 acres) and an additional 250-foot-wide buffer (approximately 53 acres) surrounding the disturbance area to account for potential indirect impacts. The Study Area is in Sections 17 and 18 of the U.S. Geological Survey (USGS) 7.5-minute Cupertino Quadrangle, Township 7 South, Range 3 West and Range 2 West; it is located on Assessor Parcel Numbers 351-09-023 and 351-09-025.

1.2 Project Summary

Lehigh operates the Quarry in accordance with the 2012 Reclamation Plan and other entitlements, including a vested right to mine within certain parcels. Lehigh proposes to amend the 2012 Reclamation Plan and obtain related entitlements to accomplish the following primary components of the Project:

1. Incorporate development and reclamation of the Rock Plant Reserve.

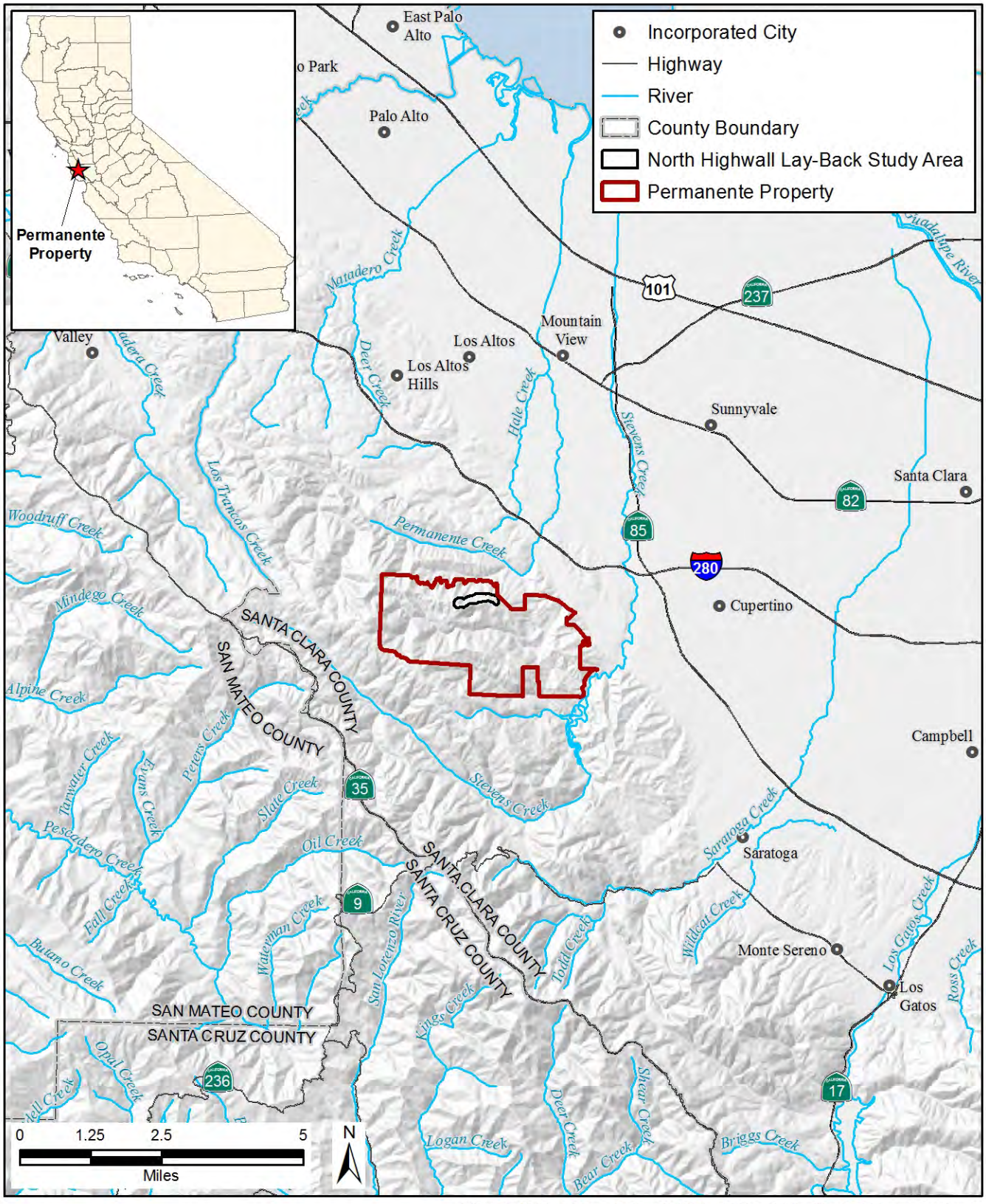
2. Regrade and mine the upper slopes of the North Highwall of the North Quarry to recover limestone, eliminate the need for a large fill buttress, and achieve long-term slope stability.

3. Reclaim the majority of the West Materials Storage Area in place.

4. Backfill the North Quarry using a combination of imported surplus construction soil that meets site-specific acceptance criteria and greenstone overburden to protect water quality.

This Biological Resources Report evaluates potential biological resources impacts associated with the North Highwall Lay-Back component of the Project. The planned mining and reclamation activities include regrading the North Highwall Reserve and lowering the north crest to an approximate elevation of 1,400 feet above mean sea level (msl). The slope crest will be contour graded to blend with ridgeline topography, resoiled, and planted with native trees as a first phase of the Project (within approximately 18–24 months). The North Highwall Lay-Back area encompasses the north crest area where these activities will take place.

Figure 1. Permanente Property and North Highwall Lay-Back Study Area Location



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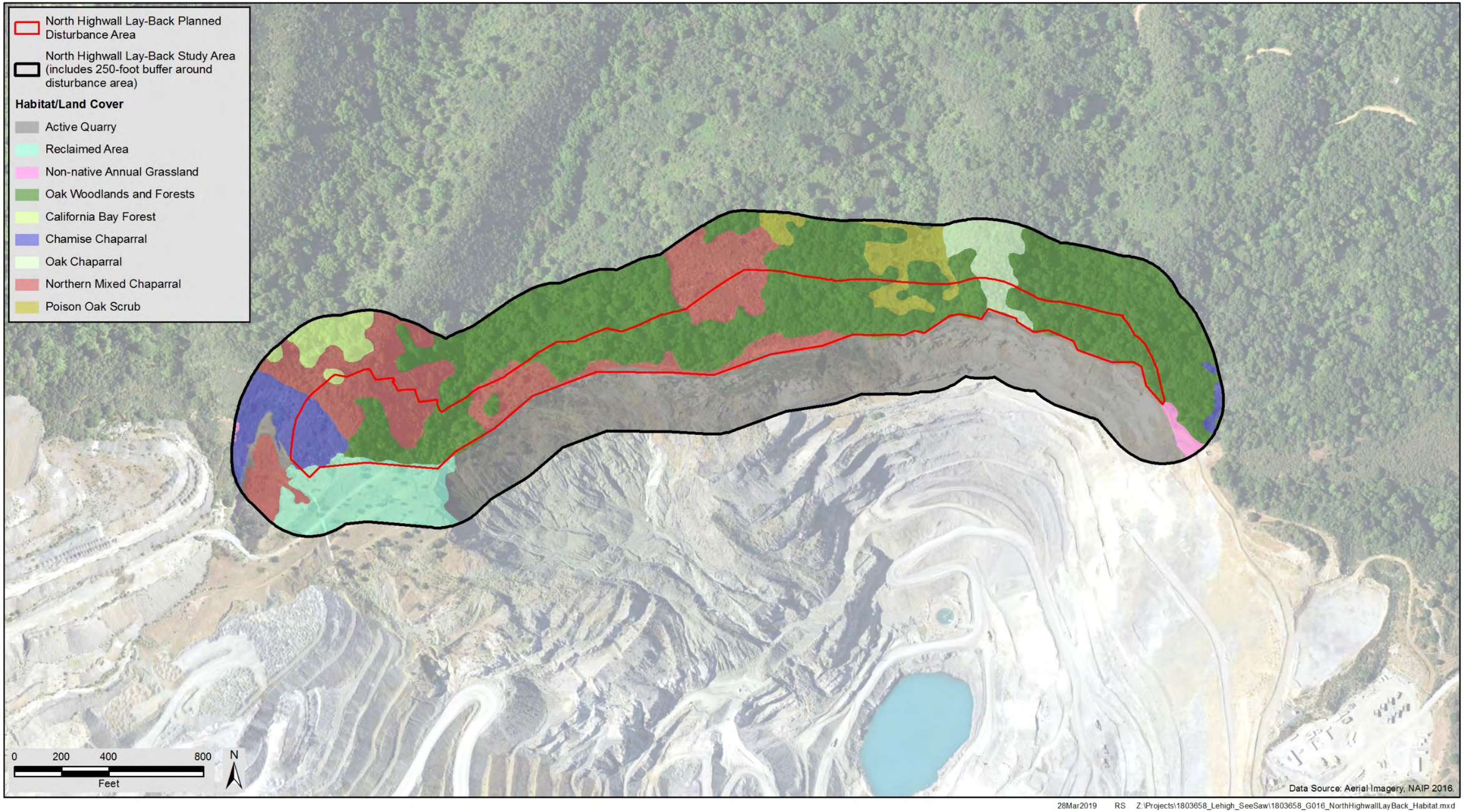
Source: GEI Consultants, Inc. 2018

Figure 2. Habitat Types in the North Highwall Lay-Back Study Area



Source: WRA 2011, adapted by GEI Consultants, Inc. in 2019

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2. Biological Resource Assessment Methods

This biological resource assessment is based on review of documents addressing biological resources that were prepared to support the 2012 Reclamation Plan and other applicable documents and sources that address biological resources in the region, as well as observations made during a field survey of the Study Area that was conducted by a GEI Consultants, Inc. (GEI) biologist on September 6, 2018. The GEI field survey focused on evaluating current habitat conditions for potential to support special-status species. Weather conditions during the field survey were clear and sunny, and the temperature ranged from 74 to 81 degrees Fahrenheit.

2012 Reclamation Plan documents that were reviewed and are incorporated by reference include:

- *Biological Resources Assessment Lehigh Permanente Quarry* (WRA 2011)
- *Lehigh Permanente Quarry Reclamation Plan Amendment Environmental Impact Report* (Santa Clara County 2011a)
- *Reclamation Plan Amendment for Permanente Quarry* (EnviroMine, Inc. 2011)
- *Final Conditions of Approval* for the Reclamation Plan (Santa Clara County 2012)

GEI biologists also reviewed the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) (CDFW 2018) and the California Native Plant Society (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2018) for occurrences of special-status plants and wildlife on or near the Study Area. These reviews were centered on the Cupertino USGS 7.5- minute quadrangle and included the eight surrounding quadrangles. A list of sensitive resources that could occur on or near the Study Area was obtained from the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) website (USFWS 2018a), and the USFWS online map of critical habitat for federally threatened and endangered species (USFWS 2018b) was reviewed. Results of the CNDDB and CNPS Inventory queries and the IPaC resource list are provided in **Appendix A**. The *Soil Survey of Santa Clara Area, California, Western Part* (NRCS 2017) also was reviewed.

3. Environmental Setting

The Study Area is located on the eastern slope of the Santa Cruz Mountains, within the Permanente Creek-Frontal San Francisco Bay Estuaries watershed. Mean annual precipitation in the vicinity is approximately 28 inches (Santa Clara County 2007). Topography in the Study Area slopes toward the northeast and can exceed 30 percent slope. Elevations range from approximately 1,800 feet above msl at the western end to approximately 1,500 feet at the eastern end. Representative photographs of the Study Area are provided in **Appendix B**.

3.1 Habitat and Land Cover Types

Figure 2 shows habitat and land cover types present in the Study Area, and **Table 1** indicates the amount of each type. Figure 2 and the habitat descriptions provided below are based on information compiled for the 2012 Reclamation Plan (WRA 2011).

Table 1. Habitat and Land Cover Types in the North Highwall Lay-Back Study Area

Habitat/Land Cover Type	Acres in Disturbance Area	Acres in Buffer Area	Total Acres in Study Area
Oak Woodland and Forest	12.06	16.70	28.76
Northern Mixed Chaparral	5.26	6.15	11.41
Chamise Chaparral	1.09	1.84	2.93
Poison Oak Scrub	0.55	1.66	2.21
Oak Chaparral	0.41	1.49	1.90
California Bay Forest	0.05	1.41	1.46
Nonnative Annual Grassland	<0.01	0.38	0.38
Reclaimed	0.26	4.20	4.46
Quarry	0.27	19.43	19.70
Total	**19.95**	**53.26**	**73.21**

Source: WRA 2011, adapted by GEI Consultants, Inc. in 2019

Oak Woodland and Forest. Several oak woodland community types are described in detail in Holland (1986). These community types can be generally categorized as oak woodland/forest on the Permanente property, because there is not a dominant oak species. Areas of oak woodland/forest on the Permanente property have a co-dominant canopy of coast live oak (*Quercus agrifolia*), interior live oak (*Q. wislizeni*), and blue oak (*Q. douglasii*). Other tree species encountered include California buckeye (*Aesculus californica*), grey pine (*Pinus sabiniana*), California bay (*Umbellularia californica*), madrone (*Arbutus menziesii*), and tanbark oak (*Lithocarpus densiflorus*). Shrubs are common and include toyon (*Heteromeles arbutifolia*), coffeeberry (*Rhamnus californica*), poison oak (*Toxicodendron diversilobum*), gooseberry (*Ribes* spp.), manzanita, and elderberry (*Sambucus nigra* ssp. *caerulea*). Oak woodland and forest is the most extensive community in vegetated portions of the Study Area, including the North Highwall Lay-Back disturbance area.

Northern mixed chaparral. Northern mixed chaparral is a shrub-dominated community that forms dense, often impenetrable stands dominated by chamise (*Adenostoma fasciculatum*), scrub oak (*Quercus berberidifolia*), various manzanitas (*Arctostaphylos* spp.), and various members of the genus *Ceanothus* (Holland 1986). This community type occurs on dry, rocky, steep, typically south-facing slopes with thin to little soil. On the Permanente property, northern mixed chaparral occurs primarily on east and south-facing slopes and intergrades with oak woodlands and oak chaparrals on deeper soils and with chamise chaparral on southern exposures. It is a diverse 2- to 3-meter-tall community on the Permanente property and includes species such as chamise, scrub oak, Eastwood's Manzanita (*Arctostaphylos glandulosa* ssp. *glandulosa*), jimbrush (*Ceanothus oliganthus* var. *sorediatus*), buckbrush (*Ceanothus cuneatus*), birch-leaf mountain mahogany (*Cercocarpus betuloides*), poison oak, yerba santa (*Eriodictyon californicum*), white pitcher sage (*Lepichinia calycina*), coffeeberry (*Rhamnus californicus*), and redberry (*Rhamnus crocea*). There is typically little to no understory; where present, the understory includes Indian warrior (*Pedicularis densiflorus*), Pacific sanicle (*Sanicula crassicaulis*),

coyote mint (*Monardella villosa* ssp. *villosa*), and Indian paintbrush (*Castilleja affinis*). Northern mixed chaparral occurs along the ridgeline and on east-facing slopes in the western portion of the Study Area.

Chamise chaparral. Chamise chaparral is a 1- to 3-meter-tall shrub-dominated community characterized by a prevalence of chamise (*Adenostoma fasciculatum*). Mature stands contain very little herbaceous understory (Holland 1986). This community typically has more than 50 percent cover of chamise; associated species typically include manzanita (*Arctostaphylos* spp.), scrub oak (*Quercus berberidifolia*), buckbrush (*Ceanothus cuneatus*), birch-leaf mountain mahogany (*Cercocarpus betuloides*), and yerba santa (*Eriodictyon californicum*). Chamise chaparral occurs in several patches in the northern portion of the Study Area, on northwestern and northeastern facing slopes with shallow soils.

Poison oak scrub. Briefly described in Holland (1986), poison oak scrub is a shrub-dominated community dominated by poison oak. Poison oak scrub occurs on a north-facing slope adjacent to oak woodland/forest and oak chaparral in the north-central portion of the Study Area. This area contains extremely dense, monotypic stands of poison oak.

Oak chaparral. Oak chaparral includes plant communities described in Holland (1986) as scrub oak chaparral and undescribed plant communities dominated by canyon live oak (*Quercus chrysolepis*) less than 4 meters tall. Oak chaparral is a dense, evergreen chaparral dominated by oak shrubs. Species typical of this community include scrub oak, bush interior live oak (*Quercus wislizeni* var. *frutescens*), coffeeberry, madrone, poison oak, and birch-leaf mountain mahogany. Oak chaparral occurs on a north-facing slope in the eastern portion of the Study Area, where conditions are slightly more mesic than other onsite slopes

California bay forest. California bay forest is described in Holland (1986) as similar to a mixed evergreen forest but typically consisting entirely of California bay trees up to 30 meters tall. This habitat type is typically associated with moist, north-facing slopes; on the Permanente property, it consists of dense, monotypic stands of California bay, with little to no understory. A small area of California bay forest occurs on a north-facing slope in the northeastern portion of the Study Area.

Non-native annual grassland. Non-native annual grassland is described in Holland (1986) as a dense to sparse cover of annual grasses and herbs 0.2 to 0.5 meters tall. Characteristic species include ripgut brome (*Bromus diandrus*), soft chess (*B. hordeaceus*), Italian ryegrass (*Festuca perennis*), six-week rattail grass (*F. myuros*), wall barley (*Hordeum murinum*), and wild oat (*Avena fatua*). Common forbs include shamrock clover (*Trifolium dubium*), broadleaf filaree (*Erodium botrys*), common vetch (*Vicia sativa* ssp. *nigra*), and common fiddleneck (*Amsinckia intermedia*). A small area of nonnative annual grassland occurs at the eastern end of the Study Area, adjacent to North Quarry.

Reclaimed area. Areas classified as reclaimed include historically disturbed slopes that have been graded to a final contour and planted with grass species and/or a low to moderate density native shrubs and trees including coyote brush, chamise, and oaks. Generally, these areas are dominated by grass species, including wild oat, brome grasses, small fescue (*Festuca microstachys*), and Italian ryegrass.

Quarry. Areas identified as quarry have been disturbed by quarry activities and in some locations host a limited amount of weedy plant species, such as yellow star thistle (*Centaurea solstitialis*), wild oat, sweet fennel (*Foeniculum vulgare*), and field mustard (*Brassica rapa*). Generally, plant cover in these areas is very sparse due to the lack of topsoil and provides little value to wildlife. The southern portion of the Study Area overlaps the North Quarry.

3.2 Special-status Species

Special-status species are plants and animals that fall into any of the following categories:

- species officially listed by the Federal government or the State of California as endangered, threatened, or rare;
- candidate species for federal or state listing as endangered or threatened;
- species proposed for federal or state listing as endangered or threatened;
- taxa (i.e., taxonomic categories or groups) that meet the criteria for listing;
- wildlife species identified by CDFW as species of special concern and plant taxa considered by CDFW to be "rare, threatened, or endangered in California;"
- species listed as Fully Protected under the California Fish and Game Code (FGC); or
- species afforded protection under local or regional planning documents.

As indicated above, only plant taxa considered by CDFW to be "rare, threatened, or endangered in California" (i.e., CRPR 1B and 2B plants) are considered special-status in this analysis.

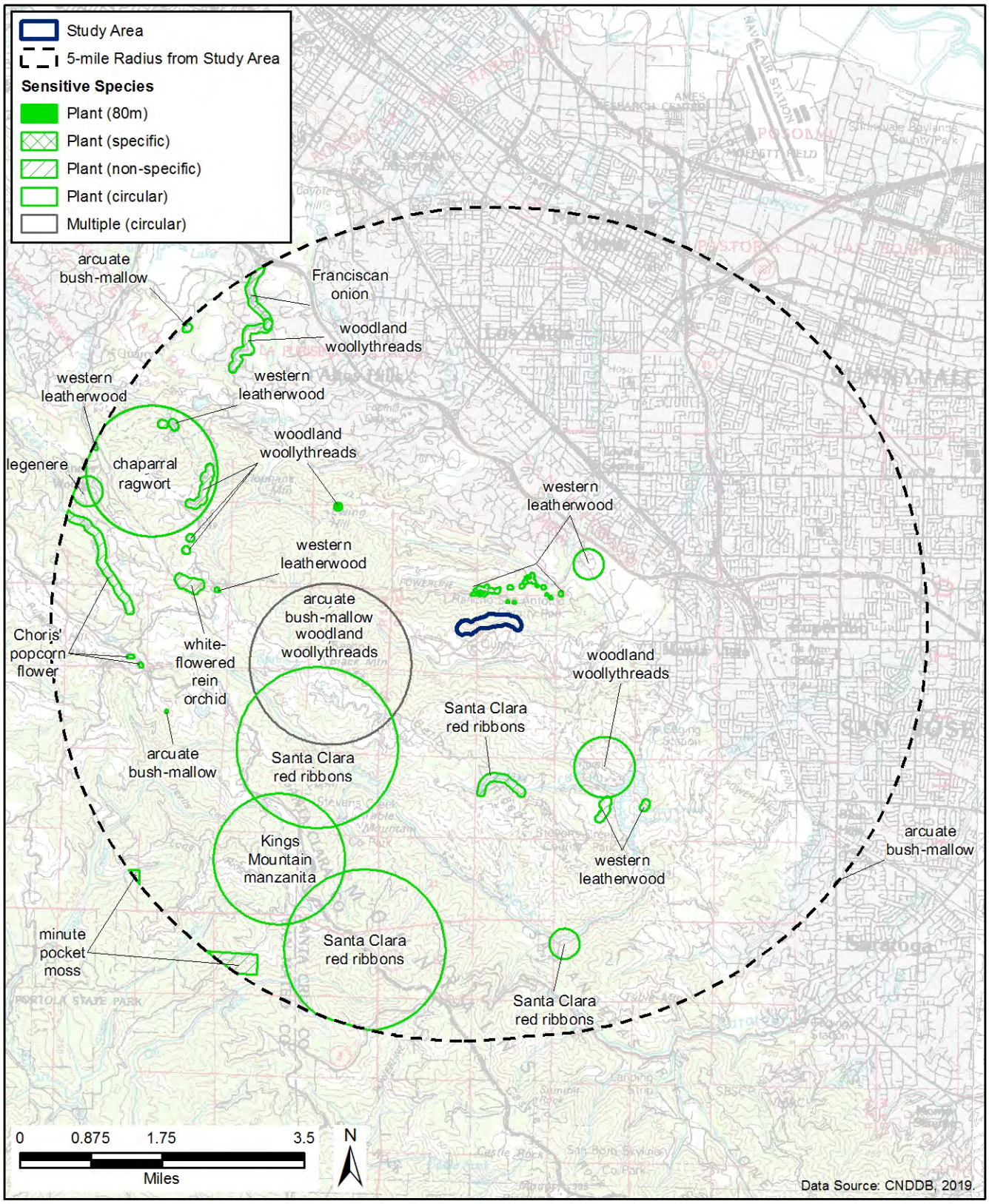
GEI biologists reviewed current results of the CNDDB and CNPS USGS 9-quadrangle searches (see Appendix A). Eight special-status plants and nine special-status animals have been documented within 5 miles of the Study Area, as shown in **Figure 3** and **Figure 4**. (Note: Not all species tracked in the CNDDB meet the special-status definition described above.)

Table 2 provides information on 18 special-status plants included in the current CNDDB and CNPS search results and evaluated by GEI for potential to occur in the Study Area. Based on observations made during the GEI field survey for this current evaluation, habitat for these plants was not observed and is not present in the Study Area, and none of the plants listed in Table 2 is considered to have potential to occur in the Study Area.

Table 3 provides information on 15 special-status animals included in the current CNDDB and CNPS search results and evaluated by GEI for potential to occur in the Study Area. Based on observations made during the field survey, six of the special-status wildlife species included in Table 3 have moderate or high potential to occur in the Study Area: white-tailed kite (*Elanus leucurus*), olive-sided flycatcher (*Contopus cooperi*), yellow warbler (*Dendroica petechia*), San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), pallid bat (*Antrozous pallidus*), and western red bat (*Lasiurus blossevillii*). None of these species were detected during the GEI survey. White-tailed kite, olive-sided flycatcher, yellow warbler, and San Francisco dusky-footed woodrat were documented on the Permanente property during WRA surveys (WRA 2011).

The four special-status amphibians included in Table 3 are not expected to occur in the Study Area, because no permanent or seasonal aquatic habitat is present on or near the site. In addition, conditions are generally dry and unlikely to provide enough moisture to provide suitable shelter, because the site is located along a ridge. The CNDDB includes an 1893 occurrence of California tiger salamander (*Ambystoma californiense*) on the Permanente Property (see Figure 4). However, the validity of this occurrence is questioned, because of its age and likely misidentification (WRA 2011) and the lack of any subsequent identification of California tiger salamander on the site during the past 125 years; therefore, California tiger salamander is not addressed in this report.

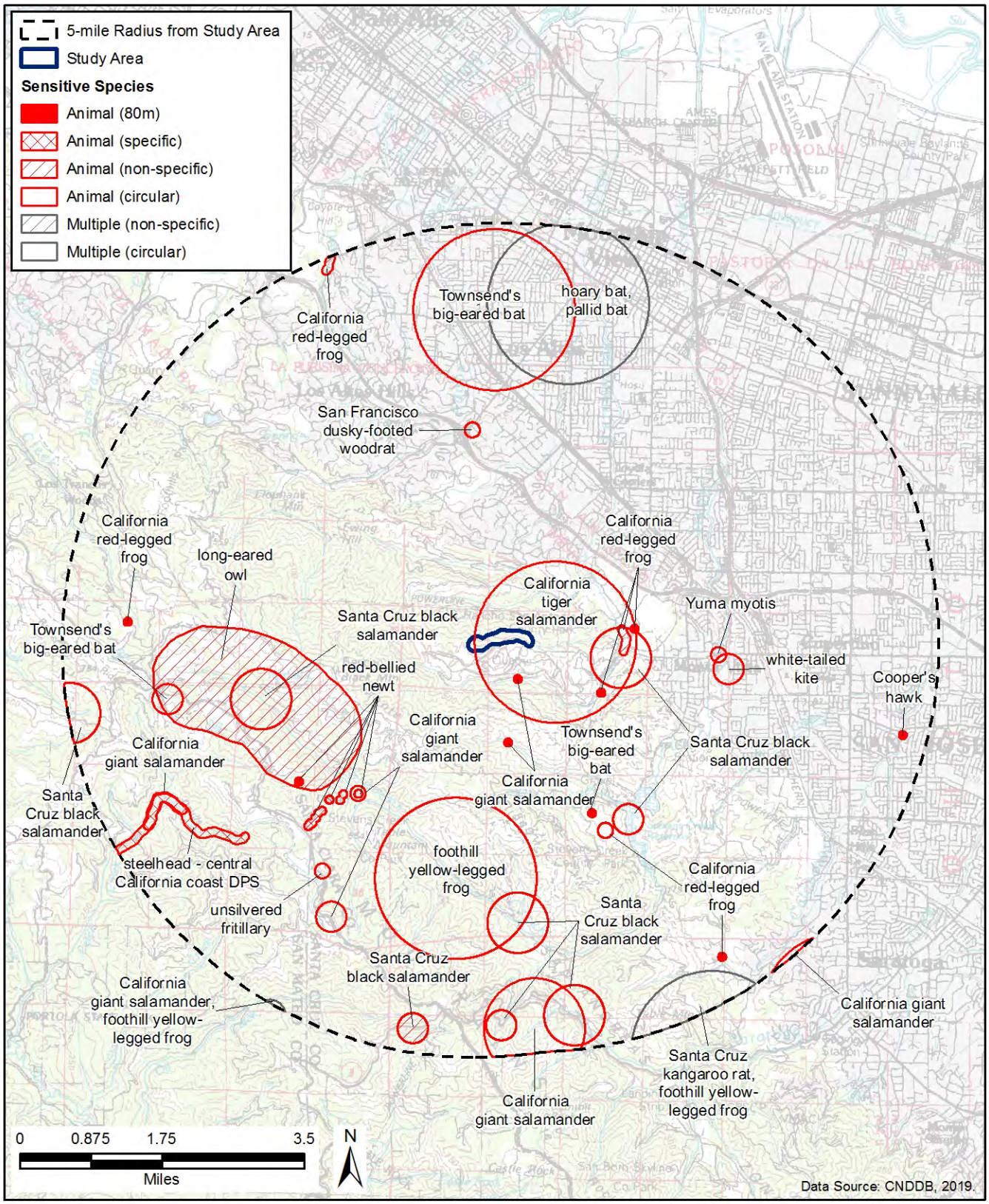
Figure 3. California Natural Diversity Database Occurrences of Special-status Plants within 5 Miles of the North Highwall Lay-Back Study Area



Z:\Projects\1803658_Lehigh_SeeSaw\1803658_G018_NorthHighwallLayBack_CNDDB_Plants.mxd
29Mar2019 RS

Source: CDFW 2018, adapted by GEI Consultants, Inc. 2018

Figure 4. California Natural Diversity Database Occurrences of Special-status Animals within 5 Miles of the North Highwall Lay-Back Study Area



Z:\Projects\1803658_Lehigh_SeeSaw\1803658_G019_NorthHighwallLayBack_CNDDB_Animals.mxd
29Mar2019 RS

Source: CDFW 2018, adapted by GEI Consultants, Inc. 2018

Table 2. Special-status Plants Evaluated for Potential to Occur in the North Highwall Lay-Back Study Area

Species	Blooming Period	Status[1]		Habitat Associations	Potential to Occur in the Study Area
		Federal	State		
Ohlone manzanita *Arctostaphylos ohloneana*	February–March	–	1B.1	Siliceous shale soils in closed-cone coniferous forest and coastal scrub	None; no suitable habitat is present in the Study Area; none observed during surveys.
Lesser saltscale *Atriplex minus* *cula*	May–October	–	1B.1	Alkaline sandy soils in chenopod scrub, valley and foothill grassland, and playas	None; no suitable habitat is present in the Study Area; none observed during surveys.
Condon's tarplant *Centromadia parryi* ssp.*congdonii*	May–October	–	1B.1	Alkaline soils on valley and foothill grassland	None; no suitable habitat is present in the Study Area; none observed during surveys.
Ben Lomond spineflower *Chorizanthe pungens* var. *hartwegiana*	April–July	E	1B.1	Lower mountain coniferous forest; known only from sandhill parklands in the Santa Cruz Mountains	None; no suitable habitat is present in the Study Area; none observed during surveys.
Robust spineflower *Chorizanthe robusta* var. *robusta*	April–September	E	1B.1	Sandy or gravelly substrate in maritime chaparral, openings in cismontane woodland, coastal dunes, or coastal scrub; known only from six extant populations	None; no suitable habitat is present in the Study Area; none observed during surveys.
Jepson's coyote thistle *Eryngium jepsonii*	April–August	–	1B.2	Clay soils in vernal and foothill vernal pool grasslands	None; no suitable habitat is present in the Study Area; none observed during surveys.
Minute pocket moss *Fissidens pauperculus*	none	–	1B.2	Moist North Coast coniferous forest soils	None; no suitable habitat is present in the Study Area; none observed during surveys.
Toren's grimmia *Grimmia torenii*	none	–	1B.3	Openings in chaparral, cismontane woodland, and lower coniferous forest on carbonate or volcanic rock	None; no suitable habitat is present in the Study Area; none observed during surveys.
Vaginulate grimmia *Grimmia vaginulata*	none	–	1B.1	Openings in chaparral habitat on carbonate sandstone substrate	None; no suitable habitat is present in the Study Area; none observed during surveys.
Santa Cruz cypress *Hesperocyparis abramsiana* var. *abramsiana*	none	T	E, 1B.2	Closed-cone coniferous forest, chaparral, and lower coniferous forest on sandstone or granitic substrate; known only from the Santa Cruz Mountains	None; no suitable habitat is present in the Study Area; none observed during surveys.
Butano Ridge cypress *Hesperocyparis abramisana* var. butanoensis	October	T	E, 1B.1	Closed-cone coniferous forest, chaparral, and lower coniferous forest on sandstone or granitic substrate; known only from the Butano Ridge of the Santa Cruz Mountains	None; no suitable habitat is present in the Study Area; none observed during surveys.

Table 2. Special-status Plants Evaluated for Potential to Occur in the North Highwall Lay-Back Study Area

Species	Blooming Period	Status[1]		Habitat Associations	Potential to Occur in the Study Area
		Federal	State		
Woodland woolythreads *Monolopia gracilens*	March–July	–	1B.2	Serpentine soil in openings of broadleaf upland forest, chaparral, cismontane woodland, North Coast coniferous forest, and valley and foothill grassland	None; no suitable habitat is present in the Study Area; none observed during surveys.
Kellman's bristle moss *Orthotrichum kellmanii*	none	–	1B.2	Sandstone and carbonate substrate in chaparral and cismontane woodland	None; no suitable habitat is present in the Study Area; none observed during surveys.
Choris' popcornflower *Plagiobothrys chorisianus* var. *chorisianus*	March–June	–	1B.2	Mesic soils in chaparral, coastal prairie, and coastal scrub	None; no suitable habitat is present in the Study Area; none observed during surveys.
California alkali grass *Puccinellia simplex*	March–May	–	1B.2	Alkaline soils in wet areas, lake margins, meadows and seeps, vernal pools, chenopod scrub, vernal pools, and valley and foothill grassland	None; no suitable habitat is present in the Study Area; none observed during surveys.
Slender-leaved pondweed *Stuckenia filiformis* ssp.*alpina*	May–July	–	2B.2	Marshes and swamps	None; no suitable habitat is present in the Study Area; none observed during surveys.
Santa Cruz clover *Trifolium buckwestiorum*	April–October	–	1B.1	Gravelly soils along the margins of broadleaf upland forest, cismontane woodland, and coastal prairie	None; no suitable habitat is present in the Study Area; none observed during surveys.
Saline clover *Trifolium hydrophilum*	April–June	–	1B.2	Alkaline soils in marshes and swamps, mesic valley and foothill grassland, and vernal pools	None; no suitable habitat is present in the Study Area; none observed during surveys.

[1] Status Definitions

Legal Status
E = Listed as Endangered under the Federal or California Endangered Species Act
T = Listed as Threatened under the Federal Endangered Species Act

California Rare Plant Ranks
1B = Plant species considered rare or endangered in California and elsewhere (but not legally protected under the Federal or California Endangered Species Acts)
2B = Plant species considered rare or endangered in California but more common elsewhere (but not legally protected under the Federal or California Endangered Species Acts)

California Rare Plant Rank Extensions
.1 = Seriously endangered in California (greater than 80 percent of occurrences are threatened and/or have a high degree and immediacy of threat)
.2 = Fairly endangered in California (20 to 80 percent of occurrences are threatened and/or have a moderate degree and immediacy of threat)
– = no status

Sources: CDFW 2018; CNPS 2018; GEI data 2018; USFWS 2018a

Table 3. Special-status Wildlife Evaluated for Potential to Occur in the North Highwall Lay-Back Study Area

Species	Status		Habitat Associations	Potential to Occur in the Study Area
	Federal	State		
Amphibians				
Santa Cruz black salamander *Aneides flavipunctatus niger*	–	SSC	Rocks, talus, and damp woody debris in mixed deciduous and coniferous woodlands and coastal grasslands	Low; conditions in the Study Area are likely too dry to support this species; none observed during surveys.
California giant salamander *Dicamptodon ensatus*	–	SSC	Wet coastal forests near streams and seeps; breeds in cold, clear streams, occasionally in lakes and ponds; adults also occur in wet forests, under rocks and logs near streams and lakes	Low; conditions are likely too dry to support this species, and no breeding habitat occurs in or near the Study Area; none observed during surveys.
Red-bellied newt *Taricha rivularis*	–	SSC	Moist terrestrial habitats; typically breed in streams with moderate flow and rocky substrate	Low; conditions are likely too dry to support this species, and no breeding habitat occurs in or near the Study Area; none observed during surveys.
California red-legged frog *Rana draytonii*	T	SSC	Perennial to intermittent ponds, stream pools and wetlands. Prefers shorelines with extensive vegetation. Can disperse through upland habitats after rain	Low; no suitable breeding or non-breeding aquatic habitat occurs in or near the Study Area; the nearest known occurrence of this species on the Permanente property is approximately 1 mile from the Study Area, with heavily disturbed active mine facilities that do not provide suitable upland or dispersal habitat in the intervening area; none detected during surveys.
Birds				
White-tailed kite *Elanus leucurus*	–	FP	Nests in woodlands and isolated trees and forages in grasslands, pasture, and agricultural fields	Moderate; oak woodland/forest in the Study Area provides potentially suitable nest trees, but potentially suitable foraging habitat is very limited; nearest documented nest site is along Stevens Creek, approximately 2 miles east of the Study Area (CDFW 2018), but this species has been regularly observed foraging on the Permanente property (WRA 2011).
Bald eagle *Haliaeetus leucocephalus*	–	E, FP	Ocean shore, lake margins, and rivers; nests in large, live trees with open branches, typically within 1 mile of permanent water	Low; no suitable nesting or foraging habitat is present in the Study Area; nearest known active nest site is at Felt Reservoir, approximately 6 miles northwest of the Study Area (CDFW 2018); none detected during surveys.

Table 3. Special-status Wildlife Evaluated for Potential to Occur in the North Highwall Lay-Back Study Area

Species	Status		Habitat Associations	Potential to Occur in the Study Area
	Federal	State		
Long-eared owl *Asio otus*	–	SSC	Nests in mature riparian and oak woodland, typically along streams; forages in open habitats	Low; Study Area provides potentially suitable nesting and foraging habitat, but this species is considered rare in Santa Clara County and is an irregular breeder (Bousman 2005); disturbance from adjacent Quarry operations also reduce potential to nest Study Area; nearest known occurrence is from the Monte Bello Open Space Preserve, several miles west of the Study Area (CDFW 2018); none detected during surveys.
Purple martin *Progne subis*	–	SSC	Deciduous woodland and low elevation coniferous forest; typically nests in old woodpecker cavities in tall, isolated tree or snag; also nests in human-made structures	Low; Study Area provides only marginally suitable nesting habitat; nearest known recently active nest colony is at Mount Umunhum, approximately 15 miles southwest of the Study Area (CDFW 2018); none detected during surveys.
Olive-sided flycatcher *Contopus cooperi*	–	SSC	Nests primarily in late-successional coniferous forest with open canopies	Moderate; unlikely to nest, because the Study Area does not provide preferred nesting habitat; foraging individuals could occur in the Study Area; has been observed on the Permanente property (WRA 2011).
Loggerhead shrike *Lanius ludovicianus*	–	SSC	Open habitats with sparse shrubs, trees, posts, and other suitable perches; nests in shrubs and small trees	Low; the Study Area supports very dense vegetation and provides only marginally suitable habitat; nearest known nesting occurrence is from open grassland/ agricultural habitat in Coyote Valley, approximately 20 miles southeast of the Study Area (CDFW 2018); none detected during surveys.
Yellow warbler *Dendroica petechia*	–	SSC	Riparian, typically prefers willows, cottonwoods, sycamores, and alders for nesting and foraging	Moderate; potential to forage but unlikely to nest in the Study Area; has been regularly observed on the Permanente property during migration and the breeding season (WRA 2011).
Grasshopper sparrow *Ammodramus savannarum*	–	SSC	Dense grassland on rolling hills, low plains, lower mountain slopes, and in valleys; prefers native grasslands with mix of grasses, forbs and scattered shrubs	Low; habitat quality in the Study Area is poor; nearest known nesting occurrence is from serpentine grassland on Coyote Ridge, approximately 20 miles southeast of the Study Area; has been observed in sparsely vegetated areas of the Permanente property (WRA 2011).
Mammals				
San Francisco dusky-footed woodrat *Neotoma fuscipes* *Annectens*	–	SSC	Forest with moderate canopy and moderate to dense understory; require adequate materials for constructing and maintaining nests of sticks, shredded grass, leaves, and other material	High; known to occur in various woodland/forest and scrub habitats on the Permanente property (WRA 2011).

Table 3. Special-status Wildlife Evaluated for Potential to Occur in the North Highwall Lay-Back Study Area

Species	Status		Habitat Associations	Potential to Occur in the Study Area
	Federal	State		
Pallid bat *Antrozous pallidus*	–	SSC	Most common in open, dry habitats with rocky areas for roosting; roosts in caves, crevices, mines, and occasionally in hollow trees and buildings; very sensitive to disturbance of roosting sites	Moderate; oak woodland/forest in the Study Area may provide suitable roost sites; if roost sites are present in the vicinity, individuals could forage onsite; nearest known and presumed extant occurrence in the past 30 years is from nearly 20 miles south of the Study Area (CDFW 2018); none detected during surveys.
Western red bat *Lasiurus blossevillii*	–	SSC	Deciduous and coniferous woodland and forest; roosts primarily in trees; prefers riparian vegetation, habitat edges and mosaics with open areas	Moderate; Study Area may provide suitable roost trees, and individuals from nearby roosting habitat could forage over the Study Area; nearest known recent roost site is from Golden Gate Park (CDFW 2018); none detected during surveys.

Notes: CNDDB = California Natural Diversity Database

[1] **Status Definitions**

E = Listed as Endangered under the Federal or State Endangered Species Act
T = Listed as Threatened under the Federal or State Endangered Species Act
FP = Fully Protected under the California Fish and Game Code
SSC = California Species of Special Concern

Sources: CDFW 2018; GEI data 2018; USFWS 2018a

Most of the special-status bird species listed in Table 3 are not likely to occur in the Study Area. White-tailed kite, olive-sided flycatcher, and yellow warbler are the only species with moderate potential to occur; other species have low potential to occur. Trees in the Study Area could provide suitable nest sites for white-tailed kite, but potential foraging habitat is very limited on this portion of the Permanente property. Olive-sided flycatcher and yellow warbler are unlikely to nest in the Study Area, because the forest is not typical of their preferred nesting habitat, but they could forage in the Study Area.

San Francisco dusky-footed woodrat has high potential to occur in oak woodland and forest, poison oak scrub, and the various chaparral habitats in the Study Area. These rodents are locally abundant in forest, woodland, and scrub/shrub habitats. No woodrat nests were documented during the GEI survey, but their nests were commonly found in nearly every upland habitat during surveys conducted for the 2012 Reclamation Plan (WRA 2011); thus, it is assumed that they may be present within the Study Area. Pallid and western red bat could forage in the Study Area. There is limited potential for these bat species to roost in trees in portions of the Study Area that support oak woodland/forest, although this is not the preferred roosting habitat or conditions for either species.

3.3 Sensitive Habitats

Sensitive habitats include those that are of special concern to resource agencies or are afforded specific consideration through the California Environmental Quality Act (CEQA), the Federal Endangered Species Act (FESA), Section 1602 of the FGC, Sections 404 or 401 of the Federal Clean Water Act (CWA), or the Porter-Cologne Water Quality Control Act (Porter-Cologne Act). Sensitive habitats may be of special concern for a variety of reasons, including their locally or regionally declining status, or because they provide important habitat for special-status species.

3.3.1 Critical Habitat

No critical habitat designated or proposed for designation by USFWS or National Marine Fisheries Service (NMFS) is present on or adjacent to the Study Area. Designated critical habitat for Central California Coastal steelhead (*Oncorhynchus mykiss*) occurs in Stevens Creek, approximately 4 miles downstream of the Permanente property. No designated critical habitat for California red-legged frog occurs in the Study Area.

3.3.2 Jurisdictional Waters and other Habitats

No wetlands, waters, or riparian habitats under U.S. Army Corps of Engineers (USACE), San Francisco Regional Water Quality Control Board (RWQCB), or CDFW jurisdiction occur in the Study Area.

3.3.3 Natural Communities of Special Concern

The Study Area does not support any natural communities of special concern considered by CDFW to be highly imperiled.

3.3.4 Oak Woodland

The Study Area includes approximately 29 acres of oak woodland and forest, approximately 12 acres of which are in the North Highwall Lay-Back disturbance area. Oak woodlands are protected by the Oak Woodlands Conservation Act.

4. Regulatory Setting

This subsection briefly describes federal, state, and local regulations, permits, and policies pertaining to biological resources and wetlands that were considered for applicability to the North Highwall Lay-Back component.

4.1 Special-Status Species and Sensitive Communities

4.1.1 Federal Endangered Species Act

USFWS, which has jurisdiction over plants, wildlife, and most freshwater fish, and NMFS, which has jurisdiction over anadromous fish, marine fish, and marine mammals, oversee implementation of FESA to ensure that federal agencies' actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. A federal agency is required to consult with USFWS and NMFS if it determines that its decision may affect a listed species under the agency's jurisdiction. FESA prohibits the "take"[1] of any fish or wildlife species listed as threatened or endangered, including the destruction of habitat that could hinder species recovery.

[1] "Take" is broadly defined in Section 9 of the federal Endangered Species Act to include intentional or accidental "harassment" or "harm" to wildlife. "Harass" is further defined by the U.S. Fish and Wildlife Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering. "Harm" is defined as an act which actually kills or injures wildlife. This may include significant habitat modification or

FESA Section 9 take prohibition applies only to wildlife and fish species that are listed as threatened or endangered. Candidate species and species that are proposed for listing or are under petition for listing receive no protection under Section 9. Section 9 also prohibits the removal, possession, damage or destruction of any endangered plant from federal land, as well as acts to remove, cut, dig up, damage, or destroy an endangered plant species in nonfederal areas in knowing violation of any state law or in the course of criminal trespass.

FESA Section 10 requires the issuance of an "incidental take" permit before any public or private action may be taken that would potentially harm, harass, injure, kill, capture, collect, or otherwise hurt (i.e., take) any individual of an endangered or threatened species. The permit requires preparation and implementation of a habitat conservation plan that would offset the take of individuals that may occur incidental to implementation of otherwise lawful activities, by providing for the overall preservation of the affected species through specific conservation measures.

Under FESA, the Secretary of the Interior (or the Secretary of Commerce, as appropriate) formally designates critical habitat for certain federally listed species and publishes these designations in the Federal Register. Critical habitat is not automatically designated for all federally listed species; thus, many do not have designated critical habitat.

Critical habitat is defined as the specific areas that are essential to the conservation of a federally listed species, and that may require special management consideration or protection. Critical habitat is determined using the best available scientific information about the physical and biological needs of the species. These needs, or primary constituent elements, include: space for individual and population growth and for normal behavior; food, water, light, air, minerals, or other nutritional or physiological needs; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitat that is protected from disturbance or is representative of the historical geographic and ecological distribution of a species.

4.1.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC, §703, Supplement I, 1989) prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs. An April 11, 2018 USFWS memorandum indicates that the MBTA's prohibitions on take apply when the purpose of an action is to take migratory birds, their eggs, or their nests. Therefore, take occurring as the result of an activity, the purpose of which is not to take birds, eggs or nests, is not prohibited by the MBTA.

4.2 Surface Mining and Reclamation Act

Regulations implementing the Surface Mining and Reclamation Act require that the reclamation of mined lands be implemented in conformance with specified standards (14 CCR §3700 et seq.). Standards regarding wildlife habitat and stream protection are outlined below.

Wildlife and wildlife habitat shall be protected in accordance with the following standards:

degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(a) Rare, threatened or endangered species as listed by [CDFW], (14 CCR, §§670.2 - 670.5) or the U.S. Fish and Wildlife Service, (50 CFR 17.11 and 17.12) or species of special concern as listed by [CDFW] in the Special Animals List, Natural Diversity Data Base, and their respective habitat, shall be conserved as prescribed by [FESA] and the California Endangered Species Act, Fish and Game Code §2050 et seq. If avoidance cannot be achieved through the available alternatives, mitigation shall be proposed in accordance with the provisions of the California Endangered Species Act, Fish and Game Code §2050 et seq., and the [FESA].

(b) Wildlife habitat shall be established on disturbed land in a condition at least as good as that which existed before the lands were disturbed by surface mining operations, unless the proposed end use precludes its use as wildlife habitat or the approved reclamation plan establishes a different habitat type than that which existed prior to mining.

(c) Wetland habitat shall be avoided. Any wetland habitat impacted as a consequence of surface mining operations shall be mitigated at a minimum of one to one ratio for wetland habitat acreage and wetland habitat value.

Streams, including surface water and groundwater, shall be protected in accordance with the following standards:

(a) Surface and groundwater shall be protected from siltation and pollutants which may diminish water quality as required by Federal Clean Water Act §301 et seq. (33 U.S.C. §1311) and §404 et seq. (33 U.S.C. §1344), the Porter-Cologne Water Quality Control Act §13000 et seq., County anti-siltation ordinances, the Regional Water Quality Control Board or the State Water Resources Control Board.

(b) In-stream surface mining operations shall be conducted in compliance with Section 16000 et seq. of the California Fish and Game Code, §404 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. §403).

(c) Extraction of sand and gravel from river channels shall be regulated to control channel degradation in order to prevent undermining of bridge supports, exposure of pipelines or other structures buried within the channel, loss of spawning habitat, lowering of ground water levels, destruction of riparian vegetation, and increased stream bank erosion (exceptions may be specified in the approved reclamation plan). Changes in channel elevations and bank erosion shall be evaluated annually using records of annual extraction quantities and benchmarked annual cross sections and/or sequential aerial photographs to determine appropriate extraction locations and rates.

(d) In accordance with requirements of the California Fish and Game Code §1600 et seq., instream mining activities shall not cause fish to become entrapped in pools or in off-channel pits, nor shall they restrict spawning or migratory activities.

4.3 California Environmental Quality Act

The intent of CEQA is to maintain “high-quality ecological systems and the general welfare of the people of the State.” It is the policy of the State to “prevent the elimination of fish or wildlife species due to man’s activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities and examples of the major periods of California history.” CEQA forbids agencies from approving projects

with significant adverse impacts when feasible alternatives or feasible mitigation measures can substantially reduce such impacts.[2]

CEQA Guidelines Section 15065(a) indicates that impacts to state- and federally listed rare, threatened, or endangered plants or animals are significant if they significantly reduce the number or restrict the range of an endangered, rare, or threatened species. Under CEQA Guidelines Section 15380, impacts to other species ("special status species") that meet certain criteria (i.e., it can be shown that the species' survival in the wild is in jeopardy or it is at risk of becoming endangered in the near future) but are not officially listed also may be considered significant by the lead agency under CEQA, depending on the applicability of other laws (e.g., MBTA) and the discretion of the lead agency. For example, CDFW interprets Lists 1A, 1B, and 2 of the CNPS Inventory of Rare and Endangered Vascular Plants of California to consist of plants that, in a majority of cases, would qualify for listing as rare, threatened, or endangered. However, the determination of whether an impact is significant is a function of the lead agency, absent the protection of other laws. Projects subject to CEQA review must specifically address potential impacts to listed species and provide mitigation measures if the impact is significant.

4.3.1 California Oak Woodlands Conservation Act

California Senate Bill 1334, the Oak Woodlands Conservation Act, became law on January 1, 2005 and was added to CEQA as Public Resources Code Section 21083.4. This law protects oak woodlands that are not protected under the Z'Berg-Nejedly Forest Practice Act (Pub. Res. Code §§4511-4628). This Act requires a county to determine whether or not a project would result in a significant impact on oak woodlands and, when a project would result in a significant impact on oak woodlands, to implement mitigation measures as prescribed under the Public Resources Code to reduce or compensate for the loss of oak woodlands.

4.3.2 California Environmental Quality Act Guidelines Section 15380

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines Section 15380(b) provides that a species not included on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the FESA definition and the FGC section that addresses rare or endangered plants or animals. This section was included in the CEQA Guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a "candidate species" that has not yet been listed by either USFWS or CDFW. Thus, CEQA provides a CEQA lead agency with the ability to protect a species from a project's potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

4.4 California Fish and Game Code

4.4.1 California Endangered Species Act

Under the California Endangered Species Act (CESA) (FGC §2070 et seq.), CDFW has the responsibility for maintaining a list of threatened and endangered species. CDFW also maintains a list of "candidate species," which are species formally noticed as being under review for addition to either the

[2] The California Environmental Quality Act also provides that a project might be approved in spite of residual, unmitigated significant impacts, by adoption of a statement of overriding social and economic considerations in situations where mitigation or alternatives are deemed infeasible.

list of endangered species or the list of threatened species. In addition, CDFW maintains lists of "species of special concern," which serve as "watch lists." Pursuant CESA requirements, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species could be present in the area affected by the project and determine whether the proposed project could have a potentially significant impact on such species. In addition, CDFW encourages informal consultation on any proposed project that may affect a candidate species.

4.4.2 California Native Plant Protection Act

State listing of plant species began in 1977 with the passage of the California Native Plant Protection Act (NPPA), which directed CDFW (then California Department of Fish and Game) to carry out the legislature's intent to "preserve, protect, and enhance endangered plants in this State." The NPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. CESA expanded upon the original NPPA and enhanced legal protection for plants. CESA established threatened and endangered species categories and grandfathered all rare animals—but not rare plants—into the act as threatened species. Thus, there are three listing categories for plants in California: rare, threatened, and endangered.

4.4.3 Nesting Birds

Under FGC Section 3503, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. In turn, Section 3503.3 prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs.

4.4.4 Fully Protected Species

The FGC also allows the designation of a species as Fully Protected (see §3511 regarding birds, §4700 regarding mammals, §5050 regarding reptiles and amphibians, and §5515 regarding fish). This designation provides a greater level of protection than is afforded by CESA, and until recently, fully protected species could not be taken at any time. On October 18, 2011, Senate Bill 618 was signed into law, which permits take of fully protected species where a Natural Communities Conservation Plan has been approved and is being implemented to ensure protection of those species.

4.4.5 Sensitive Natural Communities

Sensitive natural communities are identified as such by CDFW's Natural Heritage Division and include those that are naturally rare and those whose extent has been greatly diminished through changes in land use. The CNDDB tracks 135 such natural communities in the same way that it tracks occurrences of special-status species: information is maintained on each site's location, extent, habitat quality, level of disturbance, and current protection measures. CDFW is mandated to seek the long-term perpetuation of the areas in which these communities occur. While there is no statewide law that requires protection of all sensitive natural communities, CEQA requires consideration of a project's potential impacts on biological resources of statewide or regional significance.

4.5 Wetlands and Jurisdictional Waters

4.5.1 U.S. Army Corps of Engineers

Wetlands and other waters (e.g., rivers, streams, and natural ponds) are a subset of waters of the United States and receive protection under CWA Section 404. The term "waters of the United States," as defined in the Code of Federal Regulations (33 CFR 328.3[a]; 40 CFR 230.3[s]), includes: (1) all waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; (2) all interstate waters, including interstate wetlands; (3) territorial seas; (4) all impoundments of waters otherwise identified as waters of the United States under this section; (5) all tributaries of waters identified in (1) through (3); (6) all waters adjacent to a water identified in (1) through (5), including wetlands, ponds, lakes, oxbows, impoundments, and similar waters; (7) all prairie potholes, Carolina bays and Delmrva bays, pocosins, western vernal pools, and Texas coastal prairie wetlands where they are determined, on a case-specific basis, to have a significant nexus to a water identified in (1) through (3); and (8) all waters located within the 100-year floodplain of a water identified in (1) through (3) and all waters located within 4,000 feet of the high tide line or ordinary high water mark of a water identified in (1) through (5) where they are determined on a case-specific basis to have a significant nexus to a water identified in (1) through (3).

USACE has primary federal responsibility for administering regulations that concern waters of the United States. In this regard, the USACE acts under two statutory authorities: Rivers and Harbors Act (§§9, 10), which governs specified activities in "navigable waters,"[3] and CWA (§404), which governs specified activities in waters of the United States, including wetlands. USACE requires a permit if a project proposes placement of structures within navigable waters and/or alteration of waters of the United States. Some classes of fill activities may be authorized under Regional General or Nationwide permits if specific conditions are met. The Nationwide permit outlines general conditions and may specify project-specific conditions as required by USACE during the Section 404 permitting process. When a project's activities do not meet the conditions for a Nationwide Permit, USACE may issue an Individual Permit or Letter of Permission. USACE has a policy of no net loss of wetlands and typically requires mitigation for all impacts to wetlands before it will issue a permit under CWA Section 404. U.S. Environmental Protection Agency has the ultimate authority for designating dredge and fill material disposal sites and can veto the USACE's issuance of a permit to fill jurisdictional waters of the United States.

The federal government also supports a policy of minimizing "the destruction, loss, or degradation of wetlands." Executive Order 11990 (May 24, 1977) requires that each federal agency take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

4.5.2 San Francisco Bay Regional Water Quality Control Board

The San Francisco Bay RWQCB regulates waters of San Francisco Bay under the Porter-Cologne Act (Water Code §13000 et seq.). Dredging, filling, or excavation of isolated waters constitutes a discharge of waste to waters of the State. Under the Porter-Cologne Act, anyone who discharges waste or proposes to discharge waste within any region that could affect the quality of the waters of the state must file a

[3] Navigable waters are defined as those waters that are subject to the ebb and flow of the tide or that are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

"report of waste discharge" with the applicable RWQCB. The RWQCB then issues a permit (called "waste discharge requirements" or WDRs) implementing relevant water quality control plans and taking into consideration the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, and the need to prevent nuisances (Water Code §13263).

In addition, California has been delegated CWA Section 402 permit authority for the National Pollutant Discharge Elimination System permit program including stormwater permits. Although the issuance of Section 404 permits remains the responsibility of the USACE, the State actively uses its CWA Section 401 water quality certification authority to ensure that Section 404 permits protect state water quality standards. The RWQCB has a policy of no net loss of wetlands and typically requires mitigation for all impacts to wetlands before it will issue a water quality certification under CWA Section 401.

4.5.3 California Department of Fish and Wildlife

Under FGC Sections 1600–1616, CDFW regulates activities that would substantially divert, obstruct the natural flow of, or substantially change rivers, streams, and lakes. The jurisdictional limits are defined in Section 1602 as the "bed, channel, or bank of any river, stream, or lake." In practice, CDFW may exert authority over activities near such features that adversely affect fish and wildlife resources associated with them. Activities that would "deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake" are prohibited by CDFW unless a streambed alteration agreement is issued.

4.6 Local Plans and Policies

4.6.1 Santa Clara County General Plan

Several policies and goals in the Santa Clara County General Plan (1994) provide for the protection of biotic resources. Relevant Resource Conservation Policies and Implementation Measures include:

C-RC 2. The County shall provide leadership in efforts to protect or restore valuable natural resources, such as wetlands, riparian areas, and woodlands, and others:

a. for County-owned lands; and

b. through multi-jurisdictional endeavors.

R-RC 19. Habitat types and biodiversity within Santa Clara County and the region should be maintained and enhanced for their ecological, functional, aesthetic, educational, medicinal, and recreational importance.

R-RC 20. Strategies and policies for maintaining and enhancing habitat and biodiversity should include the following:

1. Improve current knowledge and awareness of habitats and natural areas.

2. Protect the biological integrity of critical habitat areas.

3. Encourage habitat restoration wherever possible.

4. Evaluate the effectiveness of project mitigations as required under CEQA.

R-RC 31. Natural streams, riparian areas, and freshwater marshes shall be left in their natural state providing for percolation and water quality, fisheries, wildlife habitat, aesthetic relief, and educational or recreational uses that are environmentally compatible. Streams which may still provide spawning areas for anadromous fish species should be protected from pollution and development impacts which would degrade the quality of the stream environment.

R-RC 32. Riparian and freshwater habitats shall be protected through the following general means: a. setback of development from the top of the bank; b. regulation of tree and vegetation removal; c. reducing or eliminating use of herbicides, pesticides, and fertilizers by public agencies; d. control and design of grading, road construction, and bridges to minimize environmental impacts and avoid alteration of the streambed and stream banks (freespan bridges and arch culverts, for example); and e. protection of endemic, native vegetation.

R-RC 37. Lands near creeks, streams, and freshwater marshes shall be considered to be in a protected buffer area, consisting of the following: 1. 150 feet from the top bank on both sides where the creek or stream is predominantly in its natural state; 2. 100 feet from the top bank on both sides of the waterway where the creek or stream has had major alterations; and 3. In the case that neither (1) nor (2) are applicable, an area sufficient to protect the stream environment from adverse impacts of adjacent development, including impacts upon habitat, from sedimentation, biochemical, thermal and aesthetic impacts.

R-RC 38. Within the aforementioned buffer areas, the following restrictions and requirements shall apply to public projects, residential subdivisions, and other private nonresidential development: a. No building, structure or parking lots are allowed, exceptions being those minor structures required as part of flood control projects. b. No despoiling or polluting actions shall be allowed, including grubbing, clearing, unrestricted grazing, tree cutting, grading, or debris or organic waste disposal, except for actions such as those necessary for fire suppression, maintenance of flood control channels, or removal of dead or diseased vegetation, so long as it will not adversely impact habitat value. c. Endangered plant and animal species shall be protected within the area.

R-RC 43. Large scale grading and clearing of land should not be allowed if it will significantly degrade valuable habitat or impair surface water quality.

R-RC 49. Retention and planting of native plant species shall be encouraged, especially for landscape uses.

R-RC 53. Restoration of habitats should be encouraged and utilized wherever feasible, especially in cases where habitat preservation and flood control, water quality, or other objectives can be successfully combined. Implementation of the Project would be consistent with these policies and goals.

4.6.2 Santa Clara County Oak Woodlands Impact Guidelines

In accordance with the Oak Woodlands Conservation Act, the County created the *Guide to Evaluating Oak Woodlands Impacts* (Santa Clara County 2011b). According to the County's guidelines, a land development project is considered to have a significant direct impact on oak woodlands if the project will result in a decrease of 0.5 acre or more of native oak canopy within oak woodland on the project site. The County specifies mitigation measures for significant impacts to oak woodlands, which are based on the mitigation measures required under Public Resources Code Section 21083.4.

5. Impact Evaluation

This evaluation recognizes that biological resources would be impacted by mining in the North Highwall Lay-Back area, as well as reclamation after mining is completed. Mining would remove all vegetation and habitat features within the approximately 20-acre disturbance area. This habitat removal would directly impact any plant and animal species in the affected area. In addition, noise and vibration could indirectly affect any animals in habitat adjacent to the direct disturbance area. After mining is complete, reclamation activities will involve grading and stabilizing the ridgeline for proper drainage and in preparation for installing plantings on disturbed areas, in accordance with the revegetation plan component of the Project.

Consistent with the County's Environmental Checklist and Appendix G of the CEQA Guidelines (as amended in December 2018), the North Highwall Lay-Back component of the Project would have a significant impact on biological resources if it would:

(a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS

(b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW or USFWS

(c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means

(d) Have a substantial adverse effect on oak woodland habitat as defined by Oak Woodlands Conservation Law (conservation/loss of oak woodlands) – Pub. Res. Code §21083.4

(e) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites

(f) Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan

(g) Conflict with any local policies or ordinances protecting biological resources:

   i. Tree Preservation Ordinance [Section C16]

   ii. Wetland Habitat [GP Policy, R-RC 25-30]

   iii. Riparian Habitat [GP Policy, R-RC 31-41]

CEQA Guidelines Section 15382 identifies a significant effect on the environment as a "…substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance."

CEQA Guidelines Section 15065 directs lead agencies to find that a project may have a significant effect if it has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish and wildlife species, cause a fish or wildlife population to drop below self-sustaining

levels, threaten to eliminate a plant or wildlife community, or reduce the number or restrict the range of an endangered, rare, or threatened species.

CEQA Guidelines Section 15380 further provides that a plant or wildlife species, even if not on one of the official lists, may be treated as "rare or endangered" if, for example, it is likely to become endangered in the foreseeable future.

In addition to the above, the CDFW and USFWS consider a project to have a significant impact if it were to cause a change in species composition or result in the measurable degradation of sensitive habitats, such as wetlands.

The impact discussions below focus on resources determined to have potential to be affected by mining and/or reclamation in the North Highwall Lay-Back area. Special-status species that are not expected to occur in the Study Area (because no suitable habitat is present or the area is outside the species' current range), including special-status and migratory bird species that are unlikely to nest in the Study Area, would not be adversely affected and are therefore not addressed further.

5.1 Impacts and Mitigation Measures

The sections below address potential impacts associated with each of the criteria listed above, based on the County's Environmental Checklist and Appendix G of the CEQA Guidelines. Each impact discussion separately addresses effects associated with mining and effects associated with reclamation. For each potentially significant impact, recommendations are provided that would avoid or reduce the impact to less than significant.

(a) Would the Project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS?

Impact 1: Mining and reclamation activities associated with the North Highwall Lay-Back could result in adverse effects on special-status and migratory birds.

Effects of Mining

Potentially suitable foraging and/or nesting habitat for several special-status birds is present throughout oak woodland/forest, scrub, and chaparral communities in the Study Area (see Table 3). Based on the habitat conditions, only white-tailed kite, olive-sided flycatcher, and yellow warbler, have moderate potential to occur in the Study Area, and white-tailed kite is the only species with moderate potential to nest in the Study Area. Olive-sided flycatcher and yellow warbler are unlikely to nest in the Study Area, because the forest is not typical of their preferred nesting habitat. Long-eared owl (*Asio otus*) and purple martin (*Progne subis*) have low potential to occur in the Study Area, because the habitat is only marginally suitable and both species are rare in Santa Clara County. 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 MBTA and FGC. Many common bird species are likely to occur and could nest in the Study Area. Vegetation removal and grading associated with initial site preparation and mining activities could directly impact nesting birds by damaging or destroying active nests, causing adults to abandon nests, and/or directly killing or injuring nesting birds and their eggs or young. Additionally, elevated sound levels from heavy

equipment use during initial site preparation and mining could cause birds nesting nearby to abandon nests, particularly raptors and other species that are less tolerant of disturbance.

Based on current USFWS guidance, loss of migratory birds that could result from initial site preparation and mining activities would not violate the MBTA, because it would not be considered intentional take. However, loss of migratory birds, including destruction of certain nests or eggs, could be considered a violation of FGC Section 3503 and 3503.5.

Because extensive areas of oak woodland/forest, scrub, and chaparral habitats are present on other portions of the Permanente property and in adjacent and nearby undeveloped lands, habitat loss associated with mining in the North Highwall Lay-Back area is not anticipated to have a substantial adverse effect on the overall populations or distribution of any bird species. However, if active nests of special-status birds are present when vegetation removal and other initial ground disturbance activities occur, these activities could directly destroy active nests and/or disturb nesting birds to an extent that results in nest failure or reduced nest success. Mining activities that directly or indirectly cause such effects to special-status bird species would be considered a significant impact.

Effects of Reclamation

Activities associated with reclamation of the North Highwall Lay-Back area would include soil placement and revegetation. Compared to mining activities, these reclamation activities would be less intensive in terms of equipment operation, materials movement, etc. No new areas of vegetation clearing would be required for reclamation, and reclamation would reestablish vegetation, including shrubs and trees that would mature over time and provide nesting and foraging opportunities for special-status and migratory bird species. Although the potential impact to special-status and migratory birds would be substantially less during reclamation than mining, the impact of reclamation activities is considered potentially significant, because of the potential for reclamation activities to disturb special-status nesting birds and cause nest failure or reduce nest success.

Recommended Measures for Impact 1

Initial tree removal and vegetation clearing in preparation for mining should be conducted either during the non-nesting season or during the nesting season only after preconstruction surveys confirm the absence of special-status and migratory bird species. If such species are identified in areas where they could be disturbed from initial tree removal and vegetation clearing, buffers sufficient to avoid adverse effects should be established in coordination with CDFW. Measures similar to those established in 2012 Conditions of Approval 46 and 47 would ensure potential impacts to special-status and migratory bird species are sufficiently mitigated.

Impact 2: Mining and reclamation activities associated with the North Highwall Lay-Back could result in adverse effects on special-status bats.

Effects of Mining

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 in the Study Area contains marginally suitable roost sites for these bats.

Tree removal associated with initial site preparation and mining could directly impact roosting bats, and elevated sound levels from heavy equipment could cause adult bats to abandon maternity roosts. In addition, increase in night lighting associated with mining activities could disturb bat movement.

Because extensive areas of woodland and forest habitat are present in other portions of the Permanente property and in adjacent and nearby undeveloped lands, habitat loss or abandonment associated with mining in the North Highwall Lay-Back area is not anticipated to have a substantial adverse effect on the overall populations or distribution of western red bat or pallid bat. However, potential mortality of individuals at active roosts or maternity roost abandonment could have a substantial adverse effect, and mining activities that directly or indirectly cause roost mortality or maternity roost abandonment would be considered a significant impact.

Effects of Reclamation

Activities associated with reclamation of the North Highwall Lay-Back area would include soil placement and revegetation. Compared to mining activities, these reclamation activities would be less intensive in terms of equipment operation, materials movement, etc. No new areas of vegetation clearing would be required for reclamation, and reclamation would reestablish vegetation, including trees that would mature over time and provide potential bat roosting habitat. Although the potential impact to special-status bat species would be substantially less during reclamation than mining, the impact of reclamation activities is considered potentially significant, because of the potential for reclamation activities to cause maternity roost abandonment.

Recommended Measures for Impact 2

Initial tree removal and vegetation clearing in preparation for mining should be conducted either during the non-roosting and non-hibernation seasons or during these seasons only after preconstruction surveys confirm the absence of special-status bat species. If such species are identified in areas where they could be disturbed from initial tree removal and vegetation clearing, buffers sufficient to avoid adverse effects should be established in coordination with CDFW. Felled trees determined to be potential roosting habitat should not be chipped or otherwise disturbed for 48 hours to allow escape. Additionally, any special-status bat species roosts destroyed during site preparation should be replaced with a suitable roost. Measures similar to those established in 2012 Conditions of Approval 48 through 52 would ensure potential impacts to special-status bat species are sufficiently mitigated.

Impact 3: Mining and reclamation activities associated with the North Highwall Lay-Back could result in adverse effects on the San Francisco dusky-footed woodrat.

Effects of Mining

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 in the Study Area. Vegetation removal and grading associated with initial site preparation and mining activities could directly impact dusky-footed woodrats. Direct impacts associated with mining could include injury or mortality of adults or young, as well as destruction of woodrat stick nests. Indirect impacts to dusky-footed woodrat associated with mining could include increased night time lighting, noise or other mining-related disturbances that result in nest abandonment.

Because extensive areas of oak woodland/forest, scrub, and chaparral habitat are present on other portions of the Permanente property and in adjacent and nearby undeveloped lands, habitat loss associated with mining in the North Highwall Lay-Back area is not anticipated to have a substantial

adverse effect on the overall population or distribution of San Francisco dusky-footed woodrat. However, potential mortality of adults and young could have a substantial adverse effect, and mining activities that directly or indirectly cause mortality would be considered a significant impact.

Effects of Reclamation

Activities associated with reclamation of the North Highwall Lay-Back area would include soil placement and revegetation. Compared to mining activities, these reclamation activities would be less intensive in terms of equipment operation, materials movement, etc. No new areas of vegetation clearing would be required for reclamation, and reclamation would reestablish vegetation, including shrubs and trees that would mature over time and provide habitat for dusky-footed woodrat. Although the potential impact to San Francisco dusky-footed woodrat would be substantially less during reclamation than mining, the impact of reclamation activities is considered potentially significant, because of the potential for reclamation activities to cause woodrat mortality.

Recommended Measures for Impact 3

Preconstruction surveys in suitable habitat should be conducted to identify the presence of any dusky-footed woodrat stick nests and, if identified, such nests should be relocated under supervision of a qualified biologist. In the event that young woodrats are identified within the nests, the nest should be left undisturbed to allow sufficient time (up to approximately 3 weeks) for young to mature and leave the nest. Measures similar to those established in 2012 Conditions of Approval 53 and 54 would ensure potential impacts to San Francisco dusky-footed woodrat are sufficiently mitigated.

Impact 4: Mining and reclamation activities associated with the North Highwall Lay-Back are unlikely to result in adverse effects on special-status amphibians.

Four special-status amphibian species have low potential to occur in the Study Area: Santa Cruz black salamander (*Aneides flavipunctatus niger*), California giant salamander (*Dicamptodon ensatus*), red-bellied newt (*Taricha rivularis*), and California red-legged frog (*Rana draytonii*). Although these species have been documented on and/or near the Permanente property, they are unlikely to occur in the Study Area, because conditions along this ridge are relatively dry, and no suitable habitat for species that breed in aquatic habitats (giant salamander, red-bellied newt, and red-legged frog) is present in or near the Study Area. Therefore, individuals are unlikely to disperse through the Study Area in transit to more suitable habitat elsewhere, particularly because the North Quarry acts as a barrier to dispersal from the south. Neither mining nor reclamation activities in the North Highwall Lay-Back area are expected to affect special-status amphibians, because these species are unlikely to occur in the Study Area. Therefore, these activities would not have a substantial adverse effect, and this impact would be less than significant.

Recommended Measures for Impact 4

Impact 4 is considered less than significant and no mitigation is required.

Impact 5: Mining and reclamation activities associated with the North Highwall Lay-Back are unlikely to result in selenium-burdened runoff reaching aquatic habitats and, thereby, in deleterious effects to aquatic organisms and their prey base.

Effects of Mining

Selenium is a bio-accumulative pollutant and potential aquatic species exposure to selenium is primarily through their diet. Risks stem from aquatic life eating food that is contaminated with selenium, rather than from direct exposure to selenium in the water. Although selenium accumulates in tissues of aquatic organisms, concentrations of selenium do not increase significantly in animals at each level of the food chain. For aquatic life, the toxic effects with the lowest thresholds are effects on the growth and survival of juvenile fish and effects on larval offspring of adult fish that were exposed to excessive selenium. In the latter case, besides reducing survival, selenium causes skeletal deformities. Selenium can also be a risk to birds that eat aquatic organisms that have been exposed to selenium.

If certain types of limestone are exposed to air and precipitation, selenium could be released and contained in runoff from mined surfaces. If stormwater runoff or groundwater seepage runoff containing selenium discharges to adjacent drainages, it would create the potential for significant adverse impacts to aquatic habitat. Potential indirect effects to amphibian species associated with stormwater runoff quality from exposed limestone areas during mining could occur if such runoff were to be discharged without appropriate treatment. Mining within the North Highwall Lay-Back area would involve active ground disturbance and could result in increased exposure of stormwater runoff to exposed limestone. All such runoff will be within the North Quarry and conveyed to onsite treatment facilities consistent with existing North Quarry water management. Lehigh has installed and operates a water treatment system to treat runoff water prior to discharge to Permanente Creek. The treatment system reduces concentrations of selenium discharged to levels below the surface water quality standard of 5 µg/L (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) and below the more stringent discharge requirements set forth in the Permanente Quarry individual National Pollutant Discharge Elimination System (NPDES) permit (Golder 2019). Storm water runoff from the North Highwall Lay-Back area during operations will be managed and treated as process water in the existing water treatment system. This water will be returned to Permanente Creek only after being treated, eliminating the potential for water quality effects on aquatic resources associated with potential selenium runoff during mining.

Effects of Reclamation

Under reclaimed conditions, surface water runoff from the North Quarry Highwall (including the North Highwall Lay-Back area) will run down the quarry walls and infiltrate the North Quarry backfill material to mix with the North Quarry water (i.e., groundwater in the backfill material). Where vegetated soil covers are established, the peak runoff flow rates will be substantially lower than in the operational period, and the water quality is expected to improve due to reduced exposure and attenuation of runoff and metals, sulfate, and other constituents. Once the North Quarry is backfilled and groundwater returns to regional groundwater levels, selenium concentrations in the North Quarry water are predicted to be less than 5 µg/L (Golder 2019). The water will continue to be managed and treated under an NPDES permit prior to discharging to Permanente Creek until water quality objectives are met, eliminating the potential for water quality effects on aquatic resources associated with potential selenium runoff under reclaimed conditions.

Recommended Measures for Impact 5

Impact 5 is considered less than significant, and no mitigation is required.

(b) Would the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations by the CDFW or USFWS?

The Study Area does not include any riparian habitat. Potential effects of mining and reclamation on oak woodland/forest within North Highwall Lay-Back area are discussed below. Potential impacts to wetlands are considered below, under **(c)**.

Impact 6: Mining and reclamation activities associated with the North Highwall Lay-Back would result in loss of native oak woodland.

Effects of Mining

As shown in Figure 2 and presented in Table 1, approximately 29 acres of oak woodland/forest is present in the Study Area, approximately 12 acres of which are in the disturbance area footprint. According to County guidelines, protected oak woodland includes a woodland (grouping of trees) on a unit of land where oak trees encompass 10 percent or greater of the canopy cover (the 10 percent canopy cover applies to the individual woodland and not the entire project site). Canopy cover in oak woodland/forest in the North Highwall Lay-Back area includes more than 10 percent oak and, therefore, may be subject to the County guidelines. Initial site preparation and mining would remove approximately 12 acres of oak woodland/forest habitat within the disturbance area. Because County guidelines indicate a decrease of 0.5 acre or more of native oak canopy within oak woodland on a project site is considered to have a significant direct impact on oak woodlands, removal of approximately 12 acres of oak woodland during mining activities in the North Highwall Lay-Back area is considered a significant impact.

In addition to the direct loss of oak woodland/forest, vegetation clearing and soil movement associated with mining in the North Highwall Lay-Back area could introduce non-native plant species that outcompete native oak trees or introduce Sudden Oak Death into adjacent or other oak woodland/forest. Sudden Oak Death is caused by *Phytophthora ramorum*, an invasive water mold of unknown origin. This pathogen produces small sacs (sporangia) of swimming spores that readily break off and can spread in rain splash, drip, stem flow, wind, and by contaminated materials. Sudden Oak Death has killed millions of trees since it first became evident in the mid-1990s, and has resulted in reduced ecosystem functions, increased fire and safety hazards, and reduced property values in developed areas (BLM 2009). Focused surveys for sudden oak death have not been conducted on the Permanente property; however, sudden oak death is assumed to occur on the property, due to the close proximity of known infected areas (WRA 2011). Humans and construction equipment working in areas that are infected with Sudden Oak Death could spread this disease to non-infected areas on the Permanente property and surrounding areas. Common host species known or with potential to occur on or near the Study Area include coast live oak, madrone, and manzanita. Introduction of non-native species or Sudden Oak Death into healthy oak woodland as a result of contaminated site preparation or mining equipment would have a substantial adverse effect on oak woodland and is considered a potentially significant impact.

Effects of Reclamation

Activities associated with reclamation of the North Highwall Lay-Back area would include soil placement and revegetation. Compared to mining activities, these reclamation activities would be less intensive. No oak tree removal would be required for reclamation, and reclamation would reestablish vegetation that would mature over time. Reclamation of the Permanente Quarry site under the proposed

reclamation plan amendment and associated revegetation plan would establish over 27 acres of oak woodland, with oak trees planted at densities of 200 to 470 trees per acre, depending on soils conditions. Although no oak trees would be removed and reclamation activities would be less intensive than mining activities, reclamation would have potential to introduce non-native species or Sudden Oak Death into adjacent oak woodland/forest or to oak trees planted in the North Highwall Lay-Back area as part of the reclamation process. Such introduction during reclamation could have a substantial adverse effect on oak woodland and is considered a potentially significant impact.

Recommended Measures for Impact 6

Measures should be implemented to comply with the Santa Clara County Oak Woodland Mitigation Guidelines for the loss of oak trees associated with mining within the North Highwall Lay-back area. Measures should include one or a combination of 1) planting replacement oak trees at a ratio commensurate with the quality of the affected area, 2) establishing an oak woodland conservation easement of a size and quality commensurate with the quality of the affected area, 3) other options that may be deemed appropriate and feasible through coordination between Lehigh and the County. Additionally, measures should be implemented to minimize the potential for import, export, or on-site movement of any vegetation or soils having the potential to introduce or spread *Phytophthora ramorum* spores. Measures similar to those established in 2012 Conditions of Approval 55 and 56 would ensure potential impacts associated with Sudden Oak Death are sufficiently mitigated.

(c) Would the Project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Impact 7: Mining and reclamation activities would not affect state or federally protected wetlands through direct removal, filling, hydrological interruption, or other means.

No features that qualify as state or federally protected wetlands, subject to jurisdiction of USACE, San Francisco Bay RWQCB, or CDFW are present in the Study Area. Therefore, neither mining or reclamation activities has potential for such wetlands to be adversely affected and there would be no impact to this resource.

(d) Would the Project have a substantial adverse effect on oak woodland habitat as defined by Oak Woodlands Conservation Law (conservation/loss of oak woodlands) – Pub. Res. Code §21083.4?

See discussion above, under **(b)**, **Impact 6**.

(e) Would the Project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.

The Study Area does not specifically serve as a wildlife corridor, although terrestrial wildlife is likely to travel through the area. The Study Area does not support aquatic habitat, and therefore does not provide for movement of fish or aquatic wildlife. Potential effects of mining and reclamation on terrestrial wildlife movement through the Study Area are discussed below. Potential impacts to nursery sites associated with nesting birds and bat maternity roosts are considered above, under **(a)**, **Impact 1** and **Impact 2.**

Impact 8: Mining and reclamation activities would not interfere substantially with fish or wildlife movement.

Effects of Mining

The Study Area is part of a much larger extent of woodland/forest, scrub, and chaparral habitats and does not serve as an established corridor or other primary route for wildlife movement. Animals are likely to travel through the Study Area, and movement may be somewhat concentrated along the ridgeline, but this feature is not a major migratory corridor. Therefore, although initial site preparation for mining within the North Highwall Lay-Back area would remove habitat through which animals may currently travel, abundant and equally suitable habitat is immediately adjacent to the north, and such modifications would not substantially interfere with the movement of any wildlife species or with use of an established wildlife corridor.

Effects of Reclamation

Activities associated with reclamation of the North Highwall Lay-Back area would include soil placement and revegetation. No new areas of vegetation clearing would be required for reclamation, and reclamation would reestablish vegetation, including shrubs and trees that would mature over time and provide cover for wildlife movement. In a broader context, habitats on the Permanente property (both existing and to be established with reclamation of other Quarry areas) provide large amounts of forest/woodland, scrub, chaparral, and other habitats that serve as a general corridor for wildlife travel. Localized and small reductions in vegetation cover during mining of the North Highwall Lay-Back area would be compensated for by the substantial increases in wildlife habitat upon final reclamation of this and other areas of the Permanente Quarry, which would greatly increase wildlife movement opportunities within and through the Permanente property.

f) Would the Project conflict with the provisions of any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Impact 9: Mining and reclamation activities would not conflict with the provisions of any adopted habitat conservation plan.

The North Highwall Lay-Back area is not within an area covered by an adopted Habitat Conservation Plan or Natural Community Conservation Plan. The northwest boundary of the Santa Clara Valley Habitat Plan study area/permit area is several miles east of the Permanente property. Neither mining nor reclamation of the North Highwall Lay-Back area would conflict with any provisions, guidelines, goals, or objectives related to this plan.

g) Would the Project conflict with local Santa Clara County policies, including a tree removal ordinance.

This evaluation does not identify inconsistencies with Santa Clara County General Plan policies, including those listed in the Regulatory Setting section above. General Plan consistency is ultimately a determination to be made by County decision makers.

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Appendix A. Special-status Species Query Results

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Cupertino (3712231) OR Mindego Hill (3712232) OR Palo Alto (3712242) OR Big Basin (3712222) OR Castle Rock Ridge (3712221) OR Los Gatos (3712128) OR San Jose West (3712138) OR Milpitas (3712148) OR Mountain View (3712241))
 AND Elevation IS greater than OR equal to "300"

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Allium peninsulare var. franciscanum Franciscan onion	PMLIL021R1	None	None	G5T2	S2	1B.2
Ambystoma californiense California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3	WL
Amsinckia lunaris bent-flowered fiddleneck	PDBOR01070	None	None	G3	S3	1B.2
Aneides flavipunctatus niger Santa Cruz black salamander	AAAAD01070	None	None	G3	S3	SSC
Antrozous pallidus pallid bat	AMACC10010	None	None	G5	S3	SSC
Aquila chrysaetos golden eagle	ABNKC22010	None	None	G5	S3	FP
Arctostaphylos andersonii Anderson's manzanita	PDERI04030	None	None	G2	S2	1B.2
Arctostaphylos glutinosa Schreiber's manzanita	PDERI040G0	None	None	G1	S1	1B.2
Arctostaphylos ohloneana Ohlone manzanita	PDERI042Y0	None	None	G1	S1	1B.1
Arctostaphylos regismontana Kings Mountain manzanita	PDERI041C0	None	None	G2	S2	1B.2
Arctostaphylos silvicola Bonny Doon manzanita	PDERI041F0	None	None	G1	S1	1B.2
Asio otus long-eared owl	ABNSB13010	None	None	G5	S3?	SSC
Bombus caliginosus obscure bumble bee	IIHYM24380	None	None	G4?	S1S2	
Bombus occidentalis western bumble bee	IIHYM24250	None	None	G2G3	S1	
Brachyramphus marmoratus marbled murrelet	ABNNN06010	Threatened	Endangered	G3G4	S1	
Calasellus californicus An isopod	ICMAL34010	None	None	G2	S2	
Calyptridium parryi var. hesseae Santa Cruz Mountains pussypaws	PDPOR09052	None	None	G3G4T2	S2	1B.1
Chorizanthe pungens var. hartwegiana Ben Lomond spineflower	PDPGN040M1	Endangered	None	G2T1	S1	1B.1

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Chorizanthe robusta var. robusta robust spineflower	PDPGN040Q2	Endangered	None	G2T1	S1	1B.1
Cirsium fontinale var. campylon Mt. Hamilton fountain thistle	PDAST2E163	None	None	G2T2	S2	1B.2
Cirsium fontinale var. fontinale Crystal Springs fountain thistle	PDAST2E161	Endangered	Endangered	G2T1	S1	1B.1
Clarkia concinna ssp. automixa Santa Clara red ribbons	PDONA050A1	None	None	G5?T3	S3	4.3
Corynorhinus townsendii Townsend's big-eared bat	AMACC08010	None	None	G3G4	S2	SSC
Dicamptodon ensatus California giant salamander	AAAAH01020	None	None	G3	S2S3	SSC
Dipodomys venustus venustus Santa Cruz kangaroo rat	AMAFD03042	None	None	G4T1	S1	
Dirca occidentalis western leatherwood	PDTHY03010	None	None	G2	S2	1B.2
Dudleya abramsii ssp. setchellii Santa Clara Valley dudleya	PDCRA040Z0	Endangered	None	G4T2	S2	1B.1
Elanus leucurus white-tailed kite	ABNKC06010	None	None	G5	S3S4	FP
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Erethizon dorsatum North American porcupine	AMAFJ01010	None	None	G5	S3	
Eriophyllum latilobum San Mateo woolly sunflower	PDAST3N060	Endangered	Endangered	G1	S1	1B.1
Eryngium jepsonii Jepson's coyote-thistle	PDAPI0Z130	None	None	G2	S2	1B.2
Euphydryas editha bayensis Bay checkerspot butterfly	IILEPK4055	Threatened	None	G5T1	S1	
Falco peregrinus anatum American peregrine falcon	ABNKD06071	Delisted	Delisted	G4T4	S3S4	FP
Fritillaria liliacea fragrant fritillary	PMLIL0V0C0	None	None	G2	S2	1B.2
Geothlypis trichas sinuosa saltmarsh common yellowthroat	ABPBX1201A	None	None	G5T3	S3	SSC
Grimmia torenii Toren's grimmia	NBMUS32330	None	None	G2	S2	1B.3
Grimmia vaginulata vaginulate grimmia	NBMUS32340	None	None	G2G3	S1	1B.1
Haliaeetus leucocephalus bald eagle	ABNKC10010	Delisted	Endangered	G5	S3	FP

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Hesperevax sparsiflora var. brevifolia short-leaved evax	PDASTE5011	None	None	G4T3	S2	1B.2
Hesperocyparis abramsiana var. abramsiana Santa Cruz cypress	PGCUP04081	Threatened	Endangered	G1T1	S1	1B.2
Hesperocyparis abramsiana var. butanoensis Butano Ridge cypress	PGCUP04082	Threatened	Endangered	G1T1	S1	1B.2
Hesperolinon congestum Marin western flax	PDLIN01060	Threatened	Threatened	G1	S1	1B.1
Hoita strobilina Loma Prieta hoita	PDFAB5Z030	None	None	G2?	S2?	1B.1
Legenere limosa legenere	PDCAM0C010	None	None	G2	S2	1B.1
Lessingia micradenia var. glabrata smooth lessingia	PDAST5S062	None	None	G2T2	S2	1B.2
Malacothamnus arcuatus arcuate bush-mallow	PDMAL0Q0E0	None	None	G2Q	S2	1B.2
Monolopia gracilens woodland woollythreads	PDAST6G010	None	None	G3	S3	1B.2
Myotis yumanensis Yuma myotis	AMACC01020	None	None	G5	S4	
North Central Coast Drainage Sacramento Sucker/Roach River North Central Coast Drainage Sacramento Sucker/Roach River	CARA2623CA	None	None	GNR	SNR	
Northern Interior Cypress Forest Northern Interior Cypress Forest	CTT83220CA	None	None	G2	S2.2	
Oncorhynchus kisutch pop. 4 coho salmon - central California coast ESU	AFCHA02034	Endangered	Endangered	G4	S2?	
Oncorhynchus mykiss irideus pop. 8 steelhead - central California coast DPS	AFCHA0209G	Threatened	None	G5T2T3Q	S2S3	
Orthotrichum kellmanii Kellman's bristle moss	NBMUS56190	None	None	G2	S2	1B.2
Pandion haliaetus osprey	ABNKC01010	None	None	G5	S4	WL
Pedicularis dudleyi Dudley's lousewort	PDSCR1K0D0	None	Rare	G2	S2	1B.2
Penstemon rattanii var. kleei Santa Cruz Mountains beardtongue	PDSCR1L5B1	None	None	G4T2	S2	1B.2
Pentachaeta bellidiflora white-rayed pentachaeta	PDAST6X030	Endangered	Endangered	G1	S1	1B.1
Piperia candida white-flowered rein orchid	PMORC1X050	None	None	G3	S3	1B.2
Plagiobothrys chorisianus var. chorisianus Choris' popcornflower	PDBOR0V061	None	None	G3T1Q	S1	1B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Plagiobothrys glaber hairless popcornflower	PDBOR0V0B0	None	None	GH	SH	1A
Progne subis purple martin	ABPAU01010	None	None	G5	S3	SSC
Rana boylii foothill yellow-legged frog	AAABH01050	None	Candidate Threatened	G3	S3	SSC
Rana draytonii California red-legged frog	AAABH01022	Threatened	None	G2G3	S2S3	SSC
Senecio aphanactis chaparral ragwort	PDAST8H060	None	None	G3	S2	2B.2
Serpentine Bunchgrass Serpentine Bunchgrass	CTT42130CA	None	None	G2	S2.2	
Speyeria adiaste adiaste unsilvered fritillary	IILEPJ6143	None	None	G1G2T1	S1	
Streptanthus albidus ssp. peramoenus most beautiful jewelflower	PDBRA2G012	None	None	G2T2	S2	1B.2
Taricha rivularis red-bellied newt	AAAAF02020	None	None	G4	S2	SSC
Thamnophis sirtalis tetrataenia San Francisco gartersnake	ARADB3613B	Endangered	Endangered	G5T2Q	S2	FP
Trifolium buckwestiorum Santa Cruz clover	PDFAB402W0	None	None	G2	S2	1B.1
Trimerotropis infantilis Zayante band-winged grasshopper	IIORT36030	Endangered	None	G1	S1	
Usnea longissima Methuselah's beard lichen	NLLEC5P420	None	None	G4	S4	4.2

Record Count: 73

CNPS California Native Plant Society

Plant List

Inventory of Rare and Endangered Plants

75 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3712242, 3712241, 3712148, 3712232, 3712231, 3712138, 3712222, 3712221 and 3712128; Elevation is above 300 feet

Modify Search Criteria | Export to Excel | Modify Columns | Modify Sort | Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Acanthomintha duttonii	San Mateo thorn-mint	Lamiaceae	annual herb	Apr-Jun	1B.1	S1	G1
Allium peninsulare var. franciscanum	Franciscan onion	Alliaceae	perennial bulbiferous herb	(Apr)May-Jun	1B.2	S1	G5T1
Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	annual herb	Mar-Jun	1B.2	S2S3	G2G3
Androsace elongata ssp. acuta	California androsace	Primulaceae	annual herb	Mar-Jun	4.2	S3S4	G5? T3T4
Anomobryum julaceum	slender silver moss	Bryaceae	moss		4.2	S2	G5?
Arabis blepharophylla	coast rockcress	Brassicaceae	perennial herb	Feb-May	4.3	S4	G4
Arctostaphylos andersonii	Anderson's manzanita	Ericaceae	perennial evergreen shrub	Nov-May	1B.2	S2	G2
Arctostaphylos glutinosa	Schreiber's manzanita	Ericaceae	perennial evergreen shrub	(Nov)Mar-Apr	1B.2	S1	G1
Arctostaphylos ohloneana	Ohlone manzanita	Ericaceae	evergreen shrub	Feb-Mar	1B.1	S1	G1
Arctostaphylos regismontana	Kings Mountain manzanita	Ericaceae	perennial evergreen shrub	Dec-Apr	1B.2	S2	G2
Arctostaphylos silvicola	Bonny Doon manzanita	Ericaceae	perennial evergreen shrub	Jan-Mar	1B.2	S1	G1
Atriplex depressa	brittlescale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
Atriplex minuscula	lesser saltscale	Chenopodiaceae	annual herb	May-Oct	1B.1	S2	G2
Calandrinia breweri	Brewer's calandrinia	Montiaceae	annual herb	(Jan)Mar-Jun	4.2	S4	G4
Calyptridium parryi var. hesseae	Santa Cruz Mountains pussypaws	Montiaceae	annual herb	May-Aug	1B.1	S2	G3G4T2
Centromadia parryi ssp. congdonii	Congdon's tarplant	Asteraceae	annual herb	May-Oct(Nov)	1B.1	S2	G3T2
Chorizanthe pungens var. hartwegiana	Ben Lomond spineflower	Polygonaceae	annual herb	Apr-Jul	1B.1	S1	G2T1
Chorizanthe robusta var. robusta	robust spineflower	Polygonaceae	annual herb	Apr-Sep	1B.1	S1	G2T1
	Mt. Hamilton fountain	Asteraceae	perennial herb	(Feb)Apr-	1B.2	S2	G2T2

Cirsium fontinale var. campylon	thistle			Oct			
Cirsium fontinale var. fontinale	Crystal Springs fountain thistle	Asteraceae	perennial herb	(Apr)May-Oct	1B.1	S1	G2T1
Cirsium praeteriens	lost thistle	Asteraceae	perennial herb	Jun-Jul	1A	SX	GX
Clarkia breweri	Brewer's clarkia	Onagraceae	annual herb	Apr-Jun	4.2	S4	G4
Clarkia concinna ssp. automixa	Santa Clara red ribbons	Onagraceae	annual herb	(Apr)May-Jun(Jul)	4.3	S3	G5?T3
Clarkia lewisii	Lewis' clarkia	Onagraceae	annual herb	May-Jul	4.3	S4	G4
Collinsia multicolor	San Francisco collinsia	Plantaginaceae	annual herb	(Feb)Mar-May	1B.2	S2	G2
Cypripedium fasciculatum	clustered lady's-slipper	Orchidaceae	perennial rhizomatous herb	Mar-Aug	4.2	S4	G4
Dirca occidentalis	western leatherwood	Thymelaeaceae	perennial deciduous shrub	Jan-Mar(Apr)	1B.2	S2	G2
Dudleya abramsii ssp. setchellii	Santa Clara Valley dudleya	Crassulaceae	perennial herb	Apr-Oct	1B.1	S2	G4T2
Eriogonum nudum var. decurrens	Ben Lomond buckwheat	Polygonaceae	perennial herb	Jun-Oct	1B.1	S1	G5T1
Eriophyllum latilobum	San Mateo woolly sunflower	Asteraceae	perennial herb	May-Jun	1B.1	S1	G1
Eryngium jepsonii	Jepson's coyote thistle	Apiaceae	perennial herb	Apr-Aug	1B.2	S2?	G2?
Extriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	annual herb	Apr-Oct	1B.2	S2	G2
Fissidens pauperculus	minute pocket moss	Fissidentaceae	moss		1B.2	S2	G3?
Fritillaria liliacea	fragrant fritillary	Liliaceae	perennial bulbiferous herb	Feb-Apr	1B.2	S2	G2
Galium andrewsii ssp. gatense	phlox-leaf serpentine bedstraw	Rubiaceae	perennial herb	Apr-Jul	4.2	S3	G5T3
Grimmia torenii	Toren's grimmia	Grimmiaceae	moss		1B.3	S2	G2
Grimmia vaginulata	vaginulate grimmia	Grimmiaceae	moss		1B.1	S1	G2G3
Hesperevax sparsiflora var. brevifolia	short-leaved evax	Asteraceae	annual herb	Mar-Jun	1B.2	S2	G4T3
Hesperocyparis abramsiana var. abramsiana	Santa Cruz cypress	Cupressaceae	perennial evergreen tree		1B.2	S1	G1T1
Hesperocyparis abramsiana var. butanoensis	Butano Ridge cypress	Cupressaceae	perennial evergreen tree	Oct	1B.2	S1	G1T1
Hesperolinon congestum	Marin western flax	Linaceae	annual herb	Apr-Jul	1B.1	S1	G1
Hoita strobilina	Loma Prieta hoita	Fabaceae	perennial herb	May-Jul(Aug-Oct)	1B.1	S2	G2
Iris longipetala	coast iris	Iridaceae	perennial rhizomatous herb	Mar-May	4.2	S3	G3
Lasthenia conjugens	Contra Costa goldfields	Asteraceae	annual herb	Mar-Jun	1B.1	S1	G1
Legenere limosa	legenere	Campanulaceae	annual herb	Apr-Jun	1B.1	S2	G2
Leptosiphon ambiguus	serpentine	Polemoniaceae	annual herb	Mar-Jun	4.2	S4	G4

	leptosiphon						
Lessingia hololeuca	woolly-headed lessingia	Asteraceae	annual herb	Jun-Oct	3	S3?	G3?
Lessingia micradenia var. glabrata	smooth lessingia	Asteraceae	annual herb	(Apr-Jun)Jul-Nov	1B.2	S2	G2T2
Malacothamnus arcuatus	arcuate bush-mallow	Malvaceae	perennial evergreen shrub	Apr-Sep	1B.2	S2	G2Q
Malacothamnus davidsonii	Davidson's bush-mallow	Malvaceae	perennial deciduous shrub	Jun-Jan	1B.2	S2	G2
Malacothamnus hallii	Hall's bush-mallow	Malvaceae	perennial evergreen shrub	(Apr)May-Sep(Oct)	1B.2	S2	G2
Micropus amphibolus	Mt. Diablo cottonweed	Asteraceae	annual herb	Mar-May	3.2	S3S4	G3G4
Monolopia gracilens	woodland woolythreads	Asteraceae	annual herb	(Feb)Mar-Jul	1B.2	S3	G3
Navarretia prostrata	prostrate vernal pool navarretia	Polemoniaceae	annual herb	Apr-Jul	1B.1	S2	G2
Orthotrichum kellmanii	Kellman's bristle moss	Orthotrichaceae	moss	Jan-Feb	1B.2	S2	G2
Pedicularis dudleyi	Dudley's lousewort	Orobanchaceae	perennial herb	Apr-Jun	1B.2	S2	G2
Penstemon rattanii var. kleei	Santa Cruz Mountains beardtongue	Plantaginaceae	perennial herb	May-Jun	1B.2	S2	G4T2
Pentachaeta bellidiflora	white-rayed pentachaeta	Asteraceae	annual herb	Mar-May	1B.1	S1	G1
Piperia candida	white-flowered rein orchid	Orchidaceae	perennial herb	(Mar)May-Sep	1B.2	S3	G3
Plagiobothrys chorisianus var. chorisianus	Choris' popcornflower	Boraginaceae	annual herb	Mar-Jun	1B.2	S2	G3T2Q
Plagiobothrys chorisianus var. hickmanii	Hickman's popcornflower	Boraginaceae	annual herb	Apr-Jun	4.2	S3	G3T3Q
Plagiobothrys glaber	hairless popcornflower	Boraginaceae	annual herb	Mar-May	1A	SH	GH
Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3
Ranunculus lobbii	Lobb's aquatic buttercup	Ranunculaceae	annual herb (aquatic)	Feb-May	4.2	S3	G4
Senecio aphanactis	chaparral ragwort	Asteraceae	annual herb	Jan-Apr(May)	2B.2	S2	G3
Silene verecunda ssp. verecunda	San Francisco campion	Caryophyllaceae	perennial herb	(Feb)Mar-Jun(Aug)	1B.2	S1	G5T1
Stebbinsoseris decipiens	Santa Cruz microseris	Asteraceae	annual herb	Apr-May	1B.2	S2	G2
Streptanthus albidus ssp. albidus	Metcalf Canyon jewelflower	Brassicaceae	annual herb	Apr-Jul	1B.1	S1	G2T1
Streptanthus albidus ssp. peramoenus	most beautiful jewelflower	Brassicaceae	annual herb	(Mar)Apr-Sep(Oct)	1B.2	S2	G2T2
Stuckenia filiformis ssp. alpina	slender-leaved pondweed	Potamogetonaceae	perennial rhizomatous herb (aquatic)	May-Jul	2B.2	S3	G5T5
Trifolium amoenum	two-fork clover	Fabaceae	annual herb	Apr-Jun	1B.1	S1	G1
Trifolium buckwestiorum	Santa Cruz clover	Fabaceae	annual herb	Apr-Oct	1B.1	S2	G2

Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	1B.2	S2	G2
Tropidocarpum capparideum	caper-fruited tropidocarpum	Brassicaceae	annual herb	Mar-Apr	1B.1	S1	G1
Usnea longissima	Methuselah's beard lichen	Parmeliaceae	fruticose lichen (epiphytic)		4.2	S4	G4

Suggested Citation

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IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Santa Clara County, California



Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS

California Clapper Rail Rallus longirostris obsoletus — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/4240

California Least Tern Sterna antillarum browni — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/8104

Marbled Murrelet Brachyramphus marmoratus — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/4467

Amphibians

NAME	STATUS

California Red-legged Frog Rana draytonii — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/2891

California Tiger Salamander Ambystoma californiense — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/2076

Fishes

NAME	STATUS

Delta Smelt Hypomesus transpacificus — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/321

Insects

NAME	STATUS

Bay Checkerspot Butterfly Euphydryas editha bayensis — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/2320

San Bruno Elfin Butterfly Callophrys mossii bayensis — Endangered
There is **proposed** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/3394

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Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

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BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Allen's Hummingbird Selasphorus sasin — Breeds Feb 1 to Jul 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9637

Bald Eagle Haliaeetus leucocephalus — Breeds Jan 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Black Skimmer Rynchops niger — Breeds May 20 to Sep 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5234

Black Swift Cypseloides niger — Breeds Jun 15 to Sep 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8878

Burrowing Owl Athene cunicularia — Breeds Mar 15 to Aug 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9737

Clark's Grebe Aechmophorus clarkii — Breeds Jan 1 to Dec 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

NOT FOR CONSULTATION

Common Yellowthroat Geothlypis trichas sinuosa — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Lawrence's Goldfinch Carduelis lawrencei — Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Lewis's Woodpecker Melanerpes lewis — Breeds Apr 20 to Sep 30
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9408

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

Rufous Hummingbird selasphorus rufus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Song Sparrow Melospiza melodia — Breeds Feb 20 to Sep 5
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Spotted Towhee Pipilo maculatus clementae — Breeds Apr 15 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/4243

NOT FOR CONSULTATION

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910

Wrentit Chamaea fasciata — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

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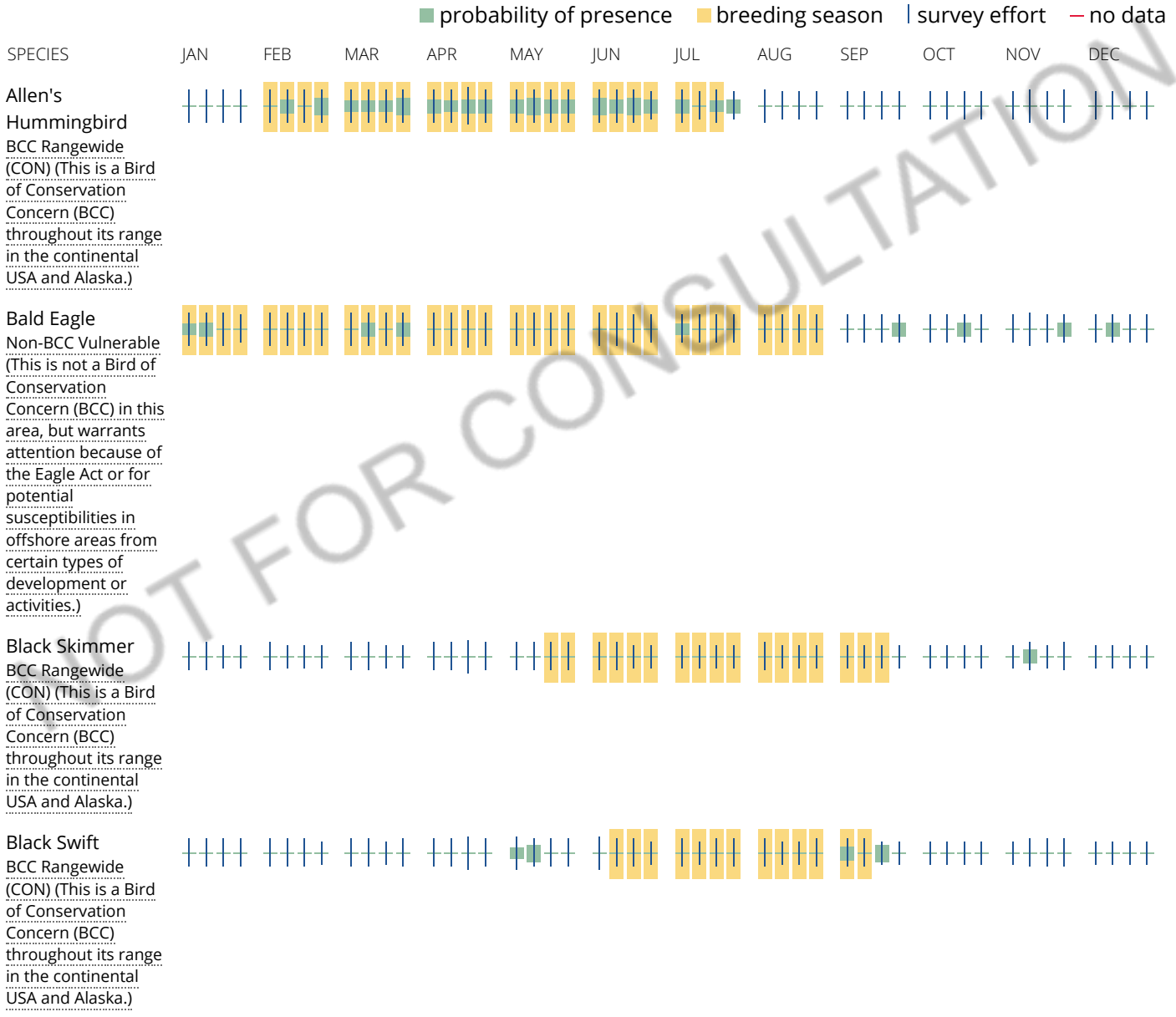
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

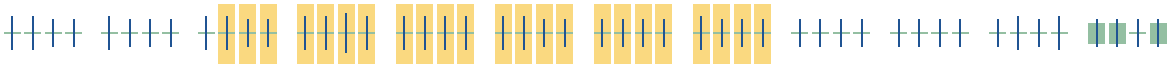
No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

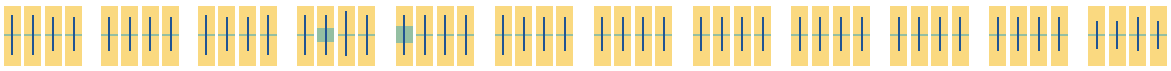


NOT FOR CONSULTATION

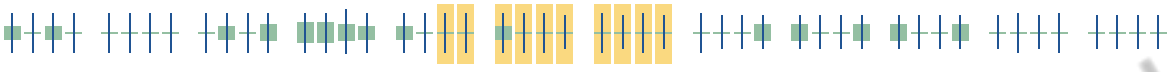
Burrowing Owl
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



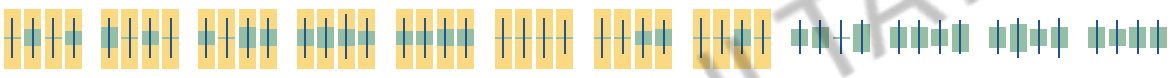
Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



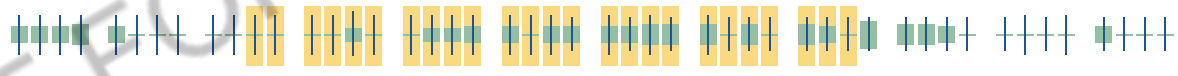
Common Yellowthroat
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



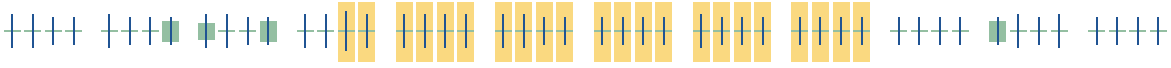
Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Lawrence's Goldfinch
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



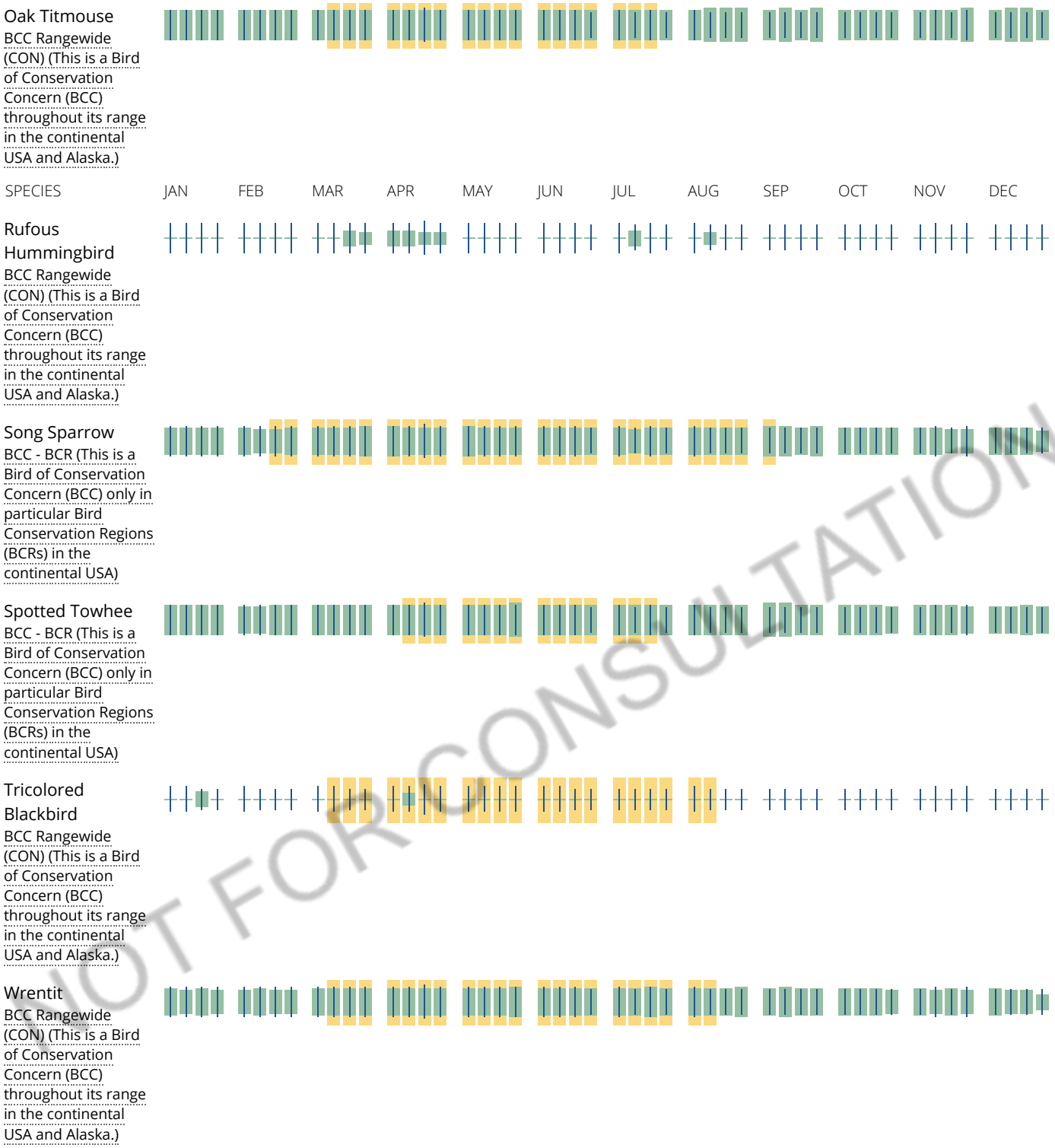
Lewis's Woodpecker
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Nuttall's Woodpecker
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



NOT FOR CONSULTATION



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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review.

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Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER FORESTED/SHRUB WETLAND

- PSSAx
- PSSCx
- PFOAx
- PSSA
- PFOA

FRESHWATER POND

- PUBHx
- PUSCx
- PUBFh
- PUBHh

RIVERINE

- R4SBA
- R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website

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Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged

aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Appendix B. Representative Photos



View to the east along the southern edge of the North Highwall Lay-Back Study Area.



Oak woodland/forest typical of the Study Area.

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Archaeology Inventory Report
Permanente Quarry
Reclamation Plan Amendment
Rock Plant Reserve Component

Archaeology Inventory Report
Permanente Quarry Reclamation Plan Amendment – Rock Plant Reserve Component



Prepared for:

Lehigh Southwest Cement Company

May 2019

Prepared by:

GEI Consultants

Consulting Engineers and Scientists

Archaeology Inventory Report Permanente Quarry Reclamation Plan Amendment – Rock Plant Reserve Component

Prepared for:

Lehigh Southwest Cement Company
24001 Stevens Creek Blvd.
Cupertino, CA 95014

Contact:

Erika Guerra
Environmental and Land Resources Director
408.257.7476 ext. 106

Prepared by:

GEI Consultants, Inc.
2868 Prospect Park Drive, Suite 400
Sacramento, CA 95670

Contact: Jesse Martinez, RPA
Archaeologist
916.631.4500

May 2019

GEI Project No. 1803892

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Abbreviations and Acronyms

A.D.	anno Domani
B.C.	Before Christ
CA-ALA	California Alameda County
CA-CCO	California Contra Costa County
CA-MRN	California Marin County
CA-SMA	California San Mateo County
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
County	Santa Clara County
CRHR	California Register of Historical Resources
CVP	Central Valley Project
DPR	California Department of Parks and Recreation
GEI	GEI Consultants, Inc.
HJK	Henry J. Kaiser
Lehigh	Lehigh Southwest Cement Company
MA	Master of Arts
MLD	Most Likely Descendant
NAHC	Native American Heritage Commission
NPS	National Park Service
NRHP	National Register of Historic Places
NWIC	Northwest Information Center
PCC	Permanente Cement Company
PRC	California Public Resources Code
Project	Proposed amendment to 2012 Reclamation Plan and related entitlements
Quarry	Permanente Quarry
RPA	Registered Professional Archaeologist
SPRR	Southern Pacific Railroad
Study Area	Rock Plant Reserve study area
USBR	U.S. Bureau of Reclamation
USGS	U.S. Geological Survey

Chapter 1. Introduction

Permanente Quarry (Quarry) is a limestone and aggregate mining operation located in the Santa Clara County (County) foothills west of the city of Cupertino as shown on Figure 1, "Permanente Quarry Location." Lehigh Southwest Cement Company (Lehigh) operates the Quarry which, among other entitlements, is subject to a reclamation plan most recently amended and approved by the County in 2012 (2012 Reclamation Plan). Lehigh proposes to amend the 2012 Reclamation Plan and obtain related entitlements (Project). This report addresses archaeological resources that could be affected by mineral extraction and reclamation activities associated with the Rock Plant Reserve component of the Project and evaluates the potential for archaeological or buried resources to be discovered during implementation. In addition, this report presents management recommendations to avoid or minimize potential for impacts on archaeological resources. Mining the Rock Plant Reserve would be conducted pursuant to Lehigh's vested rights. Although mining is not a component of the proposed project, the effects of mining in the Rock Plant Reserve are addressed in this report for the purposes of disclosure.

This evaluation concludes that there are no known significant cultural resources within the Rock Plant Reserve study area, and recommendations are provided to ensure that any inadvertent discovery of cultural resources or human remains during activities associated with the Rock Plant Reserve would be properly evaluated and treated. No significant impacts to cultural resources are anticipated as a result of the Rock Plant Reserve component of the Project.

1.1 Study Area Location

The Rock Plant Reserve study area (Study Area) is in northwestern Santa Clara County (**Figures 1** and **2**), south of Permanente Creek and the active Permanente Quarry. The Study Area is in Sections 20 and 21 of the U.S. Geological Survey (USGS) 7.5-minute Cupertino Quadrangle, Township 7 South, Range 2 West. The Study Area is located within Assessor Parcel Numbers (APNs) 351-10-033 and 351-11-001. The Study Area includes the entire Rock Plant Reserve planned disturbance area and is approximately 31 acres.

1.2 Project Summary

Lehigh operates the Quarry in accordance with the 2012 Reclamation Plan and other entitlements, including a vested right to mine within certain parcels. Lehigh proposes to amend the 2012 Reclamation Plan and obtain related entitlements to accomplish the following primary components of the Project:

1. Incorporate development and reclamation of the Rock Plant Reserve.

2. Regrade and mine the upper slopes of the North Highwall of the North Quarry to recover limestone, eliminate the need for a large fill buttress, and achieve long-term slope stability.

3. Reclaim the majority of the WMSA in place.

4. Backfill the North Quarry using a combination of imported surplus construction soil that meets site-specific acceptance criteria and greenstone overburden to protect water quality.

This Archaeological Inventory Report evaluates potential cultural resources impacts associated with the Rock Plant Reserve reclamation component of the Project. Final reclamation of the Rock Plant Reserve area would be initiated following the completion of mining and would require up to approximately 5 years. Topsoil and other amendments would be placed on the slopes and vegetation planted in a manner consistent with the revegetation plan component of the proposed Reclamation Plan amendment. Lehigh has a vested right to mine within the majority of the Project site, including the Rock Plant Reserve area. Therefore, cultural resources effects that may be associated with mining disturbance and related activities within the Rock Plant Reserve area are not attributed to the Project. Nevertheless, this evaluation recognizes that vegetation removal and ground disturbance would occur as a result of mining the Rock Plant Reserve area and discusses the potential effects of those activities.

Figure 1. Regional Location of Rock Plant Reserve Study Area

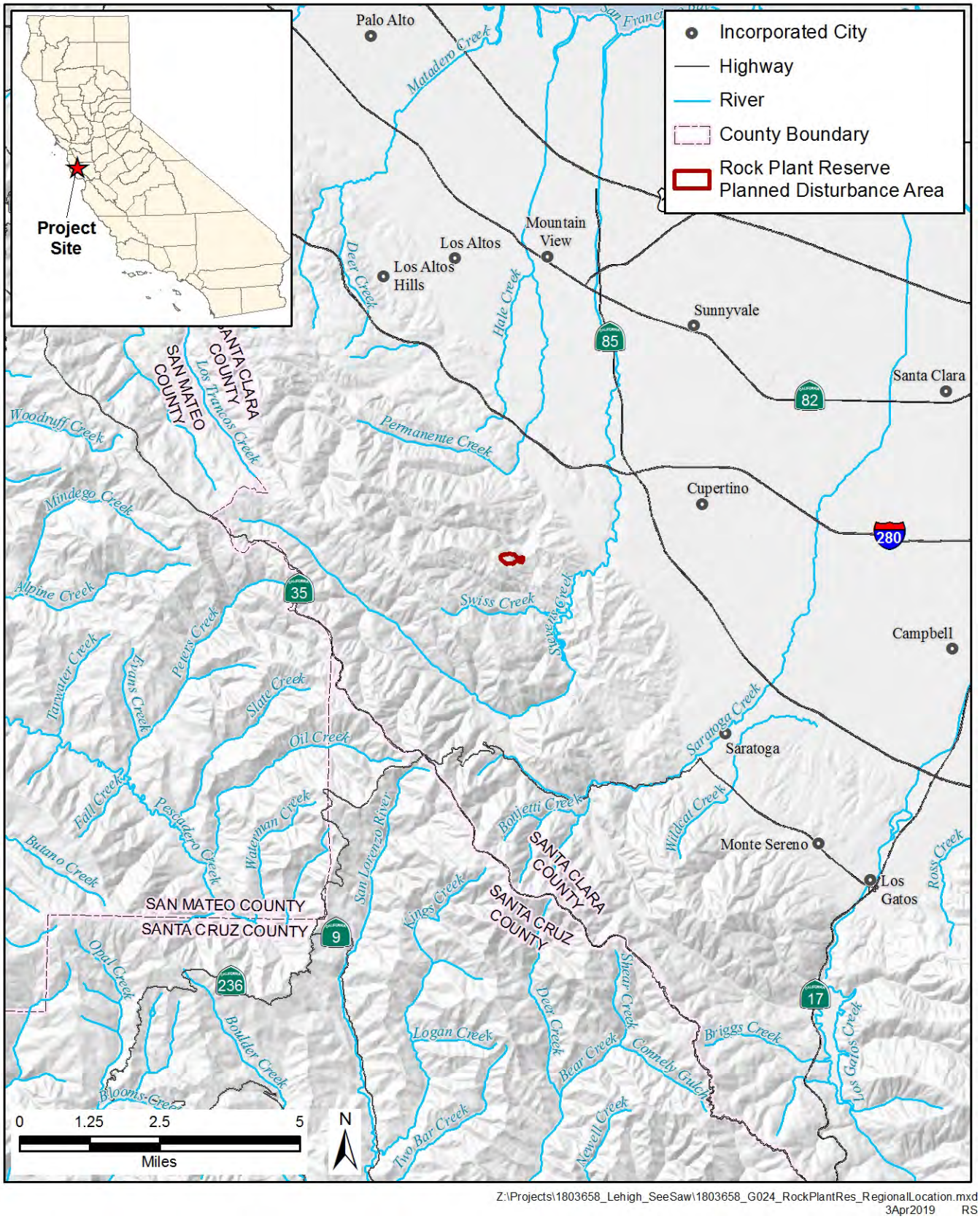
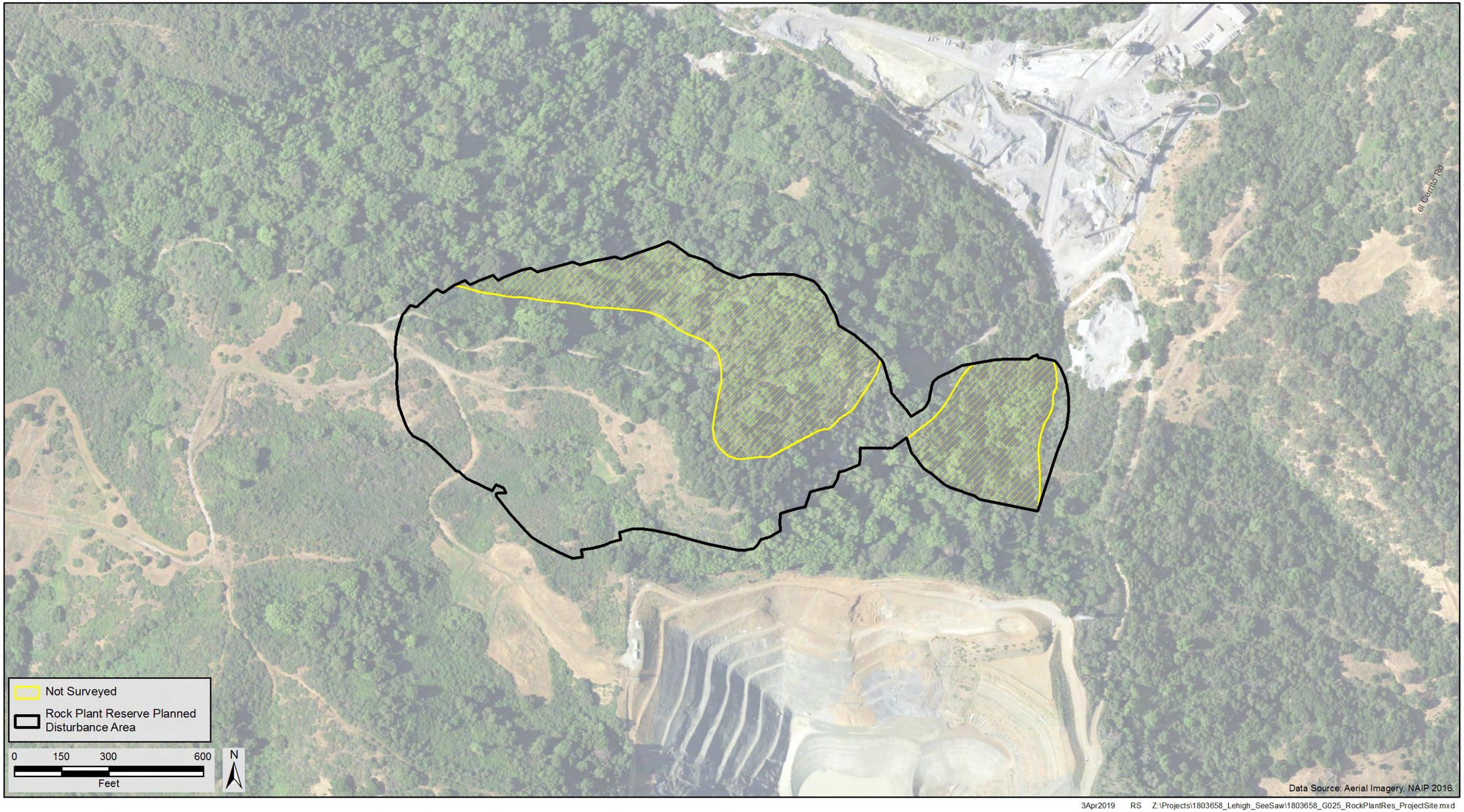


Figure 2. **Study Area**



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Source: GEI Consultants, Inc., 2018

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Chapter 2. Regulatory Context

2.1 National Register of Historic Places

The National Register of Historic Places (NRHP) is the nation's master inventory of known historic resources. It is administered by the National Park Service (NPS) in consultation with the State Historic Preservation Officer. The NRHP includes listings of buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the national, state, or local level. The NRHP criteria and associated definitions are outlined in the *National Register Bulletin: How to Apply the National Register Criteria for Evaluation* (NPS 1997). The following is a summary of that bulletin.

Properties (structures, sites, buildings, districts, and objects) more than 50 years of age can be listed in the NRHP provided they meet one of the evaluation criteria described below; however, properties less than 50 years of age that are of exceptional significance or are contributors to a district, that also meet the evaluation criteria, can be included in the NRHP.

The NRHP uses four criteria under which a property can be considered significant for listing:

A. Properties associated with events that have made a significant contribution to the broad patterns of history.

B. Properties associated with the lives of persons significant in our past.

C. Properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

D. Properties that have yielded or may likely yield information important in prehistory or history.

Properties can be listed individually or as contributors to a historic district.

In addition to meeting one of the evaluation criteria, a property must also retain integrity to convey that significance. Although the evaluation of integrity is sometimes subject to judgement, it must always be grounded in an understanding of the property's physical features and how they relate to its significance. The NRHP recognizes seven aspects of integrity:

- Location: The place where the historic property was constructed or the place where the historic event occurred.
- Design: The combination of elements that create the form, plan, space, structure, and style of a property.
- Setting: The physical environment of a historic property.

- Materials: The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.

- Workmanship: The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.

- Feeling: A property's expression of the aesthetic or historic sense of a particular period of time.

- Association: The direct link between an important historic event or person and a historic property.

2.2 California Environmental Quality Act

The California Environmental Quality Act (CEQA) of 1970 (California Public Resources Code [PRC] 21000) offers directives regarding impacts on historical resources and unique archaeological resources. The State CEQA Guidelines (California Code of Regulations [CCR] 15000) defines a "historical resource" to include more than one category of resources. The first category is, "…resource(s) listed or eligible for listing on the California Register of Historical Resources (CRHR)." (CCR Section 15064.5[a][1]; *see also* PRC Sections 5024.1 and 21084.1.) A historical resource may be eligible for inclusion in the CRHR, as determined by the State Historical Resources Commission or the lead agency, if the resource:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; or

2. Is associated with the lives of persons important in our past; or

3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

4. Has yielded, or may be likely to yield, information important in prehistory or history.

In addition, a resource is presumed to constitute a "historical resource" if it is included in a "local register of historical resources" unless "the preponderance of evidence demonstrates that it is not historically or culturally significant." (CCR Section 15064.5[a][2])

Furthermore, "historical resources" are those deemed significant pursuant to criteria set forth in PRC Section 5024.1(g), as follows:

> [a] resource identified as significant in an historical survey may be listed in the California Register if the survey meets all of the following criteria:
>
> (1) The survey has been or will be included in the State Historic Resources Inventory.
>
> (2) The survey and the survey documentation were prepared in accordance with office [State Office of Historic Preservation] procedures and requirements.

(3) The resource is evaluated and determined by the office [State Office of Historic Preservation] to have a significance rating of Category 1 to 5 on DPR Form 523 [the Department of Parks and Recreation Historic Resources Inventory Form].

(4) If the survey is five or more years old at the time of its nomination for inclusion in the California Register [CRHR], the survey is updated to identify historic resources which have become eligible or ineligible due to changed circumstances or further documentation and those which have been demolished or altered in a manner that substantially diminishes the significance of the resource.

Resources identified by such surveys are presumed to be historically or culturally significant unless the preponderance of the evidence demonstrates otherwise.

The final category of "historical resources" is an optional one, which a lead agency may opt to consider or not consider. According to the State CEQA Guidelines (CCR Section 15064.5[a][3]):

> Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

In addition to the obligation to consider impacts on "historical resources," CEQA and the State CEQA Guidelines require consideration of unique archaeological sites (PRC Section 21083.2, 14 CCR Section 15064.5). A "unique archaeological resource" is defined in CEQA (PRC Section 21083.2[g]) as:

> …an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

(1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

(2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

(3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

If a resource meeting the criteria defined above would be affected by a project and data recovery through excavation is the only feasible mitigation, a data recovery plan that makes provisions for adequately recovering the scientifically-consequential information from and about the historical resource shall be prepared and adopted before any excavation is undertaken (CCR Section 15126.4[b][3][C]). Other acceptable methods of mitigation under the State CEQA Guidelines (CCR Section 15126.4) include excavation and curation or study-in-place without excavation and curation (if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource). The State CEQA Guidelines (CCR Section 15064.5[e]) require that excavation activities be stopped whenever human remains are uncovered, and that the county coroner be called in to assess the remains. If the county coroner determines that the remains are those of Native Americans, the Native American Heritage Commission (NAHC) must be contacted within 24 hours. At

that time, the State CEQA Guidelines (CCR Section 15064.5[d]) direct the lead agency to consult with any appropriate Native Americans as identified by the NAHC in a timely manner, and direct the lead agency (or applicant), under certain circumstances, to develop an agreement with the Native Americans for the treatment and disposition of the remains.

Chapter 3. Environmental Context

3.1 Cultural Context

3.1.1 Prehistoric Setting

Three different taxonomic systems are used to describe the cultural chronology of the San Francisco Bay Area. The first employs broad temporal sequences; the second generally focuses on cultural sequences, while the third is a hybrid of the first two. The third system can be refined further when applied to restricted areas that have more clearly distinctive cultural aspects or more refined chronologies than the region as a whole.

The following is the most recent, general cultural sequence for the San Francisco Bay Area taken from Milliken et al. (2007) and following the hybrid system. Information from additional sources is included as appropriate.

Terminal Pleistocene, 11,500-8000 B.C.

No evidence for occupation during this period has yet been discovered, presumably because it has been washed away through stream action, buried under more recent alluvium, or submerged on the continental shelf (Rosenthal and Meyer 2004).

Early Holocene (Lower Archaic), 8000-3500 B.C.

Prehistoric groups during this period employed a generalized mobile forager pattern. Characteristic artifacts include well-made millingslabs and handstones as well as wide-stemmed and leaf-shaped projectile points (Jones et al. 2007). The earliest date for a millingslab component in the San Francisco Bay Area, 7920 B.C., was obtained from a charcoal concentration found underneath a millingslab at Los Vaqueros Reservoir (CA-CCO-696) in the hills east of Mount Diablo. Archaeobotanical remains recovered from the same site suggested an economy focused on acorns and wild cucumbers. Burials during this period tend to be flexed, sometimes found underneath cairns of millingslabs. Populations are thought to be sparse and highly mobile (Moratto 1984).

Hundreds of species of plants and animals were used for food, medicine, and craft materials during this period. Some researchers have postulated that the wide variety of exploited resources resulted from a decrease in available big game at the end of the Pleistocene. Early Holocene people used a range of different environments and scheduled their movements seasonally as resources became available. They spent winters in base camps along the coast and occupied interior valleys and hills during the summer. Early Holocene people developed or refined technologies such as ground stone tool production, basketry, and the manufacture of various scraper-tools. Non-utilitarian items such as ritual objects and personal ornaments were also elaborated (Chartkoff and Chartkoff 1984). In the Santa Clara Valley, the Lower Archaic Period is more specifically known as the Metcalf Creek Aspect and occurs from roughly 7000 B.C. to 3500 B.C.

Early Period (Middle Archaic), 3500-500 B.C.

Prehistoric groups changed during the Early Period from being highly mobile to sedentary or semi-sedentary. Indicative of this are the appearance of substantial shell mounds in West Berkeley (CA-ALA-307), Ellis Landing (CA-CCO-295), and Pacheco (CA-MRN-152), as well as large house floors with postholes found at the Rossmoor site (CA-CCO-309). Mortars and pestles, some made of wood, greatly increase in number during this period, and burials contain greater amounts of ornamental goods. Changes in interment practices, such as occasional burning before burial as identified at Los Vaqueros Reservoir (CA-CCO-637), also occurred during the Early Period.

Trends that began during the Lower Archaic intensified during the Middle Archaic. Mobility became more restricted, as evidenced by greater use of local lithic materials, as well as the previously mentioned substantial shell mounds and house floors. The presence of millingslabs and handstones beginning during the Early Holocene evidenced the use of small, hard seeds; during the Early Period, however, the relative number of these artifact classes decreased while mortars and pestles increased greatly, indicating that acorn use became much more important. Evidence of far-ranging trade is also present during this period, as shown by the discovery as far inland as the Great Basin of beads made of shell from the central and southern California coasts (Bennyhoff and Hughes 1987; Jackson and Ericson 1994).

Some researchers have argued that an emphasis on hunting northern fur seal emerged in the southern Bay Area during this period. In the southern Bay Area this period is called the Hunting Pattern or Lower Berkeley Pattern. In the Santa Clara Valley and along the San Mateo County coast it is called the Sandhill Bluff Aspect, although it has the same time range. Excavations at CA-SMA-77 (the University Village site) indicate that the Sandhill Aspect may have ended early in the Santa Clara Valley, at approximately 1500 B.C. The Sandhill Aspect was followed by the Early Bay Complex, which lasted until 500 B.C.

Lower Middle Period (Initial Upper Archaic), 500 B.C.–430 A.D.

Changes in ornamental items mark the beginning of this period. Rectangular shell beads, which had been used for 3,000 years, disappear from the archaeological record of the Bay Area, Central Valley, and Southern California. Split-beveled and small saucer beads made from *Olivella* shell enter the record, as do circular *Haliotis* beads. Spire-lopped *Olivella* beads, however, are more commonly found in burial contexts. Bead types such as *Olivella* saucer beads that previously had low representation become more prevalent.

Other artifact types that date to this period include barbless fish spears, elk femur spatulae, and bone tubes and whistles. In some parts of the Bay Area, basketry awls with shouldered tips appear in the record, indicating the manufacture of coiled basketry. Mortars and pestles were the sole grinding tools for most of the region, although millingslabs were still used around the periphery. Net sinkers, once prevalent, are now found only in very limited areas. Some areas that had not been heavily used in the past, such as the Napa Valley, now see more intensive use, with large accumulations of dark midden found at sites.

In the southern Bay Area this period is called the Upper Berkeley Pattern. There is a general shift from hunting of northern fur seals to a greater emphasis on large terrestrial mammals. Acorn use also increases in the area. Along the San Mateo County coast, this period is called the Año Nuevo Aspect. The period is not as well known for most of the Santa Clara Valley. In some localities it is called the Ellis Landing Complex. The Upper Berkeley Pattern for this area lasted until A.D. 1000.

Upper Middle Period (Late Upper Archaic), 430-1050 A.D.

The Upper Middle Period is characterized by dramatic changes in mortuary practices and ornaments. Previously, individuals were buried in flexed positions, but this changed to an extended position during the Upper Middle Period. The first such interment was found in the Livermore Valley at the Santa Rita village site (CA-ALA-413). The individual, a 30-year-old male, was found buried with 30,000 *Olivella* saucer beads (the largest documented California bead lot), quartz crystals, and spatulae encrusted with beads. This funerary style, called Meganos, seems to have begun inland and traveled toward the bay.

The beginning of this period also saw the abandonment of more than half the sites that had been occupied just previously, a large increase in the amount of sea otter bone in the still-occupied sites, and a general collapse of the *Olivella* trade network. As the period progressed, it saw even more changes in bead styles, generally following the spread of Meganos mortuary style. Other artifacts that appear during this period are well-fashioned "show blades," fishtail charmstones, single-barbed bone fish spears, ear spools, and large mortars. Seed recovery from midden also increases on at least some sites. In the Santa Clara Valley, from roughly A.D. 1000 to 1400, the period is known as the Meganos Complex, named after the mortuary practice.

Initial Late Period (Lower Emergent), 1050-1550 A.D.

This period is marked by an increase in cultural complexity. Among the changes that occurred was an increase in sedentism, as well as higher levels of social ascription and ceremonial integration throughout central California. Mortuary practices also point to increasing social stratification. Partial cremations appear, usually associated with the wealthiest grave offerings, although overall the number of burials found with beads decreases.

Artifacts associated with this period include fully-shaped show mortars, new types of *Olivella* beads, as well as new types of multi-perforated and bar-scored *Haliotis* ornaments. Other artifacts that appear are the flanged pipe, banjo effigy ornaments, and bow-and-arrow technology. The banjo effigy ornaments may be the precursor to the ethnographically documented Kuksu cult, a widespread ceremonial system practiced by various language groups around the Bay Area. The first arrow-sized projectile points in the region were the Stockton serrated series, which were unique to central California.

The adoption of bow-and-arrow technology seems to have affected how lithic raw material was acquired in the region. Biface production and total amounts of debitage produced at Napa Glass Mountain obsidian quarries dropped significantly, while amounts of debris from that same source increased dramatically in the interior East Bay. Researchers have interpreted this as a rearranging of technology, in which large flakes from the Napa Glass Mountain sources were transported to more distant locales where small projectile points, performs, and various simple flake tools were produced. This would be in contrast to earlier periods when more time would have been spent at the quarries to fashion tools that required more work and larger amounts of material to produce.

In the South Bay this period is known as the Augustine Pattern. Little of this pattern has been studied in the Santa Clara Valley, while along the San Mateo County Coast it is called the Bonny Doon.

Terminal Late Period, 1550–Contact A.D.

Beads are once again a marker for change during this period. The *Olivella* sequin and cup beads that distinguished the previous period disappear and are replaced by greater numbers of clamshell disk beads, while *Olivella* lipped and spire-lopped beads are the types to be found in some areas of the Bay Area. Site

distribution does not change, however, although midden accumulations for this period are generally thinner. Interestingly, evidence of the manufacture of clam disk beads is found, not along the coasts, but farther inland in the Santa Rosa Plain and the Berryessa Valley (30 kilometers and 80 kilometers inland, respectively).

Another changing characteristic of this period is projectile point types. The Stockton serrated point series is replaced by simpler corner-notched arrow points in some areas, while Desert side-notched points appear in others. Other artifacts appearing during this period are the toggle harpoon, hopper mortar, and magnesite tube beads.

Researchers have put forward various reasons for these changes. Some hypotheses include that the population became larger than the landscape's carrying capacity, which led to conflict and wealth contraction. Others surmise that population groups were migrating, displacing, or marrying their way into neighboring territory. Another possibility put forward is that the archaeological record during the Terminal Late Period actually reflects the consequences of European-introduced epidemics, causing population crashes and cultural disruption.

3.1.2 Ethnographic Setting

The Study Area lies within the traditional territory of the Ohlone (Costanoan) people. The Ohlone recognized several ethnic groups, generally based on a common language and territory. The Ohlone spoke eight distinct languages (Levy 1978), although Kroeber (1925) recognized only seven; Tamyen was spoken in Santa Clara County (Levy 1978). At the time of European contact, the Ohlone lived in approximately 50 separate, politically-autonomous nations or tribelets, four in Santa Clara County (Levy 1978); this was the densest populated area north of Mexico (Margolin 1978:1).

Tribelets consisted of one or more villages and several camps in a given tribelets's territory (Margolin 1978:13, 52). Each tribelet averaged 200 individuals and ranged from 50 to 500 people. Early accounts suggest that territorial boundaries were fiercely defended (Levy 1978). The office of chief was usually inherited patrilineally, but if there were no male heirs, the position could pass to a sister or daughter (Levy 1978; Margolin 1978:105). In either instance, the office could be obtained only with community approval. The chief generally acted as the head of a council of elders. Responsibilities included feeding visitors; helping impoverished tribal members; directing ceremonial activities; and directing hunting, fishing, gathering, and warfare expeditions. The chief also would set the dates for ceremonies, feasts, festivals, and dances (Margolin 1978:104). Direct authority was weak in Ohlone culture because of strong adherence to personal freedom; chiefs and councils acted primarily as advisors to the community. The only exception to this was during times of war, when the chief's authority increased (Kroeber 1925; Levy 1978). The chief usually had an assistant called a speaker, who announced important events (Levy 1978; Margolin 1978:95–97).

Ohlone households tended to be large for California Indians, ranging from 10 to 15 members. Some households consisted of patrilineally descended extended families. Sororal polygynous marriages also occurred with cowives and their children living together, although this was confined mostly to chiefs (Levy 1978; Margolin 1978:96), and perhaps only 10 percent of men had multiple wives (Milliken et al. 2007:51). The Ohlone were grouped into clans and divided into deer and bear moieties (Levy 1978).

Territorial claims were strictly enforced, and early accounts often mention warfare conducted over boundary violations. Wars were fought with other Ohlone groups and neighboring tribelets over breaches of boundaries, unpermitted taking of resources, and other reasons such as wife stealing (Levy 1978;

Margolin 1978:101, 108–114; Milliken et al. 2007:57). Battles could be initiated either by surprise attack or by prearranged meetings. The primary weapon was the bow and arrow.

The Plains Miwok, Sierra Miwok, and Yokuts were likely the main trading partners for the Ohlone. Cinnabar mined from the San Jose area was among the items with the highest trade value; it was used as a pigment (Margolin 1978:99). The Ohlone traded items such as mussels, abalone shells, salt, dried abalone, and *Olivella* shells for pine nuts from the Yokuts (Levy 1978) or rarely, items from farther away (Margolin 1978:98).

Prayers and offerings were a central part of Ohlone religion. Prayers to the sun were accompanied by blowing smoke to the sky. Offerings included feathers, strips of rabbit fur, seeds, tobacco, and shell beads, sometimes in areas associated with specific spirits; these offerings were often attached to the tops of poles. Shamans were powerful figures believed to be able to control the weather and cure disease. Ohlone shamans also knew how to set bones, relieve cranial pressure by drilling holes in the skull, and use numerous herbs, barks, and roots for medicinal purposes (Margolin 1978:132). They also conducted dances and ceremonies to ensure good crops, abundant fish harvests, or whale stranding. The bear was a powerful figure in Ohlone religion, and bear charms could be employed in a number of ways, including helping during childbirth (Margolin 1978:69).

The Ohlone carefully managed the land, helping to ensure good animal and plant yields through controlled burning of extensive areas (Paddison 1999:11). This reduced risk of large, uncontrolled fires minimized the presence of chaparral species, promoted the growth of seed-bearing annual plants, and provided extensive grazing areas for game animals. Acorns were likely the most important food for the Ohlone and were used to make mush or acorn bread (Levy 1978; Margolin 1978:41). Acorn was harvested during the fall (Margolin 1978:42). Poles were used to dislodge acorns from trees; the acorns were then ground and leached to remove tannin. Leaching was a complicated and involved process, with the time necessary to complete dependent on the species of acorn (Margolin 1978:43–44). Buckeye nuts were similarly used but secondary in importance. Some of the other plant foods used include tarweed, chia, digger pine, blackberries, elderberries, wild onion, thistle, and several other greens and roots (Levy 1978; Margolin 1978:46–51).

A variety of mammals were hunted, often taken by a single hunter. These species included black-tailed deer, grizzly bear, Roosevelt elk, antelope, sea lion, and whale. Hunting techniques included disguise, drives off of cliffs, or ambushes; hunting was strictly a male activity (Margolin 1978:25–26, 84). Smaller mammals that were used for food included dog, wildcat, skunk, raccoon, cottontail, jackrabbit, and a large number of rodent and reptile species (Levy 1978; Margolin 1978:25). Rabbits were communally hunted with nets. Waterfowl, including Canada goose, snow goose, white-fronted goose, mallard, teal, and American coot, were the most important birds eaten. Fish species that were important to the Ohlone included steelhead, salmon, sturgeon, and lamprey. Sturgeon and salmon were caught in seine nets. Other fish-catching techniques included the use of baskets, dip nets, and spearing. Honey was also gathered. Mussels were a very important food source along the coast (Levy 1978). Some animals, such as frogs, eagles, buzzards, ravens, and owls, were taboo for religious reasons (Margolin 1978:24).

Dwellings consisted of domed structures thatched with tule, grass, wild alfalfa, ferns, or carrizo. These plants were tied onto a framework of poles using willow withes. Some groups used a more conical structure made of split redwood or redwood bark. These homes tended to be small (Margolin 1978:15). Sweathouses generally held only six to eight individuals. Sweathouses were constructed by excavating a pit near a creek or stream bank. The remainder of the structure was built against the bank. Dance areas were circular or oval in shape and enclosed by fences made of brush or laurel branches. Some assembly

structures were large enough to hold an entire community of 200 individuals and were usually located in the center of the village, with dwellings around the periphery (Levy 1978).

The Ohlone employed an extensive technological array of items. Tule balsas were used for watercraft and propelled with a double-bladed paddle. There are some reports that stone anchors were used (Levy 1978). The Ohlone made both sinew-backed and self-bows for hunting and warfare; the wood for the bows was often acquired through trade (Margolin 1978:30). Arrows were made with three-feather radial fletching attached with asphaltum, a cane shaft, and a hardwood foreshaft. Arrowheads were made of stone or bone or were created out of the foreshaft. Nets were used to capture a variety of animals. Rocks and minerals were used for tools including manos, metates, net sinkers, anchors, pipes, arrowheads, and a variety of flaked stone tools. Stuffed ducks were used as hunting decoys (Margolin 1978:15). Minerals also were used to make pigments. Cordage was made from milkweed, Indian hemp, or nettle. Blankets were made from strips of sea otter while bedding was manufactured from tule mats or animal skins (Levy 1978).

Basket making was a highly developed art and craft among the Ohlone (Margolin 1978:117–122). Baskets were twined rather than coiled and made of willow, rush, tule, and other cut grasses. Baskets were often ornamented with abalone shell, quail plumes, and woodpecker scalps. Baskets were used for the collection, preparation, storage, and serving of food, and for water containers and a variety of other tasks and gifts (Levy 1978; Margolin 1978:117–122).

Men and boys generally wore no clothing, while women wore a front apron of netted or braided tule or grass, and a larger rear apron was made of buckskin or sea otter skins (Kroeber 1925). In cold weather, both men and women wore robes fastened under the chin. These were made of rabbit skin, sea otter skin, duck feathers, or buckskin. Tattoos were made on the face, forehead, and arms. Paints in nonritual contexts were applied on the face and body. Some men had a bone ornament pierced through the nasal septum. Necklaces of *Olivella* shells and abalone pendants also were worn (Levy 1978).

3.1.3 Historic Setting

Santa Clara County

Santa Clara County is one of California's original 27 counties and was the state's first state capital (Hoover et. al. 1990:397). In its early years, the county supported large cattle ranches, but agriculture quickly became the predominant industry. In 1919, there were more than 98,000 acres of planted fruit trees in Santa Clara County, including apricots, prunes, and grapes for wine. During this part of the 20th century, the county was the largest fruit district in California (Sawyer 1922:33, 135).

Cupertino, originally known as West Side, was settled by immigrants from France, Germany, and Italy. These early settlers planted large vineyards, but the 1895 phylloxera outbreak destroyed most of the vines. Growers that lost their vineyards switched to growing French prunes, peaches, apricots, cherries, plums, walnuts, and almonds (Hugger 2018; City of Cupertino 2018b). Like most of California, the increased population lead to orchards being sold and subdivided for housing. Residents voted to incorporate in 1955 and Cupertino became Santa Clara County's 13th city. But, despite the increased population Cupertino retained its ranches and vineyards until the mid-1960s. In 1977 Apple, Inc. settled in Cupertino, making the city its headquarters and marking the high-tech boom in the city. By 2010, Cupertino had more than 64,000 citizens (City of Cupertino 2018a).

Henry John Kaiser

Kaiser was born in New York in 1882. In 1906, he moved to Spokane, Washington. In Spokane, he worked as salesman selling hardware, sand, and gravel. Kaiser established the Henry J. Kaiser Company, Ltd. in 1914, with its headquarters in Vancouver, British Columbia. The company was a road paving business that Kaiser started in 1912 in Washington and British Columbia. His first job in California came in 1921, paving the road between Redding and Red Bluff. He then subsequently moved his headquarters to Oakland, California (Morganti n.d.:2).

Kaiser continued to grow his business. In 1923, he was awarded a road paving job between Livermore and Pleasanton, California. To supply the job, he started a sand and gravel quarry close to Livermore, which became the Kaiser Sand and Gravel Company. During the Great Depression of the 1930s, Kaiser formed Six Companies, Inc., a consortium where he was chairman of the executive committee. The company was awarded the contract to build Boulder Dam on the Colorado River (Morganti n.d.:4). Kaiser was also involved in building Bonneville Dam on the Columbia River and the Grand Coulee Dam in Washington (Foster 1989:62–63).

In 1938, Kaiser and his partners bid on the construction of Shasta Dam, north of Redding, California. But, Kaiser was outbid and lost the job by $262,907 (Foster 1989:64). The contracts to supply sand, gravel and cement were separate from the construction contract (Taylor 1941:122). It was at this point that he decided to invest in cement production and bid on the contract to supply the cement for the dam's construction. The previous year he had begun scouting locations for the cement plant and decided on a site near Permanente Creek in Cupertino in Santa Clara County. By 1938, he had already arranged with the Southern Pacific Railroad (SPRR) to use their track at the site to transport cement to Redding, 12 miles from the dam's construction site (Foster 1989:64–65). He outbid the lowest bidder and was awarded the contract despite not having a plant to deliver.

Construction on Permanente Cement Company's (PCC) plant began in June 1939. Less than 7 months later the first bag of cement was produced. Permanente Cement Plant would supply nearly 6,800,000 barrels of cement for the construction of Shasta Dam (*San Bernardino Sun* 1957:32), which equated to roughly 95 percent of the cement to construct the dam (Foster 1989:67). Kaiser also supplied the gravel from the gravel pits he owned near Redding. To cut his costs, rather than haul the gravel by rail, Kaiser had a 9.6-mile-long conveyer belt built (Taylor 1941:122). Kaiser recognized the importance of establishing the cement plant because he knew that as part of the Central Valley Project (CVP), the U.S. Bureau of Reclamation (USBR) would need 7,000,000 barrels of cement for Shasta Dam; 3,000,000 barrels for the Friant Dam, and another 1,000,000 barrels for the CVP's many canals. The work was estimated to be worth $200,000,000. He realized that the U.S. Navy would have an estimated $30,000,000 worth of work on the naval bases. Cement would also be needed for the debris dams that the U.S. Army Corps of Engineers were planning, which amounted to approximately $5,000,000 worth of work (HJK Papers 1937:43).

By 1940, cement was coming into short supply. When contracts were let by the military for large quantities of cement for defense installations in the Pacific, Kaiser presented an unusual proposal. He proposed to ship cement in the bulk in the holds of ships rather than in bags. The cement was then stored in silos in Honolulu. After Pearl Harbor was bombed on December 7, 1941, the Navy had the supplies needed and rebuilding began within days of the attack (Foster 1989:166). At the start of World War II, Kaiser became involved in the shipbuilding business, establishing Kaiser Shipyards in Richmond, California. While at the shipyards, he created the Kaiser Permanente Health Care system for his employees. Kaiser owned a

lodge near Permanente Creek that became the namesake for his medical program. He later went on to form Kaiser Aluminum and Kaiser Steel (Archives & Architecture 2011:27).

During the 1950s and 1960s, Kaiser expanded his cement business and established distribution and manufacturing plants throughout the west coast. As his operations grew, he opened or acquired interest in cement plants in the southwestern United States, Hawaii, and as far away as Japan and Thailand. In 1954, Kaiser moved to Hawaii for several construction projects. He died in Honolulu, Hawaii, in 1967 (Archives & Architecture 2011:24–25, 27).

Permanente Cement Company

The PCC was organized on February 10, 1939, under the name The Permanente Corporation, but Kaiser began planning for the PCC in 1937. The cement plant was situated in the hills above Cupertino, along Permanente Creek, on approximately 1,300 acres known as the Permanente Deposit. The site also contained approximately 140 acres of limestone outcroppings and right-of-way to connect with the SPRR at Silma Junction (near present day Interstate 280 and Foothill Boulevard interchange). The site was purchased from Santa Clara Holding Company. The cement plant was a west coast process plant, which was selected for its location, simplicity, the economy of construction, and because it made for a better concrete mix (HJK Papers 1937:5, 7). Construction of the plant began in June 1939; the plant's first shipment was on January 10, 1940 (HJK Papers 1947:17). In September 1940, a third kiln was built and placed into operation and a fourth kiln was added in 1941. In the 1940s, the plant produced 5,500,000 barrels per year and it was one of the largest cement producers in the western U.S. (HJK Papers 1947: 2, 11, 17). On February 25, 1943, the name changed to PCC, with Kaiser as the president of the company (HJK Papers 1947:1, 3).

The plant site included an upper and lower limestone quarry. The upper quarry was divided into a north and south section. A conveyor belt in the north was part of the original construction of the plant in 1939, but by 1947 it had been dismantled. The 48-inch conveyor belt system and boom conveyors moved crushed material to one of two storage piles, a high-grade and a low-grade storage pile. A single reclaim tunnel with a 48-inch conveyor belt extended beneath both storage piles and the limestone was extracted from the bottom. Limestone was deposited directly onto the 48-inch conveyor leading from the high-grade and low-grade storage piles (HJK Papers 1947:12). At the time of its construction the 48-inch conveyor belt was considered a novel system. Induction motors started the conveyors, generators driven by gravity flow supplied sufficient electricity to operate a 5-yard shovel in the quarry (Logan 1947:315).

The PCC operated the plant and quarry in Santa Clara County, with silos in Redwood City, Honolulu, and Seattle. Silos and a pack house were in Merced; a concrete batching plant was located in Stockton; and other silos and storage facilities were located in San Francisco, and Vancouver, British Columbia (HJK 1947:1).

The PCC manufactured and sold Portland cement, which was invented in 1824 by an English bricklayer named Joseph Aspden, on a wholesale basis only. Standard Portland cement is widely used when there is no special engineering or technical problems. It is a durable cement, however, agencies like USBR and the California Department of Transportation determined that Portland cement did not always meet the needs for a durable concrete for their projects. Based on their recommendations, PCC manufactured different types of standard and special purpose cements: Standard Portland Cement Type I; Modified Portland Cement Type II; High-Early Strength Portland Cement Type III; Low-Heat Portland Cement Type IV; Sulphate Resistant Portland Cement Type V; Portland Pozzolan Cement; Permanente Pronto (Pipe Cement); Permanente Brick Mix (Cement Mortar); Permanente Plastic Cement (Exterior Stucco);

and Permanente Oil Well Cements (PCC n.d.:1–10; HJK Papers 1947:1). Limestone not used for cement was used to make high-quality commercial rock for concrete aggregates, railroad ballasts, and highway paving (Logan 1947:315).

The tremendous population increase on the west coast after World War II fueled a greater demand for cement for new construction. By the end of the 1940s, the PCC plant was producing 1.1 million tons of cement a year and sold approximately 10 percent of the cement produced in the U.S. (Archives & Architecture 2011:24). In 1947, the plant underwent an expansion that allowed for a production increase by 2 million sacks of cement. By the end of the 1940s, the plant was the largest in the world (Logan 1947:315). In 1950, the plant expanded its capacity by 25 percent when it added a fifth kiln (HJK Papers 1950).

Parts of the quarry facility were updated and modernized in the 1970s to meet changing environmental requirements. In 1987, Hanson PLC, a British holding company, purchased the cement plant and renamed it Hanson Permanente Cement. In 2007, Heidelberg Cement assumed ownership of Hanson PLC and merged the plant with Heidelberg's Lehigh Cement companies. The plant was renamed Lehigh Southwest Cement Company, Permanente Plant (Lehigh) (Archives & Architecture 2011:25).

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Chapter 4. Methodology

4.1 Records Search

On October 4, 2018, a member of the GEI Consultants, Inc. (GEI) cultural resources team conducted a records search at the Northwest Information Center (NWIC) in Rohnert Park for the Study Area. A 0.25-mile search radius surrounding the Study Area was included in the records search. The search consisted of an electronic search of NWIC's Geographic Information System containing reported resources and previous investigations organized by base USGS 7.5' quadrangle maps. A previous records search done for an earlier project at the Permanente site, located near the Study Area, was also consulted (discussed further in Section 5.1, below).

4.2 Archival Research

GEI architectural historians previously prepared a historic context for the Permanente property to support several previous Lehigh projects. To create that context, archival research was done at the California Reading Room of the California State Library and the Henry J. Kaiser Papers at the Bancroft Library, University of California Berkeley.

4.3 Field Methods

4.3.1 Archaeological Field Survey

On October 5, 2018, Jesse Martinez, M.A., RPA, conducted an intensive pedestrian survey of accessible portions of the Study Area, walking transects spaced no more than 15 meters (49 feet) apart. A Trimble global positioning system unit was used to ensure adequate coverage for the survey. Portions of the Study Area that were either too steep to be safely traversed or too thick with vegetation to walk through were not surveyed (*see* **Figure 2**); these areas were restricted to the northern portion of the Study Area.

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Chapter 5. Findings

5.1 Records Search Results

The records search revealed three previous investigations were conducted in the Study Area and within the 0.25-mile search radius (**Table 1**).

Table 1. Previous Investigations within Rock Plant Reserve Study Area and within the 0.25-Mile Search Radius

Report No.	Year	Author(s)	Title	In Study Area	Within 0.25-Mile Search Radius
5867	1983	Miley Paul Homan, Holman & Associates	Permanente Archaeological Report	Yes	Yes
36633, 38058	2009	Sean Michael Jensen, Genesis Society	Archaeological Inventory Survey for the Proposed Permanente Quarry Project, c. 1,105-Acres, Santa Clara County, California	Yes	Yes
39585	2011	Franklin Maggi, Sarah Winder, and Jessica Kusz, Archives & Architecture, LLC	Historic Resource Evaluation for the Permanente Quarry Facility Comprehensive Reclamation Plan Project Lehigh Southwest Cement Company 24001 Stevens Creek Blvd. Cupertino, Santa Clara County, California (APNs 351-09-013, -020, 022, 025; 351-10-005, -033, -037, -038; 351-11-001, -005, -006, -007, and -012)	Yes	Yes

The records search also revealed one previously recorded resource in the Study Area and within the 0.25-mile search radius (**Table 2**).

Table 2. Previously Recorded Resources within Rock Plant Reserve Study Area and within the 0.25-Mile Search Radius

Primary No.	Resource Name	In Study Area	Within 0.25-Mile Search Radius	Eligibility for CRHR or County of Santa Clara's Landmark Program
43-002264	Kenna Orchard / Ranch (Permanente #3 and Permanente #5 [Sugar Shack])	Yes	Yes	Not Eligible

5.2 Archaeology Survey Results

The one previously recorded resource (P-43-002264, discussed below) could not be located during the archaeology survey. No other resources were identified during the survey.

5.2.1 P-43-002264 (Permanente #3 [Cherry Orchard]/Permanente #5 [Sugar Shack])

The previously recorded site was first recorded in 2009 by Genesis Society as two separate sites, Permanente #3 (Kenna Orchard) and Permanente #5 (Sugar Shack). The Kenna cherry orchard is outside of the Rock Plant Reserve Study Area. The "Sugar Shack" site records indicate the previously recorded site location is within the Study Area.

In 2011, Archives & Architecture combined the two sites into one record (P-43-002264) and also included other features that are not within the Study Area. The 2011 investigation and evaluation were part of the historic resources evaluation for the Permanente Quarry Facility Comprehensive Reclamation Project, which was done for the County of Santa Clara. Archives & Architecture described the larger site as an agricultural site and ranch complex that was abandoned in the mid-20th century with little of what was there in existence. Because of a lack of integrity, Archives & Architecture determined that P-43-002264 was not eligible for the CRHR or for the county of Santa Clara's landmark program (Archives & Architecture 2011:1, 4).

The location indicated by Genesis Society and Archives & Architecture was investigated during the GEI pedestrian archaeological survey; and GEI's archaeologist concluded that the feature identified as the "Sugar Shack" is no longer extant. The "Sugar Shack" location was thoroughly examined as were other locations indicated on the Archives and Architecture 2011 DPR 523 forms prepared for P-43-002264, outside of the present project boundary; no evidence of any of the features described in the P-43-002264 DPR forms were re-identified, aside from two troughs outside the Permanente Quarry property. Since the previous determination concluded P-43-002264 was ineligible for the CRHR and County landmark program, the resource does not require further consideration.

Chapter 6. Management Recommendations

No archeological or culturally significant resources have been identified within the Rock Plant Reserve Study Area and there is no indication that the Study Area has been used for human burials. Mining the Rock Plant Reserve would be conducted pursuant to Lehigh's vested right and the effects of mining are not a Project impact. However, it is recognized that ground disturbance associated with mining would occur and would create the potential for damage or destruction of any previously unidentified cultural resources that may be present within the disturbance area. Such ground disturbance would also create the potential to disturb human remains if within the disturbance area. Activities associated with reclamation of the Rock Plant Reserve would not disturb area beyond that disturbed during mining. Thus, reclamation of the Rock Plant Reserve would not have the potential to adversely affect significant archaeological or cultural resources.

Although the effects of mining within the Rock Plant Reserve area are not attributed to the Project, the following recommendations are provided to reduce the potential effects of mining. Implementation of these recommendations would avoid the potential for significant impacts associated with potential discovery of cultural resources or human remains.

6.1 Inadvertent Discovery

If materials are encountered during Project implementation that have the potential to be significant cultural resources, ground disturbance within 100 feet of the find should cease until the material is evaluated by a qualified archaeologist and a Native American representative. In the event of such discovery, Lehigh should notify the County of any such find and the results of the evaluations. If the evaluations determine that the resources may be significant and cannot be avoided, Lehigh and its consulting archaeologist should develop an appropriate treatment plan for the resource(s) for review and approval by the County. Measures in the treatment plan may include preservation in place (capping) and/or data recovery. The treatment plan should be developed in consultation with Native American representatives in determining appropriate treatment for prehistoric or Native American cultural resources. Ground disturbance shall not resume within 100 feet of the find until an agreement has been reached as to the appropriate treatment of the find.

6.2 Human Remains

In the event that human skeletal remains are encountered ground disturbance within 100 feet of the find should cease until authorized by the County Coroner. As required by Health and Safety Code Section 7050.5, Public Resources Code Section 5097.98, Title 14 California Code of Regulations Section 15064.5(e), and County Ordinance No. B6-18, Lehigh would immediately notify the County Coroner of the find and allow further investigation by the County Coroner. If the County Coroner determines that the remains are Native American, the County Coroner is required to contact the California Native American Heritage Commission, pursuant to subdivision (c) of §7050.5 of the Health and Safety Code and the County Coordinator of Indian affairs. No further disturbance within 100 feet of the find should occur

except as authorized by the County Coordinator of Indian Affairs in accordance with the provisions of state law and the County Ordinance.

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Appendix A. DPR 523 Form

State of California – The Resources Agency DEPARTMENT OF PARKS AND RECREATION **CONTINUATION SHEET**	Primary # P-43-002264 HRI # Trinomial CA-SCL-882H

Page 1 **of** 1 ***Resource Name or #** (Assigned by recorder) Kenna Orchard/Ranch
***Recorded by** Jesse Martinez, M.A., RPA ***Date** October 5, 2018 ☐ Continuation ☒ Update

P1. Other Identifier: Permanente #5 (formerly P-43-002268)

***P3b. Resource Attributes:** (List attributes and codes) AH2. Foundations/Structure Pads; AH3. Landscaping/Orchard
***P4. Resources Present:** ☐ Building ☐ Structure ☐ Object ☒ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

***P8. Recorded by:** (Name, affiliation, address) Jesse Martinez, M.A., RPA, GEI Consultants, Inc., 2868 Prospect Park Drive, Rancho Cordova, CA 95670

***P9. Date Recorded:** October 5, 2018

***P10. Survey Type:** (Describe) Intensive

***P11. Report Citation:** (Cite survey report and other sources, or enter "none.") GEI Consultants, Inc. 2018. *Archaeology Inventory Report for Project Rogers*. Prepared for Harrison, Temblador, Hungerford & Johnson, LLP.
***Attachments:** NONE ☐ Location Map ☐ Sketch Map ☐ Continuation Sheet ☐ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☒ Other (list) Copy of 2011 DPR 523 form set by Archives & Architecture for P-43-002264

Update

The site was first recorded in 2009 by Genesis Society as two separate sites, Permanente #3 (Cherry Orchard) and Permanente #5 (Sugar Shack). The cherry orchard is outside of the study area for this project. The "Sugar Shack" is within the study area.

In 2011, Archives & Architecture combined the two sites into one record (P-43-002264) and also included other features that are not within the study area boundaries. The 2011 investigation and evaluation were part of the historic resources evaluation for the Permanente Quarry Facility Comprehensive Reclamation Project, which was done for the County of Santa Clara. Archives & Architecture described the larger site it as an agricultural site and ranch complex that was abandoned in the mid-20th century with little of what was there in existence. Because of a lack of integrity, Archives & Architecture determined that the site was not eligible for the CRHR or for the County of Santa Clara's landmark program (Archives & Architecture 2011:1, 4).

On October 5, 2018, GEI's archaeologist Jesse Martinez, M.A., RPA, conducted an intensive pedestrian archaeological survey of the study area. The location indicated by Genesis Society and Archives & Architecture was surveyed and what was identified as the "Sugar Shack" is no longer extant. The "Sugar Shack" location was thoroughly examined as were other locations indicated on the Archives and Architecture 2011 DPR 523 forms prepared for P-43-002264 outside of the present project boundary; no evidence of any of the features described in the P-43-002264 DPR forms were re-identified aside from two troughs, are outside the project boundary. It is possible that the other features, including the "Sugar Shack", have been removed or destroyed since last recorded. The southern portion of the project boundary did show evidence of much recent activity including grading of some areas, excavation of two pits, installation of pipes, and the dirt road leading to the reported location of the "Sugar Shack" blocked by a high dirt berm. It is also possible the location of P-43-002264 has been misplotted.

DPR 523L (1/95) ***Required Information**

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary # P-43-002264
HRI #
Trinomial CA-SCL-882H
NRHP Status Code
Other Listings
Review Code Reviewer Date

Page 1 of 6 *Resource Name or #: (Assigned by recorder) Kenna Orchard/Ranch

P1. Other Identifier: Permanente #3 / Permanente #5 (Sugar Shack)

*P2. Location: ☐ Not for Publication ☒ Unrestricted *a. County Santa Clara
and (P2b and P2c or P2d. Attach a Location Map as necessary.)
*b. USGS 7.5' Quad Cupertino Date 1995 T.7S.; R.2W.; S ½ of NE ¼ of Sec 20; Mount Diablo B.M.
c. Address 24001 Stevens Creek Blvd. City Cupertino Zip 95014
d. UTM: (Give more than one for large and/or linear resources) Zone 10S; 579746mE/ 4129741mN
e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)
Assessor's Parcel Number: 351-11-001,
approximately 0.5 miles westerly on "Sugar Shack Road" from aggregate facility.

*P3a Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

This large early ridge-top agricultural site is located on the south side of Permanente Canyon on both sides of an unimproved access road that originates at the southwest corner of the Permanente aggregate facility south of the cement plant. It was partially recorded by Sean Michael Jensen (Genesis Society) in 2009 as two separate sites: Permanente #3 (P-43-2264) and Permanente #5 (P-43-2268). The agricultural site was about 238 acres at the time of initial development in the late-nineteenth century and was later expanded westward about another 40 acres. Today the area consists of chaparral and some non-native vegetation remaining from the agricultural and residential occupation. Access roads transverse the site, some appear original to the late-nineteenth century development of the hillside, and others contemporary that provide access to testing pads related to Lehigh Southwest operations. The main access road, referred to in the Jensen recording as "Sugar Shack Road," was originally called "McCarthy Road" and provided access to both the subject site as well as the McCarthy Ranch further to the west.
(Continued on page 4).

*P3b. Resource Attributes: (List attributes and codes) Hp2, Single family property

*P4 Resources Present: ☒ Building ☐ Structure ☐ Object ☒ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)



P5b. Description of Photo: (View, date, accession #)
House roof, viewed from road, Sept. 2011

*P6. Date Constructed/Age and Sources:
☒ Historic ☐ Prehistoric ☐ Both
Ca. 1895, McMillan Survey Map of Section 20, T7S, R2W.

*P7. Owner and Address:
Hanson Permanente Cement Inc
24001 Steven Creek Blvd.
Cupertino, CA 95014

*P8. Recorded by: (Name, affiliation, and address)
F.Maggi, J.Kusz, & S.Winder
Archives & Architecture, LLC
Po Box 1332
San Jose, CA 95109-1332

*P9. Date Recorded: Oct. 7, 2011

*P10. Survey Type: (Describe)
Intensive

*P11. Report Citation: (Cite survey report and other sources, or enter "none".)
Archives & Architecture, LLC: Historic Resource Evaluation, Permanente Quarry Facility Comprehensive Reclamation Project, prepared for County of Santa Clara, 2011.

*Attachments: ☐ NONE ☒ Location Map ☐ Sketch Map ☒ Continuation Sheet ☒ Building, Structure and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling State Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☐ Other (List)

DPR 523A * Required information

b.

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
BUILDING, STRUCTURE, AND OBJECT RECORD

Primary # P-43-002264
HRI #
CA-SCL-882H

Page 2 of 6 ***Resource Name or #** (Assigned by recorder) Kenna Orchard/Ranch ***NRHP Status Code** 6z

B1. Historic Name: Kenna Ranch
B2. Common Name: Sugar Shack
B3. Original use: Orchard/Ranch B4. Present Use: None
***B5. Architectural Style:** No style
***B6. Construction History:** (Construction date, alterations, and date of alterations)
Original occupation and related residence and ranch buildings constructed circa 1895. By mid-twentieth century the site contained at least two, and possible three building sites associated with the orchard operation.

***B7. Moved?** ☒ No ☐ Yes ☐ Unknown **Date:** n/a **Original Location:** n/a
***B8. Related Features:**
Orchard on hillside above and to the south of the three building sites. Cedar and Walnut tree.

B9a Architect: Unknown b. Builder: Unknown
***B10. Significance: Theme** Agriculture **Area** Permanente Canyon
Period of Significance n/a **Property Type** Ranch **Applicable Criteria** None
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

The northeast quarter section of Section 20 in T7S, R2W was first recorded as belonging to the Central Pacific Railroad on January 30, 1865 in early land records. The CPRR acquired lands throughout the west as a part of the Pacific Railroad Act passed by the United States in 1862. Henry Kennedy Jackson is next recorded as purchasing the parcel from the CPRR in 1886. The 1890 Santa Clara County Tax Map still shows Jackson owning the parcel, but the 1895 McMillan Survey of Section 20 shows the parcel having been divided at an angle width-wise, with A.S. Spence owning the northern half and P.J. Kenna in the southern half. Kenna also owned the 160 acre southeast quarter section of Section 20 located directly south of the parcel owned previously by Jackson. Kenna is referenced as a property owner along the Permanente Road in the 1893 Road Dedication to the County, indicating that ownership occurred sometime in the early 1890s.

An orchard is recorded on the Kenna property just to the south of McCarthy Road on the 1895 Survey Map, along with multiple structures probably associated with the orchard (and most likely a residence), as well as a structure today known as the "Sugar Shack". The Kenna lands were eventually sold to Blanche K. Rouleau (later Morris), sometime after 1914, and it was Morris who sold the property to the Permanente Corporation in 1942 (SCC OR 1103, Page 591).

(Continued on page 4, DPR523L)

B11. Additional Resource Attributes: (List attributes and codes) None

***B12. References:**

Herrmann Bros., Offical Map of the County of Santa Clara, 1890.
McMillan, J. G. Map of the Official Survey of Section 20, T.7S.R.2W.MDM. 1895.
USGS, 1899 15 minute Palo Alto Quadrange.
USGS, 1948 aerial.

B13. Remarks: None

***B14. Evaluator:** Franklin Maggi
***Date of Evaluation:** October 7, 2011

(This space reserved for official comments.)



DPR 523B

*** Required Information**

b

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Primary # P-43-002264
HRI #
Trinomial CA-SCL-882H

Page 3 of 6 *Resource Name or # (Assigned by recorder) Kenna Orchard/Ranch

*Map Name: USGS Cupertino Quadrangle 7.5 Minute *Scale: n.t.s. *Date of Map: 1995



DPR 523J

b

* Required information

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # P-43-002264
HRI #
Trinomial CA-SCL-882H

Page 4 of 6 *Resource Name or # (Assigned by recorder) Kenna Orchard/Ranch

*Recorded by Franklin Maggi, Jessica Kusz, & Sarah Winder *Date Oct. 7, 2011 ☒ Continuation ☐ Update

(Continued from page 1, DPR523a, P3a Description)

Two collapsed buildings were identified and described by Jensen that are extant to the north of the road. Jensen also recorded five remaining cherry trees on the crest of the hill to the south of the buildings.

The ranch appears to have had at least three building sites by mid-twentieth century. The "Sugar Shack" site consists today of what appears to be two single-story wood buildings that are inaccessible, as the structures have been overgrown with Poison Oak. Jensen described this building as 56 feet in length with a maximum width of 32 feet, and located 20 feet south of the road. The related diagram for this recording shows the buildings north of the road. Associated with this structure is an ancillary building he describes as being to the west and about 20 feet in length by 12 feet, and two large non-native trees: cedar and walnut. The structures are described as having post and beam foundations, and are said to be of stud wall construction clad with board and batten siding.

A 1948 USGS aerial of the site shows potentially three building sites associated with this ranch. Buildings are located on both sides of the road (north and south), and a turnoff to the north from the road, which occurs a couple of hundred feet to the east of the two building sites leads to a clearing that appears to have also contained another ancillary building. This site now contains the remains of an early truck body and frame that was identified by Jensen during his archaeological Inventory Survey report prepared in October 2009 subsequent to the site recordings (see photo, page 5).

Above these building sites and road was once a large orchard that extended across the bluff and onto its south side. Jensen identified the remains of this orchard as "Permanente 3," and recorded the remaining evidence of the agricultural use as five cherry trees within an area of about 200 feet in length east-west, and a maximum width of 50 feet and covering about 9,000 square feet. The 1948 USGS aerial shows most of the early 1890s orchard intact at that time, but later aerials during the last half of the century fail to show evidence of this agricultural site. The cherry trees were not located as a part of this investigation, but the top of the site contains two metal rings that appear to be related to water storage (see photo, page 5). The 1948 USGS aerial of the site appears on page 6.

(Continued from page 2, DPR523b, B10)

This early agricultural/horticultural site has been abandoned since the mid-twentieth century, and today little evidence remains of the early occupation and use. The people associated with this site have been researched, but none appear within local histories for their significance contributions. The remaining remnants of their habitation lack distinction, or have been lost in time. The site does not appear to qualify as a historic resource, and is not eligible for the California Register or as a County Landmark under any of the applicable criteria.

b.

DPR 523L * Required information

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # P-43-002264
HRI #
Trinomial CA-SCL-882H

Page 5 of 6 *Resource Name or # (Assigned by recorder) Kenna Orchard/Ranch

*Recorded by Franklin Maggi, Jessica Kusz, & Sarah Winder *Date Oct. 7, 2011 ☒ Continuation ☐ Update



Cistern (one of two) at crest of hill above orchard site, viewed facing northeast.



Most easterly of building pads with remains of early truck, viewed facing west.

b.

DPR 523L

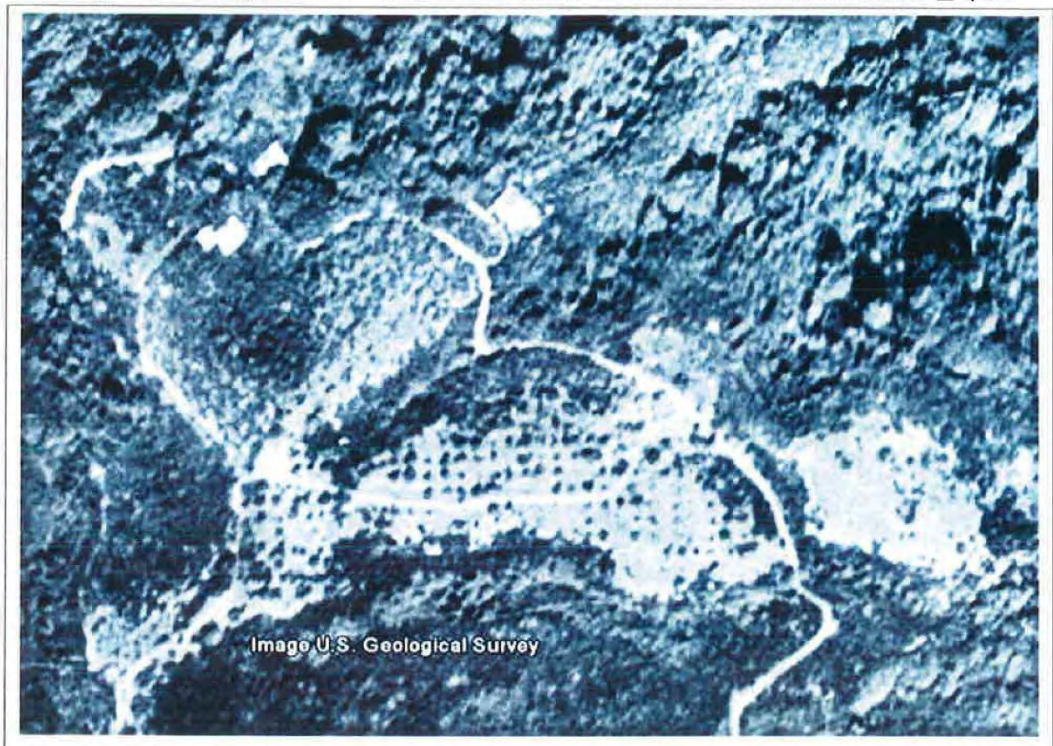
* Required information

State of California – The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # P-43-002264
HRI #
Trinomial CA-SCL-882H

Page 6 of 6 *Resource Name or # (Assigned by recorder) Kenna Orchard/Ranch

*Recorded by Franklin Maggi, Jessica Kusz, & Sarah Winder *Date Oct. 7, 2011 ☒ Continuation ☐ Update



USGS aerial of 1948.

b.

DPR 523L * Required information

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Appendix B. Representative Photographs



Photograph 1. South central portion of Study Area. View to the south.



Photograph 2. View to northeast from Study Area.

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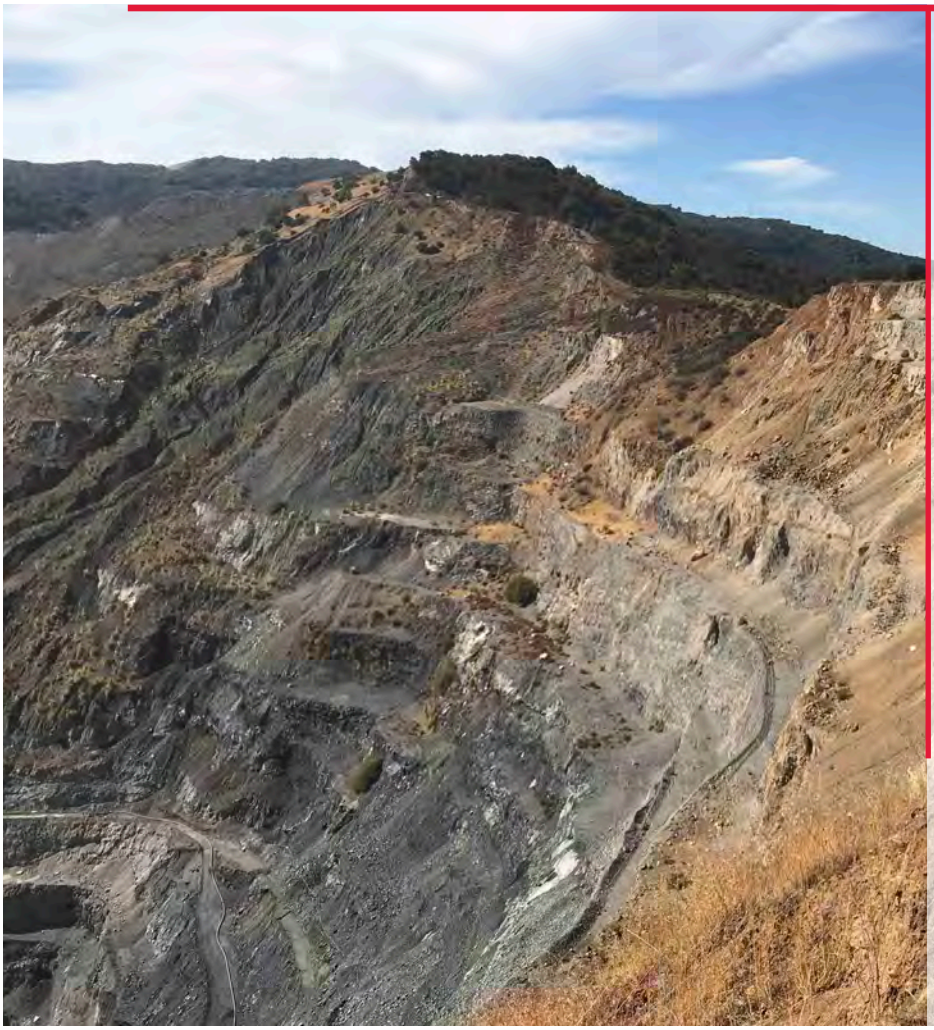
Archaeology Inventory Report
Permanente Quarry
Reclamation Plan Amendment
North Highwall Lay-Back Component

Archaeology Inventory Report Permanente Quarry Reclamation Plan Amendment – North Highwall Lay-Back Component



Prepared for:

Lehigh Southwest Cement Company

May 2019

Prepared by:

GEI Consultants

Consulting Engineers and Scientists

Permanente Quarry Reclamation Plan Amendment – Archaeology Inventory Report North Highwall Lay-Back Component

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May 2019

GEI Project No. 1803892

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Appendices

Appendix A. Representative Photographs

Abbreviations and Acronyms

A.D.	anno Domani
APN	Assessor Parcel Numbers
B.C.	Before Christ
CA-ALA	California Alameda County
CA-CCO	California Contra Costa County
CA-MRN	California Marin County
CA-SMA	California San Mateo County
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
County	Santa Clara County
CRHR	California Register of Historical Resources
CVP	Central Valley Project
DPR	California Department of Parks and Recreation
GEI	GEI Consultants, Inc.
HJK	Henry J. Kaiser
Lehigh	Lehigh Southwest Cement Company
M.A.	Master of Arts
MLD	Most Likely Descendant
Msl	mean sea level
NAHC	Native American Heritage Commission
NPS	National Park Service
NRHP	National Register of Historic Places
NWIC	Northwest Information Center
PCC	Permanente Cement Company
PRC	California Public Resources Code
Project	Proposed amendment to 2012 Reclamation Plan and related entitlements
Quarry	Permanente Quarry
RPA	Registered Professional Archaeologist
SPRR	Southern Pacific Railroad
Study Area	North Highwall Lay-Back study area
USBR	U.S. Bureau of Reclamation
USGS	U.S. Geological Survey

Chapter 1. Introduction

Permanente Quarry (Quarry) is a limestone and aggregate mining operation located in the Santa Clara County (County) foothills west of the city of Cupertino as shown on Figure 1, "Permanente Quarry Location." Lehigh Southwest Cement Company (Lehigh) operates the Quarry which, among other entitlements, is subject to a reclamation plan most recently amended and approved by the County in 2012 (2012 Reclamation Plan). Lehigh proposes to amend the 2012 Reclamation Plan and obtain related entitlements (Project). This report addresses archaeological resources that could be affected by mineral extraction and reclamation activities associated with the North Highwall Lay-Back component of the Project and evaluates, consistent with the California Environmental Quality Act (CEQA), the potential for archaeological or buried resources to be discovered during implementation. In addition, this report presents management recommendations to avoid or minimize potential for impacts on archaeological resources.

This evaluation concludes that there are no known significant cultural resources within the North Highwall Lay-Back study area, and recommendations are provided to ensure that any inadvertent discovery of cultural resources or human remains during activities associated with the North Highwall Lay-Back would be properly evaluated and treated. No significant impacts to cultural resources are anticipated as a result of the North Highwall Lay-Back component of the Project.

1.1 Study Area Location

The North Highwall Lay-Back study area (Study Area) is located above and along the North Highwall Reserve of the North Quarry (**Figure 2**). The Study Area is in Sections 17 and 18 of the U.S. Geological Survey (USGS) 7.5-minute Cupertino Quadrangle, Township 7 South, Range 3 West and Range 2 West. The Study Area is located within Assessor Parcel Numbers (APNs) 351-09-023 and 351-09-025. The Study Area includes the entire North Highwall Lay-Back planned disturbance area, and is approximately 20 acres.

1.2 Project Summary

Lehigh operates the Quarry in accordance with the 2012 Reclamation Plan and other entitlements, including a vested right to mine within certain parcels. Lehigh proposes to amend the 2012 Reclamation Plan and obtain related entitlements to accomplish the following primary components of the Project:

1. Incorporate development and reclamation of the Rock Plant Reserve.

2. Regrade and mine the upper slopes of the North Highwall of the Quarry to recover limestone, eliminate the need for a large fill buttress, and achieve long-term slope stability.

3. Reclaim the majority of the WMSA in place.

4. Backfill the Quarry using a combination of imported surplus construction soil that meets site-specific acceptance criteria and greenstone overburden to protect water quality.

This Archaeological Inventory Report evaluates potential cultural resources impacts associated with the North Highwall Lay-Back component the Project. The planned mining and reclamation activities include regrading the North Highwall Reserve and lowering the north crest to an approximate elevation of 1,400 msl. The North Highwall Lay-Back area encompasses the north crest area where these activities will take place.

Figure 1. Regional Location of North Highwall Lay-Back

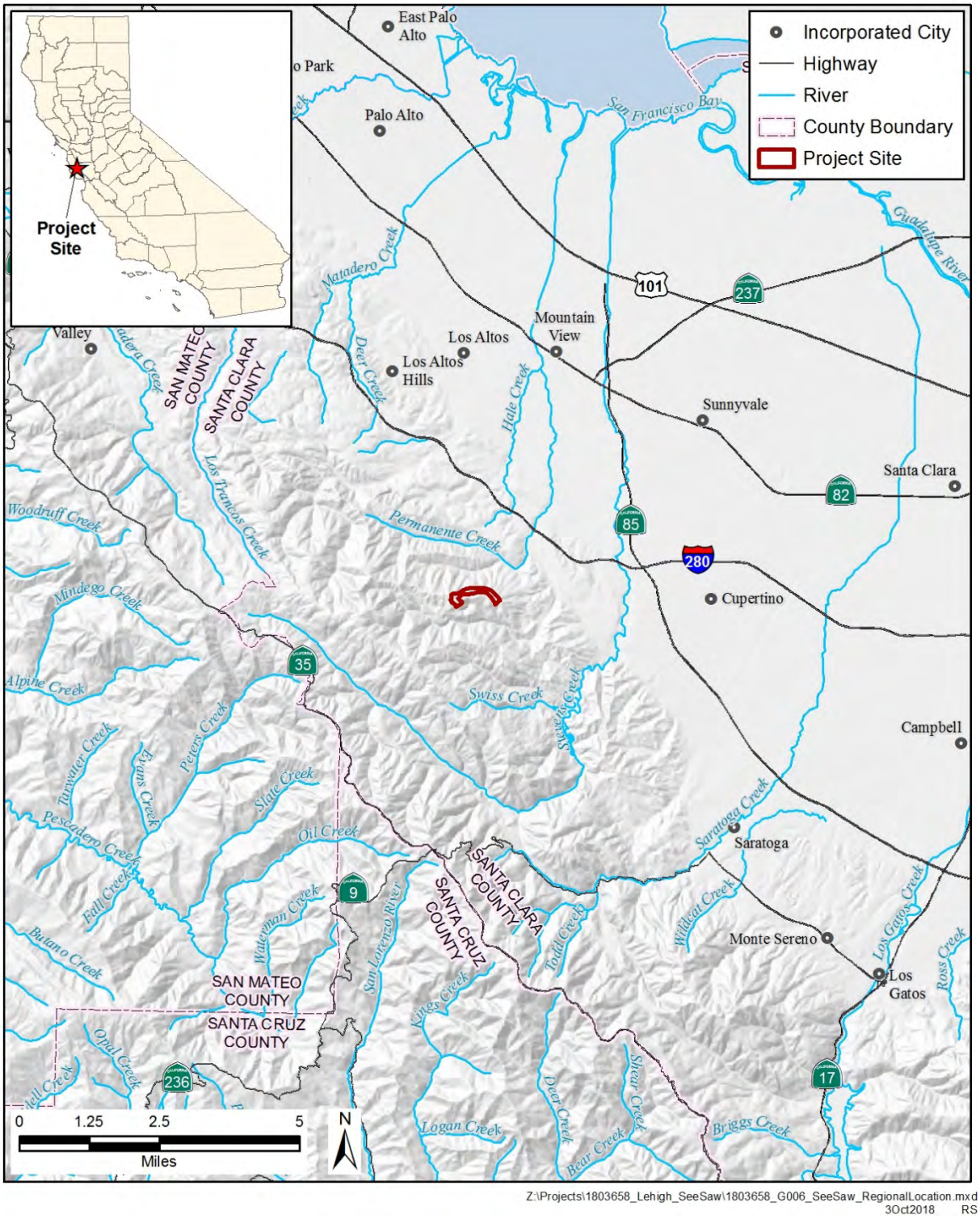

Figure 2. Study Area



Source: GEI Consultants, Inc., 2018

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Chapter 2. Regulatory Context

2.1 National Register of Historic Places

The National Register of Historic Places (NRHP) is the nation's master inventory of known historic resources. It is administered by the National Park Service (NPS) in consultation with the State Historic Preservation Officer. The NRHP includes listings of buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the national, state, or local level. The NRHP criteria and associated definitions are outlined in the *National Register Bulletin: How to Apply the National Register Criteria for Evaluation* (NPS 1997). The following is a summary of that bulletin.

Properties (structures, sites, buildings, districts, and objects) more than 50 years of age can be listed in the NRHP provided they meet one of the evaluation criteria described below; however, properties less than 50 years of age that are of exceptional significance or are contributors to a district, that also meet the evaluation criteria, can be included in the NRHP.

The NRHP uses four criteria under which a property can be considered significant for listing:

A. Properties associated with events that have made a significant contribution to the broad patterns of history.

B. Properties associated with the lives of persons significant in our past.

C. Properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

D. Properties that have yielded or may likely yield information important in prehistory or history.

Properties can be listed individually or as contributors to a historic district.

In addition to meeting one of the evaluation criteria, a property must also retain integrity to convey that significance. Although the evaluation of integrity is sometimes subject to judgement, it must always be grounded in an understanding of the property's physical features and how they relate to its significance. The NRHP recognizes seven aspects of integrity:

- Location: The place where the historic property was constructed or the place where the historic event occurred.
- Design: The combination of elements that create the form, plan, space, structure, and style of a property.

- Setting: The physical environment of a historic property.
- Materials: The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
- Workmanship: The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- Feeling: A property's expression of the aesthetic or historic sense of a particular period of time.
- Association: The direct link between an important historic event or person and a historic property.

2.2 California Environmental Quality Act

The California Environmental Quality Act (CEQA) of 1970 (California Public Resources Code [PRC] 21000) offers directives regarding impacts on historical resources and unique archaeological resources. The State CEQA Guidelines (California Code of Regulations [CCR] 15000) defines a "historical resource" to include more than one category of resources. The first category is, "…resource(s) listed or eligible for listing on the California Register of Historical Resources (CRHR)." (CCR Section 15064.5[a][1]; *see also* PRC Sections 5024.1 and 21084.1.) A historical resource may be eligible for inclusion in the CRHR, as determined by the State Historical Resources Commission or the lead agency, if the resource:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; or
2. Is associated with the lives of persons important in our past; or
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

In addition, a resource is presumed to constitute a "historical resource" if it is included in a "local register of historical resources" unless "the preponderance of evidence demonstrates that it is not historically or culturally significant." (CCR Section 15064.5[a][2])

Furthermore, "historical resources" are those deemed significant pursuant to criteria set forth in PRC Section 5024.1(g), as follows:

> [a] resource identified as significant in an historical survey may be listed in the California Register [CRHR] if the survey meets all of the following criteria:
>
> (1) The survey has been or will be included in the State Historic Resources Inventory.

(2) The survey and the survey documentation were prepared in accordance with office [State Office of Historic Preservation] procedures and requirements.

(3) The resource is evaluated and determined by the office [State Office of Historic Preservation] to have a significance rating of Category 1 to 5 on DPR Form 523 [the Department of Parks and Recreation Historic Resources Inventory Form].

(4) If the survey is five or more years old at the time of its nomination for inclusion in the California Register, the survey is updated to identify historic resources which have become eligible or ineligible due to changed circumstances or further documentation and those which have been demolished or altered in a manner that substantially diminishes the significance of the resource.

Resources identified by such surveys are presumed to be historically or culturally significant unless the preponderance of the evidence demonstrates otherwise.

The final category of "historical resources" is an optional one, which a lead agency may opt to consider or not consider. According to the State CEQA Guidelines (CCR Section 15064.5[a][3]):

> Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

In addition to the obligation to consider impacts on "historical resources," CEQA and the State CEQA Guidelines require consideration of unique archaeological sites (PRC Section 21083.2, 14 CCR Section 15064.5). A "unique archaeological resource" is defined in CEQA (PRC Section 21083.2[g]) as:

> …an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:
>
> (1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
>
> (2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.
>
> (3) Is directly associated with a scientifically recognized important prehistoric or historic event or person.

If a resource meeting the criteria defined above would be affected by a project and data recovery through excavation is the only feasible mitigation, a data recovery plan that makes provisions for adequately recovering the scientifically-consequential information from and about the historical resource shall be prepared and adopted before any excavation is undertaken (CCR Section 15126.4[b][3][C]). Other acceptable methods of mitigation under the State CEQA Guidelines (CCR Section 15126.4) include excavation and curation or study-in-place without excavation and curation (if the lead agency determines that testing or studies already completed have adequately recovered the scientifically consequential information from and about the resource). The State CEQA Guidelines (CCR Section 15064.5[e]) require that excavation activities be stopped whenever human remains are uncovered, and that the County Coroner be called in to assess the remains. If the County Coroner determines that the remains are those of Native Americans, the Native American Heritage Commission (NAHC) must be contacted within 24 hours. At that time, the State CEQA Guidelines (CCR Section 15064.5[d]) direct the lead agency to consult with any appropriate Native Americans as identified by the NAHC in a timely manner and direct the lead agency (or applicant), under certain circumstances, to develop an agreement with the Native Americans for the treatment and disposition of the remains.

Chapter 3. Environmental Context

3.1 Cultural Context

3.1.1 Prehistoric Setting

Three different taxonomic systems are used to describe the cultural chronology of the San Francisco Bay Area. The first employs broad temporal sequences; the second generally focuses on cultural sequences, while the third is a hybrid of the first two. The third system can be refined further when applied to restricted areas that have more clearly distinctive cultural aspects or more refined chronologies than the region as a whole.

The following is the most recent, general cultural sequence for the San Francisco Bay Area taken from Milliken et al. (2007) and following the hybrid system. Information from additional sources is included as appropriate.

Terminal Pleistocene, 11,500–8000 B.C.

No evidence for occupation during this period has yet been discovered, presumably because it has been washed away through stream action, buried under more recent alluvium, or submerged on the continental shelf (Rosenthal and Meyer 2004).

Early Holocene (Lower Archaic), 8000–3500 B.C.

Prehistoric groups during this period employed a generalized mobile forager pattern. Characteristic artifacts include well-made millingslabs and handstones as well as wide-stemmed and leaf-shaped projectile points (Jones et al. 2007). The earliest date for a millingslab component in the San Francisco Bay Area, 7920 B.C., was obtained from a charcoal concentration found underneath a millingslab at Los Vaqueros Reservoir (CA-CCO-696) in the hills east of Mount Diablo. Archaeobotanical remains recovered from the same site suggested an economy focused on acorns and wild cucumbers. Burials during this period tend to be flexed, sometimes found underneath cairns of millingslabs. Populations are thought to be sparse and highly mobile (Moratto 1984).

Hundreds of species of plants and animals were used for food, medicine, and craft materials during this period. Some researchers have postulated that the wide variety of exploited resources resulted from a decrease in available big game at the end of the Pleistocene. Early Holocene people used a range of different environments and scheduled their movements seasonally as resources became available. They spent winters in base camps along the coast and occupied interior valleys and hills during the summer. Early Holocene people developed or refined technologies such as ground stone tool production, basketry, and the manufacture of various scraper-tools. Non-utilitarian items such as ritual objects and personal ornaments were also elaborated (Chartkoff and Chartkoff 1984). In the Santa Clara Valley, the Lower Archaic Period is more specifically known as the Metcalf Creek Aspect and occurs from roughly 7000 B.C. to 3500 B.C.

Early Period (Middle Archaic), 3500–500 B.C.

Prehistoric groups changed during the Early Period from being highly mobile to sedentary or semi-sedentary. Indicative of this are the appearance of substantial shell mounds in West Berkeley (CA-ALA-307), Ellis Landing (CA-CCO-295), and Pacheco (CA-MRN-152), as well as large house floors with postholes found at the Rossmoor site (CA-CCO-309). Mortars and pestles, some made of wood, greatly increase in number during this period, and burials contain greater amounts of ornamental goods. Changes in interment practices, such as occasional burning before burial as identified at Los Vaqueros Reservoir (CA-CCO-637), also occurred during the Early Period.

Trends that began during the Lower Archaic intensified during the Middle Archaic. Mobility became more restricted, as evidenced by greater use of local lithic materials, as well as the previously mentioned substantial shell mounds and house floors. The presence of millingslabs and handstones beginning during the Early Holocene evidenced the use of small, hard seeds; during the Early Period, however, the relative number of these artifact classes decreased while mortars and pestles increased greatly, indicating that acorn use became much more important. Evidence of far-ranging trade is also present during this period, as evidenced by the discovery of beads made of shell from the central and southern California coasts, as far inland as the Great Basin (Bennyhoff and Hughes 1987; Jackson and Ericson 1994).

Some researchers have argued that an emphasis on hunting northern fur seal emerged in the southern Bay Area during this period. In the southern Bay Area this period is called the Hunting Pattern or Lower Berkeley Pattern. In the Santa Clara Valley and along the San Mateo County coast it is called the Sandhill Bluff Aspect, although it has the same time range. Excavations at CA-SMA-77 (the University Village site) indicate that the Sandhill Bluff Aspect may have ended early in the Santa Clara Valley, at approximately 1500 B.C. The Sandhill Bluff Aspect was followed by the Early Bay Complex, which lasted until 500 B.C.

Lower Middle Period (Initial Upper Archaic), 500 B.C.–430 A.D.

Changes in ornamental items mark the beginning of this period. Rectangular shell beads, which had been used for 3,000 years, disappear from the archaeological record of the Bay Area, Central Valley, and Southern California. Split-beveled and small saucer beads made from *Olivella* shell enter the record, as do circular *Haliotis* beads. Spire-lopped *Olivella* beads, however, are more commonly found in burial contexts. Bead types such as *Olivella* saucer beads that previously had low representation become more prevalent.

Other artifact types that date to this period include barbless fish spears, elk femur spatulae, and bone tubes and whistles. In some parts of the Bay Area, basketry awls with shouldered tips appear in the record, indicating the manufacture of coiled basketry. Mortars and pestles were the sole grinding tools for most of the region, although millingslabs were still used around the periphery. Net sinkers, once prevalent, are now found only in very limited areas. Some areas that had not been heavily used in the past, such as the Napa Valley, now see more intensive use, with large accumulations of dark midden found at sites.

In the southern Bay Area this period is called the Upper Berkeley Pattern. There is a general shift from hunting of northern fur seals to a greater emphasis on large terrestrial mammals. Acorn use also increases in the area. Along the San Mateo County coast, this period is called the Año Nuevo Aspect. The period is

not as well known for most of the Santa Clara Valley. In some localities it is called the Ellis Landing Complex. The Upper Berkeley Pattern for this area lasted until A.D. 1000.

Upper Middle Period (Late Upper Archaic), 430–1050 A.D.

The Upper Middle Period is characterized by dramatic changes in mortuary practices and ornaments. Previously, individuals were buried in flexed positions, but this changed to an extended position during the Upper Middle Period. The first such interment was found in the Livermore Valley at the Santa Rita village site (CA-ALA-413). The individual, a 30-year-old male, was found buried with 30,000 *Olivella* saucer beads (the largest documented California bead lot), quartz crystals, and spatulae encrusted with beads. This funerary style, called Meganos, seems to have begun inland and traveled toward the bay.

The beginning of this period also saw the abandonment of more than half the sites that had been occupied just previously, a large increase in the amount of sea otter bone in the still-occupied sites, and a general collapse of the *Olivella* trade network. As the period progressed, there were more changes in bead styles, generally following the spread of Meganos mortuary style. Other artifacts that appear during this period are well-fashioned "show blades," fishtail charmstones, single-barbed bone fish spears, ear spools, and large mortars. Seed recovery from midden also increases on at least some sites. In the Santa Clara Valley, from roughly A.D. 1000 to 1400, the period is known as the Meganos Complex, named after the mortuary practice.

Initial Late Period (Lower Emergent), 1050–1550 A.D.

This period is marked by an increase in cultural complexity. Among the changes that occurred was an increase in sedentism, as well as higher levels of social ascription and ceremonial integration throughout central California. Mortuary practices also point to increasing social stratification. Partial cremations appear, usually associated with the wealthiest grave offerings, although overall the number of burials found with beads decreases.

Artifacts associated with this period include fully-shaped show mortars, new types of *Olivella* beads, as well as new types of multi-perforated and bar-scored *Haliotis* ornaments. Other artifacts that appear are the flanged pipe, banjo effigy ornaments, and bow-and-arrow technology. The banjo effigy ornaments may be the precursor to the ethnographically-documented Kuksu cult, a widespread ceremonial system practiced by various language groups around the Bay Area. The first arrow-sized projectile points in the region were the Stockton serrated series, which were unique to central California.

The adoption of bow-and-arrow technology seems to have affected how lithic raw material was acquired in the region. Biface production and total amounts of debitage produced at Napa Glass Mountain obsidian quarries dropped significantly, while amounts of debris from that same source increased dramatically in the interior East Bay. Researchers have interpreted this as a rearranging of technology, in which large flakes from the Napa Glass Mountain sources were transported to more distant locales where small projectile points, performs, and various simple flake tools were produced. This would be in contrast to earlier periods when more time would have been spent at the quarries to fashion tools that required more work and larger amounts of material to produce.

In the South Bay, this period is known as the Augustine Pattern, while along the San Mateo County Coast it is called the Bonny Doon. Little of the Augustine Pattern has been studied in the Santa Clara Valley.

Terminal Late Period, 1550–Contact A.D.

Beads are once again a marker for change during this period. The *Olivella* sequin and cup beads that distinguished the previous period disappear and are replaced by greater numbers of clamshell disk beads, while *Olivella* lipped and spire-lopped beads are found around the Bay Area. Although midden accumulations for this period are generally thinner, site distribution does not change. Interestingly, evidence of the manufacture of clam disk beads is found, not along the coasts, but farther inland in the Santa Rosa Plain and the Berryessa Valley (30–80 kilometers inland, respectively).

Another changing characteristic of this period is projectile point types. The Stockton serrated point series is replaced by simpler corner-notched arrow points in some areas, while Desert side-notched points appear in others. Other artifacts appearing during this period are the toggle harpoon, hopper mortar, and magnesite tube beads.

Researchers have put forward various reasons for these changes. Some hypotheses include that the population became larger than the landscape's carrying capacity, which led to conflict and wealth contraction. Others surmise that population groups were migrating, displacing, or marrying their way into neighboring territory. Another possibility put forward is that the archaeological record during the Terminal Late Period actually reflects the consequences of European-introduced epidemics, causing population crashes and cultural disruption.

3.1.2 Ethnographic Setting

The Study Area lies within the traditional territory of the Ohlone (Costanoan) people. The Ohlone comprised several ethnic groups, generally based on a common language and territory. The Ohlone spoke eight distinct languages (Levy 1978), although Kroeber (1925) recognized only seven. Tamyen was spoken in Santa Clara County (Levy 1978). At the time of European contact, the Ohlone lived in approximately 50 separate, politically-autonomous nations or tribelets; four were found to be in Santa Clara County (Levy 1978), which was the densest populated area north of Mexico (Margolin 1978:1).

Tribelets consisted of one or more villages and several camps in a given tribelets's territory (Margolin 1978:13, 52). Each tribelet averaged 200 individuals and ranged from 50 to 500 people. Early accounts suggest that territorial boundaries were fiercely defended (Levy 1978). The office of chief was usually inherited patrilineally, but if there were no male heirs, the position could pass to a sister or daughter (Levy 1978; Margolin 1978:105). In either instance, the office could be obtained only with community approval. The chief generally acted as the head of a council of elders. Responsibilities included feeding visitors; helping impoverished tribal members; directing ceremonial activities; and directing hunting, fishing, gathering, and warfare expeditions. The chief also would set the dates for ceremonies, feasts, festivals, and dances (Margolin 1978:104). Direct authority was weak in Ohlone culture because of strong adherence to personal freedom; chiefs and councils acted primarily as advisors to the community. The only exception to this was during times of war, when the chief's authority increased (Kroeber 1925; Levy 1978). The chief usually had an assistant called a speaker, who announced important events (Levy 1978; Margolin 1978:95–97).

Ohlone households tended to be large for California Indians, ranging from 10 to 15 members. Some households consisted of patrilineally-descended extended families. Sororal polygynous marriages also occurred with co-wives and their children living together, although this was confined mostly to chiefs (Levy 1978; Margolin 1978:96), with perhaps only 10 percent of men having multiple wives (Milliken et al. 2007:51). The Ohlone were grouped into clans and divided into deer and bear moieties (Levy 1978).

Territorial claims were strictly enforced, and early accounts often mention warfare conducted over boundary violations. Wars were fought with other Ohlone groups and neighboring tribelets over breaches of boundaries, unpermitted taking of resources, and other reasons such as wife stealing (Levy 1978; Margolin 1978:101, 108–114; Milliken et al. 2007:57). Battles could be initiated either by surprise attack or by prearranged meetings. The primary weapon was the bow and arrow.

The Plains Miwok, Sierra Miwok, and Yokuts Indians were likely the main trading partners for the Ohlone. Cinnabar, used as a pigment and mined from the San Jose area, was among the items with the highest trade value (Margolin 1978:99). The Ohlone traded items such as mussels, abalone shells, salt, dried abalone, and *Olivella* shells for pine nuts from the Yokuts (Levy 1978) or rarely, items from farther away (Margolin 1978:98).

Prayers and offerings were a central part of Ohlone religion. Prayers to the sun were accompanied by blowing smoke to the sky. Offerings included feathers, strips of rabbit fur, seeds, tobacco, and shell beads, sometimes in areas associated with specific spirits; these offerings were often attached to the tops of poles. Shamans were powerful figures believed to be able to control the weather and cure disease. Ohlone shamans also knew how to set bones, relieve cranial pressure by drilling holes in the skull, and use numerous herbs, barks, and roots for medicinal purposes (Margolin 1978:132). Shamans also conducted dances and ceremonies to ensure good crops, abundant fish harvests, or whale stranding. The bear was a powerful figure in Ohlone religion, and bear charms could be employed in a number of ways, including helping during childbirth (Margolin 1978:69).

The Ohlone carefully managed the land, helping to ensure good animal and plant yields through controlled burning of extensive areas (Paddison 1999:11). This reduced risk of large, uncontrolled fires minimized the presence of chaparral species, promoted the growth of seed-bearing annual plants, and provided extensive grazing areas for game animals. Acorns, harvested during the fall, were likely the most important food for the Ohlone and were used to make mush or acorn bread (Levy 1978; Margolin 1978:41–42). Poles were used to dislodge acorns from trees, then were ground and leached to remove tannin. Leaching was a complicated and involved process, with the time necessary to complete dependent on the species of acorn (Margolin 1978:43–44). Buckeye nuts were similarly used but secondary in importance. Some of the other plant foods included tarweed, chia, digger pine, blackberries, elderberries, wild onion, thistle, as well as several other greens and roots. Honey was also gathered. (Levy 1978; Margolin 1978:46–51).

A variety of mammals were hunted, often taken by a single hunter. These species included black-tailed deer, grizzly bear, Roosevelt elk, antelope, sea lion, and whale. Hunting was strictly a male activity and techniques included disguise, drives off of cliffs, or ambushes (Margolin 1978:25–26, 84). Smaller mammals that were used for food included dog, wildcat, skunk, raccoon, cottontail, jackrabbit, and a large number of rodent and reptile species (Levy 1978; Margolin 1978:25). Rabbits were communally hunted with nets. Waterfowl, including Canada goose, snow goose, white-fronted goose, mallard, teal, and

American coot, were the most important birds eaten. Fish species that were important to the Ohlone included steelhead, salmon, sturgeon, and lamprey. Sturgeon and salmon were caught in seine nets. Other fish-catching techniques included the use of baskets, dip nets, and spearing. Mussels were a very important food source along the coast (Levy 1978). Some animals, such as frogs, eagles, buzzards, ravens, and owls, were taboo for religious reasons (Margolin 1978:24).

Dwellings consisted of domed structures thatched with tule, grass, wild alfalfa, ferns, or carrizo. These plants were tied onto a framework of poles using willow withes. Some groups used a more conical structure made of split redwood or redwood bark. These homes tended to be small (Margolin 1978:15). Sweathouses generally held only six to eight individuals. Sweathouses were constructed by excavating a pit near a creek or stream bank. The remainder of the structure was built against the bank. Dance areas were circular or oval in shape and enclosed by fences made of brush or laurel branches. Some assembly structures were large enough to hold an entire community of 200 individuals and were usually located in the center of the village, with dwellings around the periphery (Levy 1978).

The Ohlone employed an extensive technological array of items. Tule balsas were used for watercraft and propelled with a double-bladed paddle. There are some reports that stone anchors were used (Levy 1978). The Ohlone made both sinew-backed and self-bows for hunting and warfare; the wood for the bows was often acquired through trade (Margolin 1978:30). Arrows were made with three-feather radial fletching attached with asphaltum, a cane shaft, and a hardwood foreshaft. Arrowheads were made of stone or bone or were created out of the foreshaft. Nets were used to capture a variety of animals. Rocks and minerals were used for tools including manos, metates, net sinkers, anchors, pipes, arrowheads, and a variety of flaked stone tools. Stuffed ducks were used as hunting decoys (Margolin 1978:15). Minerals also were used to make pigments. Cordage was made from milkweed, Indian hemp, or nettle. Blankets were made from strips of sea otter while bedding was manufactured from tule mats or animal skins (Levy 1978).

Basket making was a highly developed art and craft among the Ohlone (Margolin 1978:117–122). Baskets were twined rather than coiled and made of willow, rush, tule, and other cut grasses. Baskets were often ornamented with abalone shell, quail plumes, and woodpecker scalps. Baskets were used for the collection, preparation, storage, and serving of food, as water containers and for a variety of other tasks and gifts (Levy 1978; Margolin 1978:117–122).

Men and boys generally wore no clothing, while women wore a front apron of netted or braided tule or grass, and a larger rear apron was made of buckskin or sea otter skins (Kroeber 1925). In cold weather, both men and women wore robes fastened under the chin. These were made of rabbit skin, sea otter skin, duck feathers, or buckskin. Tattoos were made on the face, forehead, and arms. Paints in nonritual contexts were applied on the face and body. Some men had a bone ornament pierced through the nasal septum. Necklaces of *Olivella* shells and abalone pendants also were worn (Levy 1978).

3.1.3 Historic Setting

Santa Clara County

Santa Clara County is one of California's original 27 counties and was the first state capital (Hoover et. al. 1990:397). In its early years, the county supported large cattle ranches, but agriculture quickly became the predominant industry. In 1919, there were more than 98,000 acres of planted fruit trees in Santa Clara

County, including apricots, prunes, and grapes for wine. During this part of the 20th century, the county was the largest fruit district in California (Sawyer 1922:33, 135).

Cupertino, originally known as West Side, was settled by immigrants from France, Germany, and Italy. These early settlers planted large vineyards, but the 1895 phylloxera outbreak destroyed most of the vines. Growers that lost their vineyards switched to growing French prunes, peaches, apricots, cherries, plums, walnuts, and almonds (Hugger 2018; City of Cupertino 2018b). Like most of California, the increased population lead to orchards being sold and subdivided for housing. Residents voted to incorporate in 1955 and Cupertino became Santa Clara County's 13th city. But, despite the increased population Cupertino retained its ranches and vineyards until the mid-1960s. In 1977 Apple, Inc. settled in Cupertino, making the city its headquarters and marking the high-tech boom in the city. By 2010, Cupertino had more than 64,000 citizens (City of Cupertino 2018a).

Henry John Kaiser

Kaiser was born in New York in 1882. In 1906, he moved to Spokane, Washington. In Spokane, he worked as salesman selling hardware, sand, and gravel. Kaiser established the Henry J. Kaiser Company, Ltd. in 1914, with its headquarters in Vancouver, British Columbia. The company was a road paving business that Kaiser started in 1912 in Washington and British Columbia. His first job in California came in 1921, paving the road between Redding and Red Bluff. He then subsequently moved his headquarters to Oakland, California (Morganti n.d.:2).

Kaiser continued to grow his business. In 1923, he was awarded a road paving job between Livermore and Pleasanton, California. To supply the job, he started a sand and gravel quarry close to Livermore, which became the Kaiser Sand and Gravel Company. During the Great Depression of the 1930s, Kaiser formed Six Companies, Inc., a consortium where he was chairman of the executive committee. The company was awarded the contract to build Boulder Dam on the Colorado River (Morganti n.d.:4). Kaiser was also involved in building Bonneville Dam on the Columbia River and the Grand Coulee Dam in Washington (Foster 1989:62–63).

In 1938, Kaiser and his partners bid on the construction of Shasta Dam, north of Redding, California. But, Kaiser was outbid and lost the job by $262,907 (Foster 1989:64). The contracts to supply sand, gravel and cement were separate from the construction contract (Taylor 1941:122). It was at this point that he decided to invest in cement production and bid on the contract to supply the cement for the dam's construction. The previous year he had begun scouting locations for the cement plant and decided on a site near Permanente Creek in Cupertino in Santa Clara County. By 1938, he had already arranged with the Southern Pacific Railroad (SPRR) to use their track at the site to transport cement to Redding, 12 miles from the dam's construction site (Foster 1989:64–65). He outbid the lowest bidder and was awarded the contract despite not having a plant to deliver.

Construction on Permanente Cement Company's (PCC) plant began in June 1939. Less than 7 months later the first bag of cement was produced. Permanente Cement Plant would supply nearly 6,800,000 barrels of cement for the construction of Shasta Dam (*San Bernardino Sun* 1957:32), which equated to roughly 95 percent of the cement to construct the dam (Foster 1989:67). Kaiser also supplied the gravel from the gravel pits he owned near Redding. To cut his costs, rather than haul the gravel by rail,

Kaiser had a 9.6-mile-long conveyer belt built (Taylor 1941:122). Kaiser recognized the importance of establishing the cement plant because he knew that as part of the Central Valley Project (CVP), the U.S. Bureau of Reclamation (USBR) would need 7,000,000 barrels of cement for Shasta Dam; 3,000,000 barrels for the Friant Dam, and another 1,000,000 barrels for the CVP's many canals. The work was estimated to be worth $200,000,000. He realized that the U.S. Navy would have an estimated $30,000,000 worth of work on the naval bases. Cement would also be needed for the debris dams that the U.S. Army Corps of Engineers were planning, which amounted to approximately $5,000,000 worth of work (HJK Papers 1937:43).

By 1940, cement was coming into short supply. When contracts were let by the military for large quantities of cement for defense installations in the Pacific, Kaiser presented an unusual proposal. He proposed to ship cement in the bulk in the holds of ships rather than in bags. The cement was then stored in silos in Honolulu. After Pearl Harbor was bombed on December 7, 1941, the Navy had the supplies needed and rebuilding began within days of the attack (Foster 1989:166). At the start of World War II, Kaiser became involved in the shipbuilding business, establishing Kaiser Shipyards in Richmond, California. While at the shipyards, he created the Kaiser Permanente Health Care system for his employees. Kaiser owned a lodge near Permanente Creek that became the namesake for his medical program. He later went on to form Kaiser Aluminum and Kaiser Steel (Archives & Architecture 2011:27).

During the 1950s and 1960s, Kaiser expanded his cement business and established distribution and manufacturing plants throughout the west coast. As his operations grew, he opened or acquired interest in cement plants in the southwestern United States, Hawaii, and as far away as Japan and Thailand. In 1954, Kaiser moved to Hawaii for several construction projects. He died in Honolulu, Hawaii, in 1967 (Archives & Architecture 2011:24–25, 27).

Permanente Cement Company

The PCC was organized on February 10, 1939, under the name The Permanente Corporation, but Kaiser began planning for the PCC in 1937. The cement plant was situated in the hills above Cupertino, along Permanente Creek, on approximately 1,300 acres known as the Permanente Deposit. The site also contained approximately 140 acres of limestone outcroppings and right-of-way to connect with the SPRR at Silma Junction (near present day Interstate 280 and Foothill Boulevard interchange). The site was purchased from Santa Clara Holding Company. The cement plant was a west coast process plant, which was selected for its location, simplicity, the economy of construction, and because it made for a better concrete mix (HJK Papers 1937:5, 7). Construction of the plant began in June 1939; the plant's first shipment was on January 10, 1940 (HJK Papers 1947:17). In September 1940, a third kiln was built and placed into operation and a fourth kiln was added in 1941. In the 1940s, the plant produced 5,500,000 barrels per year and it was one of the largest cement producers in the western U.S. (HJK Papers 1947: 2, 11, 17). On February 25, 1943, the name changed to PCC, with Kaiser as the president of the company (HJK Papers 1947:1, 3).

The plant site included an upper and lower limestone quarry. The upper quarry was divided into a north and south section. A conveyor belt in the north was part of the original construction of the plant in 1939, but by 1947 it had been dismantled. The 48-inch conveyor belt system and boom conveyors moved crushed material to one of two storage piles, a high-grade and a low-grade storage pile. A single reclaim

tunnel with a 48-inch conveyor belt extended beneath both storage piles and the limestone was extracted from the bottom. Limestone was deposited directly onto the 48-inch conveyor leading from the high-grade and low-grade storage piles (HJK Papers 1947:12). At the time of its construction the 48-inch conveyor belt was considered a novel system. Induction motors started the conveyors, generators driven by gravity flow supplied sufficient electricity to operate a 5-yard shovel in the quarry (Logan 1947:315).

The PCC operated the plant and quarry in Santa Clara County, with silos in Redwood City, Honolulu, and Seattle. Silos and a pack house were located in Merced; a concrete batching plant was located in Stockton; and other silos and storage facilities were located in San Francisco, and Vancouver, British Columbia (HJK Papers 1947:1).

The PCC manufactured and sold Portland cement, which was invented in 1824 by an English bricklayer named Joseph Aspden, on a wholesale basis only. Standard Portland cement is widely used when there is no special engineering or technical problems. It is a durable cement, however, agencies like USBR and the California Department of Transportation determined that Portland cement did not always meet the needs for a durable concrete for their projects. Based on their recommendations, PCC manufactured different types of standard and special purpose cements: Standard Portland Cement Type I; Modified Portland Cement Type II; High-Early Strength Portland Cement Type III; Low-Heat Portland Cement Type IV; Sulphate Resistant Portland Cement Type V; Portland Pozzolan Cement; Permanente Pronto (Pipe Cement); Permanente Brick Mix (Cement Mortar); Permanente Plastic Cement (Exterior Stucco); and Permanente Oil Well Cements (PCC n.d.:1–10; HJK Papers 1947:1). Limestone not used for cement was used to make high-quality commercial rock for concrete aggregates, railroad ballasts, and highway paving (Logan 1947:315).

The tremendous population increase on the west coast after World War II fueled a greater demand for cement for new construction. By the end of the 1940s, the PCC plant was producing 1.1 million tons of cement a year and sold approximately 10 percent of the cement produced in the U.S. (Archives & Architecture 2011:24). In 1947, the plant underwent an expansion that allowed for a production increase by 2 million sacks of cement. By the end of the 1940s, the plant was the largest in the world (Logan 1947:315). In 1950, the plant expanded its capacity by 25 percent when it added a fifth kiln (HJK Papers 1950).

Parts of the quarry facility were updated and modernized in the 1970s to meet changing environmental requirements. In 1987, Hanson PLC, a British holding company, purchased the cement plant and renamed it Hanson Permanente Cement. In 2007, Heidelberg Cement assumed ownership of Hanson PLC and merged the plant with Heidelberg's Lehigh Cement companies. The plant was renamed Lehigh Southwest Cement Company, Permanente Plant (Lehigh) (Archives & Architecture 2011:25).

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Chapter 4. Methodology

4.1 Records Search

On October 4, 2018, a member of the GEI Consultants, Inc. (GEI) cultural resources team conducted a records search at the Northwest Information Center (NWIC) in Rohnert Park for the Study Area. A 0.25-mile search radius surrounding the Study Area was included in the records search. The search consisted of an electronic search of NWIC's Geographic Information System containing reported resources and previous investigations organized by base USGS 7.5' quadrangle maps. A previous records search done for an earlier project at the Permanente site, located near the Study Area, was also consulted (discussed further in Section 5.1).

4.2 Archival Research

GEI architectural historians previously prepared a historic context for the Permanente property to support several previous Lehigh projects. To create that context, archival research was conducted at the California Reading Room of the California State Library and the Henry J. Kaiser Papers at the Bancroft Library, University of California Berkeley.

4.3 Field Methods

4.3.1 Archaeological Field Survey

On October 5, 2018, Jesse Martinez, M.A., RPA, conducted an intensive archaeological pedestrian survey of accessible portions of the Study Area, walking transects spaced no further than 15 meters (49 feet) apart. A Trimble Geographic Information System unit was carried to ensure adequate coverage for the survey. Portions of the Study Area that were determined to be too steep to be safely traversed or were too heavily vegetated to be penetrated were not surveyed (*see* **Figure 2**); much of the Study Area was either too steep and/or too heavily vegetated to survey. An area measuring from approximately 2 meters (6 feet) to 13 meters (43 feet) wide was surveyed along the southern boundary of the Study Area.

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Chapter 5. Findings

5.1 Records Search Results

The records search revealed two previous investigations were conducted in the Study Area and within the 0.25-mile search radius (**Table 1**). The records search revealed no previously recorded resources in the Study Area or within the 0.25-mile search radius.

Table 1. Previous Investigations within North Highwall Lay-Back Study Area and within the 0.25-Mile Search Radius

Report No.	Year	Author(s)	Title	In Study Area	Within 0.25-Mile Search Radius
36633, 38058	2009	Sean Michael Jensen, Genesis Society	Archaeological Inventory Survey for the Proposed Permanente Quarry Project, c. 1,105-Acres, Santa Clara County, California	Yes	Yes
39585	2011	Franklin Maggi, Sarah Winder, and Jessica Kusz, Archives & Architecture, LLC	Historic Resource Evaluation for the Permanente Quarry Facility Comprehensive Reclamation Plan Project Lehigh Southwest Cement Company 24001 Stevens Creek Blvd. Cupertino, Santa Clara County, California (APNs 351-09-013, -020, 022, 025; 351-10-005, -033, -037, -038; 351-11-001, -005, -006, -007, and -012)	Yes	Yes

5.2 Archaeology Survey Results

No archaeological resources were identified during the archaeological pedestrian survey. Approximately 1 acre of the Study Area was surveyed. Almost the entire Study Area consists of very steep, heavily vegetated terrain. Although complete pedestrian surveys of these areas were not possible due to steep terrain and heavy vegetation cover, the archaeological sensitivity and potential for the surveyed areas to yield significant resources is extremely low as the same access challenges are expected to have precluded pre-historic and historic occupation of this area.

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Chapter 6. Management Recommendations

No archaeological or culturally significant resources have been identified within the North Highwall Lay-Back Study Area and there is no indication that the Study Area has been used for human burials. The following recommendations are provided to reduce the potential effects of mining. Implementation of these recommendations would avoid the potential for significant impacts associated with potential discovery of cultural resources or human remains.

6.1 Inadvertent Discovery

If materials are encountered during Project implementation that have the potential to be significant cultural resources, ground disturbance within 100 feet of the find should cease until the material is evaluated by a qualified archaeologist and a Native American representative. In the event of such discovery, Lehigh should notify the County of any such find and the result of the evaluations. If the evaluations determine that the resources may be significant and cannot be avoided, Lehigh and its consulting archaeologist should develop an appropriate treatment plan for the resource(s) for review and approval by the County. Measures in the treatment plan may include preservation in place (capping) and/or data recovery. with the treatment plan should be developed in consultation with Native American representatives in determining appropriate treatment for prehistoric or Native American cultural resources. Ground disturbance shall not resume within 100 feet of the find until an agreement has been reached as to the appropriate treatment of the find.

6.2 Human Remains

In the event that human skeletal remains are encountered, ground disturbance within 100 feet of the find should cease until authorized by the County Coroner. As required by Health and Safety Code Section 7050.5, Public Resources Code Section 5097.98, Title 14 California Code of Regulations Section 15064.5(e), and County Ordinance No. B6-18, Lehigh would immediately notify the County Coroner of the find and allow further investigation by the County Coroner. If the County Coroner determines that the remains are Native American, the County Coroner is required to contact the California Native American Heritage Commission, pursuant to subdivision (c) of §7050.5 of the Health and Safety Code and the County Coordinator of Indian affairs. No further disturbance of within 100 feet of the find should occur except as authorized by the County Coordinator of Indian Affairs in accordance with the provisions of state law and the County Ordinance.

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Appendix A. Representative Photographs



Photograph 1. Overview of Study Area. View to the northeast.



Photograph 2. Overview of Study Area. View to the west.



Photograph 3. Study Area. View to the north.

Permanente Quarry
Reclamation Plan Amendment
Noise and Vibration Study

Permanente Quarry Reclamation Plan Amendment Noise and Vibration Study

Lehigh Southwest Cement Co.

Reclamation Plan Amendment
Burns & McDonnell Project No. 110515

Permanente Quarry
Reclamation Plan Amendment
Noise and Vibration Study

prepared for

Lehigh Southwest Cement Co.
Reclamation Plan Amendment
Cupertino, CA

prepared by

Burns & McDonnell Engineering Company, Inc.
Chicago, Illinois

Burns & McDonnell Project No. 110515

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
amsl	above mean sea level
ANSI	American National Standards Institute
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CadnaA	Computer Aided Noise Abatement
Caltrans	California Department of Transportation
Caltrans 2013	Caltrans *Transportation and Construction Vibration Guidance Manual*
CEQA	California Environmental Quality Act
County Code	Santa Clara County, CA Code of Ordinances
daytime	7:00 AM to 10:00 PM
dB	decibels
dBA	A-weighted decibels
EMSA	East Materials Storage Area
Facility	Permanente Quarry and Lehigh Cement Plant
FICON	Federal Interagency Commission on Noise
Hz	hertz
in/s	inches per second
ISO	International Organization of Standardization
L_{dn}	day/night equivalent sound level
Lehigh	Lehigh Southwest Cement Company
L_{eq}	equivalent sound level
L_x	exceedance sound level

Abbreviation	Term/Phrase/Name
nighttime	10:00 PM to 7:00 AM
PPV	peak particle velocity
Project	proposal for reclamation plan amendment and related entitlements
Quarry	Permanente Quarry
ST	short-term measurement
SMARA	California Surface Mining and Reclamation Act
TIA	Permanente Quarry Soil Import Transportation Impact Analysis (Fehr & Peers, 2019)
WMSA	West Materials Storage Area

1.0 EXECUTIVE SUMMARY

Permanente Quarry (Quarry) is an existing limestone and aggregate mining operation located in the Santa Clara County foothills west of the city of Cupertino as shown on Figure 1, "Permanente Quarry Location." Lehigh Southwest Cement Company (Lehigh) operates the Quarry which, among other entitlements, is subject to a reclamation plan most recently amended and approved by the County in 2012 (2012 Reclamation Plan). Lehigh proposes to amend the 2012 Reclamation Plan and related entitlements (Project). Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) conducted the environmental noise and vibration study documented in this report to evaluate potential noise and vibration impacts associated with the proposed Project for consideration by the County of Santa Clara in conducting environmental review as the lead agency under the California Environmental Quality Act (CEQA).

A primary feature of the 2012 Reclamation Plan is to reclaim the central mining excavation, known as the North Quarry, by backfilling the excavation with overburden material that is currently stockpiled on-site in an area known as the West Materials Storage Area (WMSA). Lehigh is developing plans to amend the reclamation plan, and obtain related entitlements, to incorporate the results of various hydrologic and geotechnical investigations that have occurred since 2012. The proposed modifications to the 2012 Reclamation Plan are designed to incorporate backfill, reclamation, and revegetation that would be superior to the approved plan while updating reclamation planning for continued mineral production. The Project comprises four primary components:

- Incorporate development and reclamation of the Rock Plant Reserve.
- Regrade and mine the upper slopes of the north highwall to recover limestone, eliminate the need for a large fill buttress, and achieve long-term slope stability.
- Reclaim the majority of the WMSA in place.
- Backfill the North Quarry using a combination of imported surplus construction soil that meets site-specific acceptance criteria and greenstone overburden to protect water quality.

Because of the extended duration of some of the proposed reclamation activities and the relatively continuous nature of related noise sources, Project-related noise and vibration are compared to the more restrictive permanent noise source regulations opposed to the temporary construction source regulations as a conservative measure.

The analyses presented herein consider the potential for the Project components to result in exceedance of noise standards or otherwise substantially increase noise levels at sensitive receiver locations. Both onsite

(mining and reclamation activities) and offsite (haul truck trips associated with imported fill) are evaluated. Potential impacts associated with onsite activities with the potential to generate vibration at receiver sites were also evaluated. The study concludes that the Project would not result in significant noise or vibration impacts.

2.0 BACKGROUND TERMINOLOGY

2.1 Acoustical Terminology

The terms "noise level" and "sound level" are often used interchangeably to describe two different sound characteristics called sound power and sound pressure. Every source that produces sound has a sound power level. The sound power level is the acoustical energy emitted by a sound source and is an absolute number that is not affected by the environment. The acoustical energy produced by a source propagates through the air as air pressure fluctuations. These pressure fluctuations, also called sound pressure, are what human ears hear and microphones measure.

Sound energy is physically characterized by amplitude and frequency. Sound amplitude is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 microPascals). The reference sound pressure corresponds to the typical threshold of human hearing. A 3-dB change in a continuous broadband sound level is generally considered "just barely perceptible" to the average listener. A 6-dB change is generally considered "clearly noticeable," and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

Frequency is measured in Hz, which is the number of cycles per second. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the low and high frequencies. As such, the A-weighted scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighted scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighted scale has been applied is expressed in dBA. For reference, the sound pressure level and subjective loudness associated with some common sound sources are listed in Table 2-1.

Sound in the environment is constantly fluctuating, for example, when a car drives by, a dog barks, or a plane passes overhead. Although an instantaneous sound level measured in dBA may indicate the level of noise experienced by an observer at that point in time, environmental noise levels vary continuously. Most ambient environmental noise includes a mixture of noise from some identifiable sources plus a relatively steady background noise where no particular source is identifiable. A single descriptor called the equivalent sound level (L_{eq}) is used to describe sound that is constant or changing in level. The L_{eq} is the average sound level for a specific time period.

Table 2-1: Typical Sound Pressure Levels Associated with Common Sound Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	Indoor
140	Deafening	Jet aircraft at 75 ft.	--
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 ft.	--
120	Threshold of feeling	Elevated train	Hard rock band
110	--	Jet flyover at 1,000 ft.	Inside propeller plane
100	Very loud	Power mower, motorcycle at 25 ft., auto horn at 10 ft., crowd noise at football game	--
90	--	Propeller plane flyover at 1,000 ft., noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 mph) at 50 ft.	Inside auto at high speed, garbage disposal
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner
60	Moderate	Air-conditioner condenser at 15 ft., near highway traffic	General office
50	Quiet	--	Private office
40	--	Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (without TV and stereo)
20	--	Rustling leaves	Quiet theater, whisper
10	Just audible	--	Human breathing
0	Threshold of hearing	--	--

Source:
(1) Adapted from *Architectural Acoustics*, M. David Egan, 1988
(2) *Architectural Graphic Standards*, Ramsey and Sleeper, 1994

Sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound level. The exceedance sound level, L_x, is the sound level exceeded during "x" percent of the sampling period. The L_{90} is a common L_x value and represents the sound level exceeded for 90 percent of the time period during which sound levels are measured. The L_{90} metric is regarded as the most accurate tool for measuring relatively constant background noise and for minimizing the influence of isolated spikes in sound levels (i.e., barking dog, door slamming).

The L_{dn}, known as the day-night level, is the average A-weighted (dBA) equivalent sound level over a 24-hour period with the inclusion of a 10-dB penalty added to the equivalent sound levels during the nighttime hours of 10:00 PM to 7:00 AM The 10-dB nighttime penalty is added to the nighttime sound levels to account for added sensitivity to noise during the night.

2.2 Vibration Terminology

The term "vibration" is generally used to refer to the dynamic mechanical excitation that may cause a dynamic response by a physical system, usually a mechanical structure that is exposed to that excitation. The motion of a rigid body, such as a concrete slab, is referred to as a fixed inertial frame of reference, represented by a system of cartesian coordinates (X, Y, and Z). The motions of the rigid body are described by giving the displacement of the body axes relative to its inertial axes. The number of times a complete motion cycle takes place during the period of 1 second is called the frequency and is measured in Hz.

Vibration levels are measured using single- or multi-axial accelerometers. The vibration amplitude is commonly expressed in one of three units of measure: displacement, velocity, or acceleration. Displacement is commonly used in applications where vibrating parts must not touch or where displacement beyond a given value results in equipment damage. Velocity is commonly used where vibration measurements on resonant structures are to be correlated with modal stress, since modal stress is proportional to modal velocity at resonance frequencies. Peak particle velocity (PPV) thresholds have been developed for applications pertaining to human perception and damage to structures. Acceleration is commonly used where forces, loads, and stresses must be analyzed where force is perpendicular to acceleration.

For the purposes of this analysis, PPV thresholds are used to quantify disturbing vibrations to humans and structures. Human and structural vibration level thresholds are defined by the California Department of Transportation, *Transportation and Construction Vibration Guidance Manual*, September 2013 (Caltrans 2013). Human thresholds of perception for transient vibration are higher than those of continuous vibration; therefore, humans are more sensitive to continuous vibrations. Caltrans reports that humans are sensitive to particle velocity up to 80 Hz. The human response thresholds to vibration are shown in Table 2-2. In the table, response thresholds are divided into steady state and transient vibration levels in PPV inches per second (in/s).

Table 2-2: Human Response Thresholds to Vibration

Human Response	Peak Particle Velocity (in/s)	
	Transient[a]	Continuous[b]
Disturbing	2.000	3.60 – 0.170
Strongly perceptible	0.900	0.10
Distinctly perceptible	0.240	0.04
Slightly perceptible	0.035	0.01

Source: Caltrans *Transportation and Construction Vibration Guidance Manual*, September 2013
(a) Transient sources create a single isolated vibration event, such as blasting.
(b) Continuous sources can also be considered frequent intermittent sources, such aggregate processing and excavation activities.

Similar, to human response, structures are more sensitive to continuous vibrations compared to transient vibrations. The structural response thresholds are shown in Table 2-3. In the table, response thresholds, compiled from the Caltrans 2013, are divided into transient and continuous vibration levels in PPV in/s. Caltrans identifies thresholds for residential structures caused by vibration: 0.2 in/sec for continuous vibration sources such as aggregate processing and excavation activities and for transient vibration sources such as blasting (Caltrans 2013).

Table 2-3: Potential Vibration Damage Threshold Criteria

Structure	Peak Particle Velocity (in/s)	
	Transient[a]	Continuous[b]
Historic buildings	0.1	0.1
Residential structures	0.2	0.2
New residential structures	0.4	0.3
Industrial buildings	1.0	0.5

Source: Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013
(a) Transient sources create a single isolated vibration event, such as blasting.
(b) Continuous sources can also be considered frequent intermittent sources, such as aggregate processing and excavation activities.

3.0 REGULATORY BACKGROUND

The Quarry is located in unincorporated Santa Clara County. A component of the proposed Project is the import of clean soil for use in reclamation. Soil import trucks will use the same surface streets (Foothill Boulevard and Steven's Creek Boulevard) in the City of Cupertino currently used by inbound and outbound Quarry trucks to connect with Interstate 280. Accordingly, the following sections discuss State, County, and City of Cupertino regulations with potential applicability to the Project.

3.1 California Environmental Quality Act (CEQA) Guidelines

The Project requires discretionary approvals from Santa Clara County, and Santa Clara County is the CEQA lead agency for the Project.

The State CEQA Guidelines, Appendix G (Environmental Checklist Form), Section XIII (Noise), as most recently amended in December 2018, list the following potential environmental effects related to noise:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
b) Generation of excessive groundborne vibration or groundborne sound levels
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, exposure of people residing or working in the project area to excessive noise levels

CEQA checklist Section XIII, items a and b are applicable to this Project and are discussed in the subsequent chapters of this report.

Regarding checklist item c, the Project site is located more than 2 miles from the nearest public or private airport, and the Project would have no impact associated with airports or airstrips. Therefore, item c is not considered further within this study.

As noted above, if a project results in a substantial permanent or temporary increase in ambient noise levels in the project vicinity above levels existing without the project, the noise impacts are considered significant. The CEQA Guidelines do not define what constitutes a significant temporary or permanent increase.

It is generally recognized that an increase of at least 3 dB for similar noise sources is usually required before most people will perceive a change in noise levels, and an increase of 5 dB is required before the

change will be clearly noticeable (*Egan, Architectural Acoustics, McGraw Hill, 1977*). The Federal Interagency Commission on Noise (FICON) studied criteria for predicting changes in community annoyance. FICON concluded that ambient noise levels of 60-65 dBA L_{dn} required a 3-dB noise increase to achieve a negative reaction, while ambient noise levels of 60 dBA L_{dn} or lower required a 5-dB noise increase to achieve a negative reaction. Given these levels of perception, this analysis considers a project-related increase of 3 dB or more to be a substantial increase if the existing noise environment is at or over an applicable County or City noise standard. If the existing noise environment is below the applicable standard, this analysis considers a project-related increase of 5 dB or more to be a substantial increase.

3.2 Santa Clara County

The Quarry is located in an unincorporated area of Santa Clara County. Therefore, the Quarry is subject to the Santa Clara County Code of Ordinances (County Code).

3.2.1 Santa Clara County Noise Ordinance

The County Code, Chapter VIII Control of Noise and Vibration, Section B11-152 defines the limits for maximum permissible noise levels by receiving land use category, when measured on the receiving property. Table B11-152 from the County Code provides the limits for each land use category and is included below as Table 3-1. The regulation defines daytime as the hours between 7:00 AM and 10:00 PM and nighttime as the hours between 10:00 PM and 7:00 AM. The land uses immediately surrounding the Quarry are open space and residential. These sound limits relate to onsite noise sources and not traffic-related noise (traffic-related standards are discussed below in Sections 3.2.2 and 3.3.2).

Table 3-1: Santa Clara County Exterior Noise Limits

Receiving Land Use Category	Time Period	Noise Level (dBA)[a]
One- and Two-Family Residential	10:00 PM – 7:00 AM 7:00 AM – 10:00 PM	45 55
Multiple-Family Dwelling	10:00PM – 7:00 AM	50
Residential Public Space	7:00 AM – 10:00 PM	55
Commercial	10:00 PM – 7:00 AM 7:00 AM – 10:00 PM	60 65
Light Industrial	Any Time	70
Heavy Industrial	Any Time	75

Source: Santa Clara County, CA Code of Ordinances Chapter VIII Control of Noise and Vibration, Table B11-152
(a) Levels not to be exceeded more than 30 minutes in any hour.

3.2.2 Santa Clara County General Plan Health and Safety Element

The Health and Safety section of the County of Santa Clara General Plan considers a land use compatibility standard of 55 dBA L_{dn} to be "satisfactory" at noise-sensitive outdoor activity areas. The L_{dn} uses the measured L_{eq} values to calculate a 24-hour time-weighted average noise exposure with a 10 decibel "penalty" to noise that is created at night (10:00 PM to 7:00 AM). This 55 dBA L_{dn} standard is used in this assessment to evaluate existing day-night ambient noise levels and Project-related increases associated with onsite noise sources. Although these limits do not directly relate to traffic-related noise levels and are applicable to siting of new residential development, they are informative in considering an appropriate threshold for Project-related traffic noise impacts. However, since the roadways that will be used by Project-related trucks and the potentially sensitive receivers along those roadways are located within the City of Cupertino, the appropriate City thresholds are used to assess traffic related noise impacts as discussed below in Section 3.3.2.

3.2.3 Santa Clara County Vibration Ordinance

The County Code, Chapter VIII Control of Noise and Vibration, Section B11-154(7) prohibits vibrations of any device that creates the following effects:

> *a. Endangers or injures the safety or health of human beings or animals; or*
> *b. Annoys or disturbs a person of normal sensitivities; or*
> *c. Endangers or injures personal or real properties.*

Vibration perception threshold is defined as:

> *…the minimum ground or structure-borne vibrational motion necessary to cause a normal person to be aware of the vibration by direct means as, but not limited to, sensation by touch or visual observation of moving objects. The perception threshold will be presumed to be a motion velocity of 1/100 inches per second over the range of one to 100 Hz.*

The County Code prohibits vibration levels from endangering, injuring, annoying, or disturbing a person or structure. The County Code defines vibration *perception* as 0.01 in/s, the threshold for continuous vibration, and the County Code does not identify a threshold for transient, non-continuous vibration sources. Since Project-related vibration potential is primarily associated with periodic blasting (a transient, non-continuous vibration source) the vibration threshold used to assess the significance of vibration-related impacts is based on the Caltrans threshold for excessive vibration disturbance of a residential structure which is 0.2 in/s PPV over the range of 1 to 100 Hz.

3.3 City of Cupertino

Project-related haul trucks would travel on segments of Foothill Boulevard and Stevens Creek Boulevard within the City of Cupertino. Accordingly, the City's Noise Ordinance and General Plan were considered in determining appropriate significance thresholds for evaluation of offsite traffic noise impacts.

3.3.1 City of Cupertino Noise Ordinance

The City of Cupertino Municipal Code, Title 10, Section 10.48.040 limits maximum noise levels from activities on nonresidential properties within the City to 65 dBA during daytime hours of 7:00 AM to 10:00 PM and 55 dBA during the nighttime hours of 10:00 PM to 7:00 AM as measured at adjacent residential properties. These sound limits relate to onsite noise sources and not traffic-related noise and are less restrictive (i.e., less protective) than the County land use compatibility standard of 55 dBA L_{dn} discussed in Section 3.2.2, above. Thus, the more restrictive (i.e., more protective) County standard is used to assess potential noise impacts from onsite noise associated with the Project.

3.3.2 City of Cupertino General Plan Health and Safety Element

The Health and Safety element of the City's General Plan establishes noise compatibility standards for land uses in the City. The City's General Plan utilizes the Community Noise Equivalent Level (CNEL) descriptor for residential exterior areas. The CNEL is similar to the L_{dn} in that it is a 24-hour time-weighted average noise metric and the two metrics are often used interchangeably. The CNEL, however, adds a 5-dBA penalty to noise created during the evening period of 7:00 PM to 10:00 PM. The City's General Plan specifies an exterior limit of 60 dBA CNEL (or L_{dn}) for single-family residential exterior areas. Although these limits do not directly relate to traffic-related noise levels and are applicable to siting of new residential development, they are informative in considering an appropriate threshold for Project-related traffic noise impacts. Since, the roadways and receivers are located within the City of Cupertino, these limits are used to assess traffic-related noise impacts.

3.4 Thresholds of Significance

The following thresholds of significance are used in this study to determine the significance of environmental noise and vibration resulting from the Project:

Noise Thresholds for Onsite Activities

a) A significant impact would be identified if the Project generates noise levels in excess of a daytime noise level of 55 dBA or nighttime noise level of 45 dBA when measured at a residential property line.

b) A significant impact would be identified if the Project increases ambient noise levels at a residential receiver by 3 dBA or more if the existing noise environment is in excess of the daytime standard of 55 dBA, the nighttime standard of 45 dBA, or the day-night standard of 55 dBA L_{dn} when measured at a residential property line.

c) A significant impact would be identified if the Project increases ambient noise levels at a residential receiver by 5 dBA or more if the existing noise environment is at or below the daytime standard of 55 dBA, the nighttime standard of 45 dBA, or the day-night standard of 55 dBA L_{dn} when measured at a residential property line.

Vibration Thresholds for Onsite Activities

d) A significant impact would be identified if the Project generates groundborne vibration of 0.2 in/s PPV or more over the range of 1 to 100 Hz at a residential structure.

Noise Thresholds for Offsite Traffic

e) A significant impact would be identified if noise from Project-related vehicles causes noise levels to exceed 60 dBA L_{dn} at the exterior areas of a single-family residence.

f) A significant impact would be identified if noise from Project-related vehicles causes an increase in ambient noise levels by 3 dBA or more if the existing noise environment is greater than 60-dBA L_{dn} at the exterior area of a single-family residence.

g) A significant impact would be identified if noise from Project-related vehicles causes an increase in ambient noise levels by 5 dBA or more if the existing noise environment is less than 60-dBA L_{dn} at the exterior area of a single-family residence.

4.0 EXISTING CONDITIONS

Burns & McDonnell personnel conducted a noise and vibration survey at onsite and offsite locations during normal operations of the Quarry and cement plant, on October 4 and 5, 2018, to establish ambient noise levels under existing (i.e., baseline) conditions. Far-field noise measurements consisted of short-term and long-term measurements at the location identified on Figure 4-1, "Far-Field Measurement Locations." Near-field noise and vibration measurements of haul road activity, drilling, unloading (i.e., dumping), and surrounding adjacent uses including the cement plant, were taken at various locations around the site to quantify operational noise levels. Sound level measurements from a routine monitoring study on August 23, 2018, were also used to quantify existing baseline noise levels at nearby residential areas (Receivers ST07, ST08, and ST09 as shown on Figure 4-1).

4.1 Setting

The Quarry is located in an unincorporated area of Santa Clara County adjacent to the cities of Cupertino and Los Altos. The Quarry is separated from residential areas to the north and east by intervening topography (which provides noise shielding); however, there are residences to the southwest of the site that are located at higher evaluations with more direct line of sight (and therefore less noise shielding) to the Quarry. The Rancho San Antonio Open Space Preserve is located north of the Quarry, and includes parks and hiking trails, most of which are shielded from Quarry activities by intervening topography. The Gate of Heaven Cemetery is located approximately 1,200 feet to the northeast of the Quarry. Non-residential land uses in the area include wineries and agricultural land, Sunnyvale Rod & Gun Club (approximately 4,000 feet south of the Quarry), and Stevens Creek Quarry (adjacent to the southern boundary of the Quarry).

4.2 Noise Measurements

Measurements of existing noise levels of the Quarry site and surrounding areas were taken using American National Standards Institute (ANSI) S1.4 type 1 sound level meters. The sound level meters were calibrated at the beginning and end of each set of measurements. None of the calibration level changes exceeded ± 0.5 dB. A windscreen was used at all times on the microphones, and the meters were mounted on a tripod. The microphones were located approximately 5 feet above ground level with the microphones directed towards the Quarry, angled per the manufacturer's recommendation. All measurements were taken when meteorological conditions were favorable for conducting sound measurements per ANSI standards (low wind, moderate temperatures, humidity, and no precipitation).

4.2.1 Long-Term Far-Field Measurements

At the beginning of the noise survey, a long-term far-field sound level meter was set up at a measurement location on the east side of the North Quarry at an observation point with a clear line of sight to North Quarry operations, labeled LT01, as shown in Figure 4-1. The measurement location was selected because it is representative of Quarry noise levels and provided the ability to secure the equipment for unattended operation. The long-term noise level meter was set up prior to onsite and offsite short-term measurements and collected data over the entire duration of the noise study.

The long-term far-field meter ran for approximately 19 hours between the hours of 3:00 PM on Thursday October 4, 2018, and 10:00 AM on Friday October 5, 2018, with the primary noise source being the haul truck roads throughout the quarry. Noise levels from onsite haul truck and drilling operations were collected during the long-term measurement period and are considered representative of baseline noise levels. Noise levels throughout the measurement period were relatively consistent, with noise levels decreasing during the period between 12:00 AM to 3:00 AM. A figure graphing the hourly (L_{90}) and 1-minute (1-minute L_{eq}) noise levels under existing conditions for the long-term far-field meter is provided in Appendix A.

Path: Z:\Clients\ENS\LehighSouthw\110515_CEQANoiseStudy\Studies\Permitting\Modeling\GIS\Figure 4-1 - Far-Field Measurement Locations.mxd irbrewe 5/3/2019
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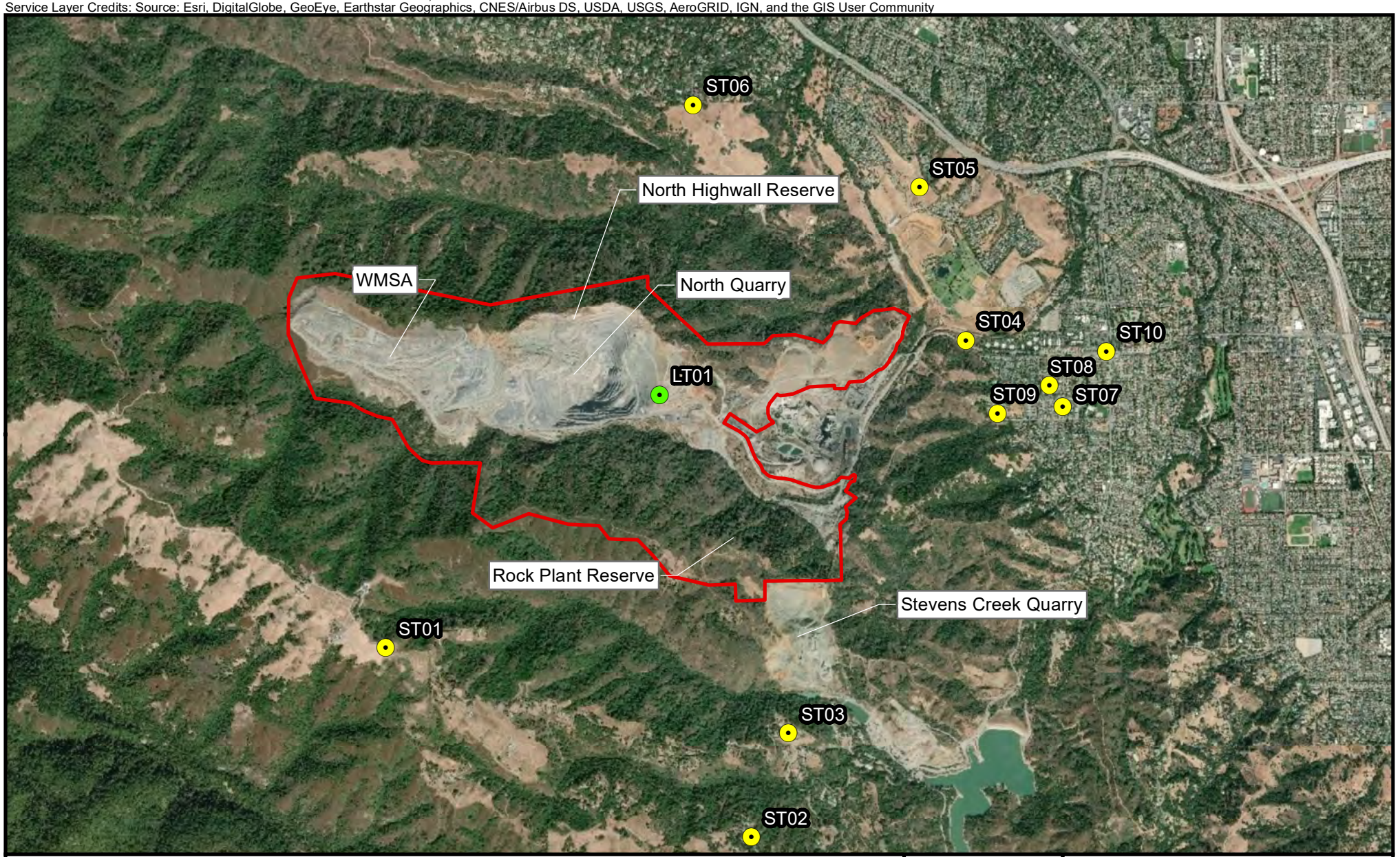

Long-Term Measurement (LT)

Short-Term Measurement (ST)

Reclamation Plan Boundary (proposed)

NORTH

3,000 1,500 0 3,000

Scale in Feet

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Figure 4-1
Permanente Quarry Noise and Vibration Study
Far-Field Measurement Locations

Source: ESRI, Burns & McDonnell Engineering Company, Inc.

Issued: 5/3/2019

4.2.2 Short-Term Far-Field Measurements

Short-term far-field measurements were made offsite at nine locations labeled short-term measurement (ST) ST01 to ST09, as shown in Figure 4-1. The measurement locations were selected because they were accessible and representative of Quarry noise levels in the direction of noise-sensitive receivers. Short-term far-field measurements were 10 minutes in duration, and measured values were logged by the noise level meter at each measurement point. Two sets of measurements were taken during the daytime and nighttime hours. Noise generated from ongoing operations at the Quarry was audible at some of the measurement locations and was not audible or discernable from other noise sources at other measurement locations. The measured noise levels and noise sources noted during the measurement periods are presented in Appendix B. The overall A-weighted L_{eq} and L_{90} noise levels collected during the measurements are shown below in Table 4-1.

Table 4-1: Existing Short-Term Far-Field Noise Level Measurements

Measurement Location	Nearby Land Use	Sound Pressure Level (dBA)			
		Daytime		Nighttime	
		L_{eq}	L_{90}	L_{eq}	L_{90}
ST01	Commercial	49.4	29.3	38.7	28.2
ST02	Residential	46.9	37.6	41.5	39.9
ST03	Residential	48.5	46.0	32.3	30.0
ST04	Residential	68.1	37.3	54.3	39.3
ST05	Park	59.3	45.6	38.5	31.6
ST06	Residential	47.4	39.8	36.5	33.1
ST07	Residential	48.5	38.8	38.9	33.8
ST08	Residential	45.6	37.3	37.3	34.8
ST09	Residential	45.7	31.6	48.5	47.0

4.2.3 Near-Field Measurements

Near-field measurements were taken as a part of the noise survey during normal Quarry operations to establish baseline noise levels. The near-field measurements were taken over 10-second intervals to establish noise levels associated with onsite noise sources. Measurements were taken of the haul roads, quarry drilling, and quarry haul truck unloading. Measurements were made at various distances from the periphery of the major surfaces of noise-emitting equipment and at an elevation of 5 feet above grade. The noise levels varied at each measurement point based on proximity to noise emitting equipment or activity.

4.3 Haul Truck Vibration Measurements

Vibration measurements to establish existing conditions associated with ongoing operations at the Quarry were taken using a high-resolution, broad-frequency piezoelectric accelerometer. The accelerometer was magnetically attached to a metal spike, which was driven into the soil at each measurement location. Measurements were taken in accordance with ISO 4866:2010 vibration measurement standard.

Vibration measurements were taken at various short-term far-field locations to quantify existing vibration levels. Measurements at ST04 were taken beside the main entrance to the Quarry with typical traffic of haul trucks and cars coming in and out of the Quarry. ST04 had the greatest levels of measured vibration from Quarry-related sources, with a haul truck passing within 5 feet of the measurement location generating the maximum PPV of 0.0013 in/s, which is well below the excessive vibration threshold of 0.2 in/s. The PPV, frequency, and source of the maximum short-term vibration measurement at ST04 compared to the excessive vibration threshold is provided in Table 4-2.

Table 4-2: Existing Short-Term Far-Field Vibration Measurements

Measurement Location	PPV (in/s)	Peak Frequency (Hz)	Source	Distance from Source (feet)
Excessive Vibration Threshold	*0.2*	*1 to 100*	--	--
ST04	0.0013	50	Passing haul truck	5

The PPV of 0.0013 in/s at ST04 was caused by a passing haul truck but is well below the excessive vibration threshold. After measurements and observations, no haul truck, drilling, or unloading operations are expected to cause excessive vibrations at offsite locations.

4.4 Traffic Noise Measurements

To aid in the development of a noise model and help quantify the existing baseline traffic noise levels, inclusive of existing vehicle trips associated with ongoing Quarry operations, noise measurements were taken at the intersection of Stevens Creek Boulevard and Foothill Boulevard (ST10), shown on Figure 4-1. 10-minute noise measurements and traffic counts were taken at ST10 during three time periods (8:00 AM, 4:00 PM, and 12:00 AM) to quantify existing traffic noise levels at this location. Traffic counts were also taken at ST04 during these short-term measurement time periods to quantify traffic coming in and out of the Quarry. The measured sound levels and traffic counts were also used to calibrate the noise

model of the roadways. A summary including measurement location, vehicle counts, and overall noise level is provided in Table 4-3.

Table 4-3: On-Road Traffic Noise Measurements

Measurement Location	Road	Car Counts over 10-Minute Period	Truck Counts over 10-Minute Period	L_{eq} (dBA)
8:00 AM				
ST10	Stevens Creek	147	9	73.2
	Foothill	115	25	
ST04	Into site	2	6	68.0
	Out of site	0	9	
4:00 PM				
ST10	Stevens Creek	65	0	65.2
	Foothill	263	2	
ST04	Into site	1	4	68.1
	Out of site	22	3	
12:00 AM				
ST04	Into site	1	1	54.3
	Out of site	1	0	

The relatively high number of cars at ST04 during the 4:00 PM measurements is expected to be due to the end of a shift at the Quarry or the adjacent cement plant that uses the same access road.

5.0 IMPACT EVALUATION

This section presents the evaluation of potential noise and vibration impacts associated with the Project. Section 5.1 provides an overview summarizing the proposed Project and Sections 5.2 through 5.4 then discuss Project impacts associated with onsite noise, onsite vibration, and offsite haul truck noise, respectively.

5.1 Project Overview

Under the proposed Project, Lehigh will continue mining operations and reclamation at the Quarry. The following sections provide a summary of the four primary components of the proposed Project.

5.1.1 Rock Plant Reserve

Lehigh proposes to conduct mining operations in an approximately 30.5-acre extraction area known as the Rock Plant Reserve in the southern portion of the property as shown on Figure 4-1. Development of the Rock Plant Reserve will include a site-specific design for surface water runoff and for placement of fill and topsoil at reclamation. The mining and reclamation activities would result in a floor elevation of approximately 915 feet above mean sea level (msl). Site preparation and mining will require approximately 5 to 10 years to complete depending on market conditions and other factors, with final reclamation grading and revegetation completed after an additional 5 years. Mining techniques and equipment used for mining and reclamation activities at the Rock Plant Reserve would be similar to existing Quarry operations, including blasting, rock drills, haul trucks, bulldozers, water trucks, front-loaders, and excavators.

5.1.2 North Highwall Reserve Mining and Slide Regrade

The proposed Project would include regrading of the North Highwall Reserve, producing an estimated 10.9 million metric tons (MT) of limestone, and lowering a portion of the north crest by approximately 50 feet to a minimum elevation of 1,400 msl. Lehigh proposes to regrade the adjacent Main Slide for long-term stability, to eliminate the need for the buttress identified in the 2012 Reclamation Plan. Slide waste (greenstone) not suitable for aggregate production will be placed permanently on the North Quarry floor and/or the WMSA. The slope crest will be contour-graded to blend with ridgeline topography, resoiled, and planted with native trees as a first phase of the project. Mining techniques and equipment used for mining and reclamation activities at the North Highwall Reserve would be similar to existing Quarry operations, including blasting, rock drills, haul trucks, bulldozers, water trucks, front-loaders, and excavators.

5.1.3 West Materials Storage Area (WMSA) Regrade

Under the proposed Project, the WMSA will be regraded and reclaimed with the majority material left in place. Equipment used for reclamation activities at the WMSA would include haul trucks, bulldozers, water trucks, front-loaders, and excavators for final grading and preparation for revegetation.

5.1.4 North Quarry Backfill

Reclamation of the North Quarry will involve placing fill materials back into the North Quarry while the remaining limestone reserves are being mined and the highwall slope is being graded for stability. The North Quarry will be backfilled to approximately 990 feet amsl, which is above the projected post-reclamation groundwater elevation in the North Quarry and is the same minimum elevation specified in the 2012 Reclamation Plan. Under the proposed Project, the North Quarry will be partially backfilled with greenstone material produced on-site. Additionally, the North Quarry backfill will include the use of imported surplus construction soil from regional construction projects. Up to approximately 1 million cubic yards per year of imported soil would be delivered to the site over a period of up to approximately 30 years. Lehigh proposes to accept imported surplus construction soil that would be delivered to the Quarry from regional construction projects in on-road trucks. Mined slopes will be graded to be stable and conform with the surrounding topography. Vegetation used for revegetation of the North Quarry backfill areas will be similar to vegetation in the surrounding undisturbed areas. Equipment used for North Quarry backfill and reclamation would include haul trucks, bulldozers, water trucks, and front-loaders. Imports of 1 million cubic yards per year would require an average of approximately 333 loads of imported soil each operational day 250 days per year) using the primary access routes of Foothill Boulevard and Stevens Creek Boulevard to access the site from I-280.

5.2 Onsite Project Noise Impact Analysis

For analysis of potential impacts associated with onsite Project noise, Burns & McDonnell predicted the noise impact from Project activities occurring within the Quarry site upon each receiver location shown on Figure 5-1 and compared predicted noise levels with the Project against the existing, baseline noise levels at each receiver. (Note that vibration analyses and offsite Project traffic noise analyses are presented, respectively, in Sections 5.3 and 5.4, below.) The predicted Project-related operations were modeled using noise modeling software and compared to noise measurements taken offsite during existing operations. Predicted Project noise levels were modeled to predict the worst-case noise scenario for far-field receivers. In other words, the modeling considered the potential for multiple onsite activities with the highest noise-generating activities to occur simultaneously representing the maximum anticipated potential impact. This represents a conservative approach that avoids understating potential

impacts and presents a scenario with greater impacts than would be anticipated under average conditions with Project implementation. The receiver locations shown on Figure 5-1 were selected as they are the nearest residential locations surrounding the Quarry and would be the most likely to be potentially affected by onsite Project-related noise sources. These receiver locations are also representative of other residences within their proximity at which potential Project noise impacts would be the same or less than those of the representative receiver.

Path: Z:\Clients\ENS\LehighSouthw\110515_CEQANoiseStudy\Studies\Permitting\Modeling\GIS\Figure 5-1 - Receiver Locations.mxd irbrewe 5/3/2019
COPYRIGHT © 2019 BURNS & McDONNELL ENGINEERING COMPANY, INC.
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Residential Receivers (Rec)

Reclamation Plan Boundary (proposed)

NORTH

3,000 1,500 0 3,000

Scale in Feet

BURNS McDONNELL

Figure 5-1
Permanente Quarry Noise and Vibration Study
Receiver Locations

Source: ESRI, Burns & McDonnell Engineering Company, Inc.

Issued: 5/3/2019

5.2.1 Noise Modeling Methodology

Noise modeling of onsite Project-related noise was performed using the industry-accepted noise modeling software Computer Aided Noise Abatement (CadnaA), version 2018. The software is a scaled, three-dimensional program, which takes into account air absorption, terrain, ground absorption, and reflections and shielding for each piece of noise-emitting equipment and predicts sound pressure levels. The model calculates sound propagation based on International Organization of Standardization (ISO) 9613-2:1996, General Method of Calculation. ISO 9613-2 assesses the sound level propagation based on the octave band center-frequency range from 31.5 to 8,000 Hz.

The ISO standard considers sound propagation and directivity. The sound-modeling software calculates sound propagation using omnidirectional, downwind sound propagation and worst-case directivity factors. In other words, the model assumes that each piece of equipment propagates its maximum sound level in all directions at all times. Empirical studies accepted within the industry have demonstrated that modeling may over-predict sound levels in certain directions, and as a result, modeling results generally are considered a conservative measure of actual noise levels that would result under conditions with the Project.

Noise sources associated with activities at the Quarry under future conditions with approval of the Project were modeled to estimate noise levels at various receiver locations. Each noise source was adjusted such that the model was representative of the measured near-field values and long-term measurement data collected onsite. Noise sources associated with haul trucks entering the site, movement of loaded haul trucks on haul roads, and operation of water trucks were modeled as transient noise sources in accordance with long-term monitoring hourly averages. Haul road noise sources were modeled as continuous operations (24 hours per day, 7 days per week). Estimated hourly average truck trips for each haul road are provided in Table 5-1. These estimates include material hauling and water truck trips. For each truck trip, noise generated from loading and/or unloading (i.e., dumping) is incorporated into the model. Modeling accounts for simultaneous use of each haul road, which conservatively accounts for potential future scenarios such as simultaneous transport of mined material from the Rock Plant Reserve at the same time material is transported to the North Quarry for backfill.

Table 5-1: Modeled Onsite Haul Road Inputs

Haul Road[a]	Average[b] Daytime Trucks/Hour	Average[b] Nighttime Trucks/Hour
Site Entrance	70	7
North Quarry	100	20
WMSA	50	10
Rock Plant Reserve	50	10

a) Modeling conservatively accounts for potential simultaneous use of each haul road.
b) Trucks per hour values are averaged over the respective daytime (7 AM to 10 PM) and nighttime (10 PM to 7 AM) periods.

In addition to the haul road activities discussed above, other activities including drilling, blasting, and operation of excavators, bulldozers, and front-loaders were modeled as intermittent noise sources averaged over a 24-hour period. Each loading/unloading point source assumes 60, 10-second unloading events per hour throughout the entire day. Each drilling area source assumes 10 hours of drilling operations during daytime hours and no drilling operations during nighttime hours. Each blasting point source assumes 100, 1-second blasts a day during daytime hours and no blasting during nighttime hours. Although mining within the Rock Plant Reserve area is a vested right and is not a component of the proposed Project, this evaluation includes noise sources associated with mining within the Rock Plant Reserve for the purposes of disclosure and to provide a conservative (i.e., tending to overstate impacts) evaluation of potential noise impacts. Table 5-2 summarizes each modeled source operation.

Table 5-2: Modeled Project Activity

Modeled Source	Number of Occurrences per Hour	Length of Occurrences	Operation Time
Loading/Unloading	60	10 seconds	24-hour period
Drilling	1	10 hours	24-hour period
Blasting	100	1 seconds	Daytime only

Noise sources were modeled for each phase of the Project as shown in Figure 5-2. The model assumes that all onsite operational noise sources occur simultaneously, including the various activities listed in Table 5-2 and the haul road activities listed in Table 5-1. Although in practice, all Quarry operations under the proposed Project would not occur simultaneously, this approach provides for a conservative evaluation of potential impacts and sufficiently accounts for the various types of simultaneous activities that could occur.

Path: Z:\Clients\ENS\LehighSouthw\110515_CEQANoiseStudy\Studies\Permitting\Modeling\GIS\Figure 5-2 - Modeled Onsite Sound Source Locations 5 -14.mxd irbrewe 5/14/2019
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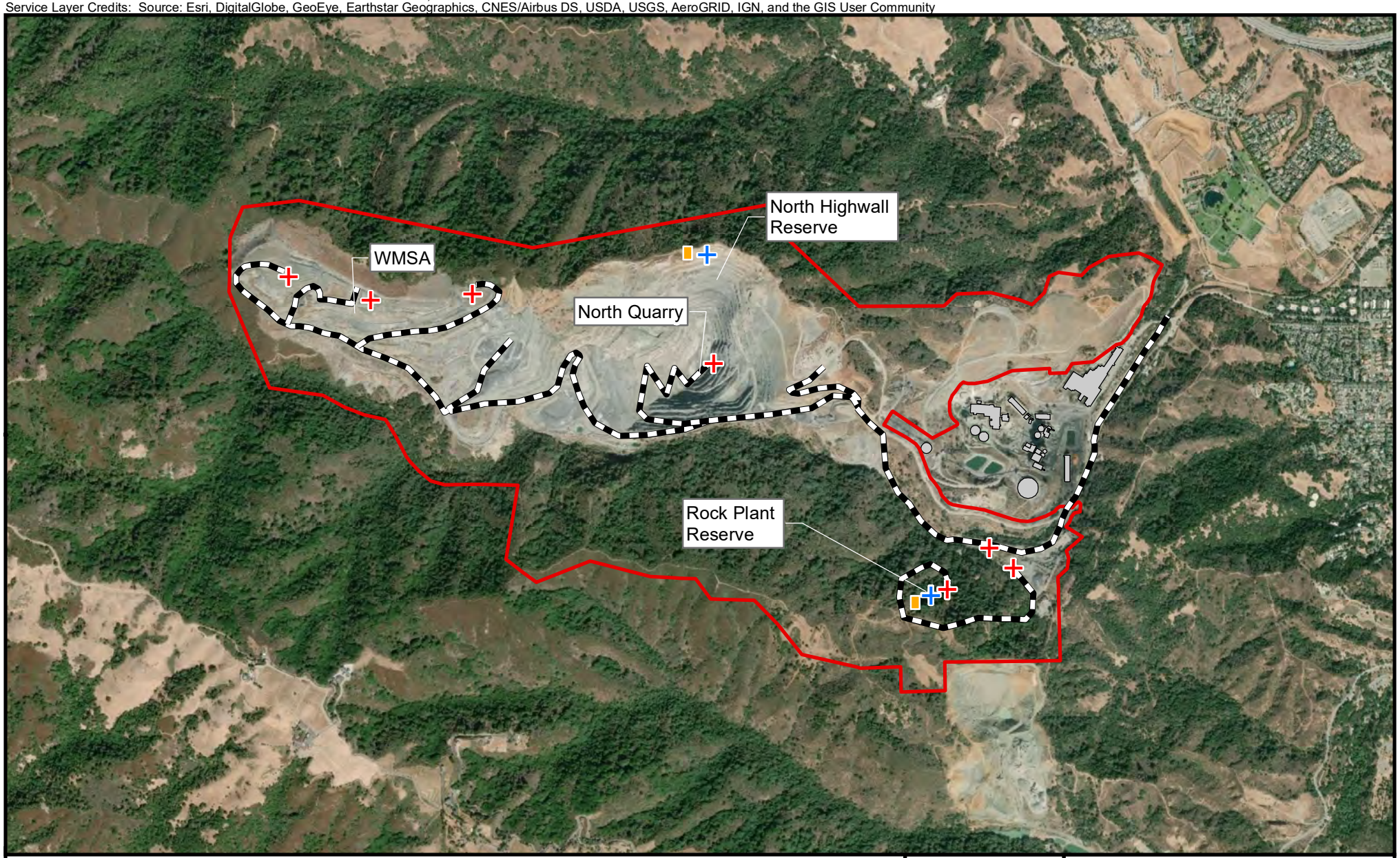


Figure 5-2
Permanente Quarry Noise and Vibration Study
Modeled Onsite Sound Source Locations

Source: ESRI, Burns & McDonnell Engineering Company, Inc.

Issued: 5/14/2019

5.2.2 Predicted Noise Levels

Potentially sensitive receiver locations were identified to model the nearest noise sensitive areas in the vicinity of onsite Project-related activities. The modeled receivers are labeled Rec01 to Rec10 and are shown in Figure 5-1.

Existing ambient noise levels were measured at six measurement location as described in Section 4.2. Access to residential receiver properties was not obtained; therefore, sound levels measurements were made in public right of ways and assumed to be representative of the surrounding area. The ambient sound level taken at the nearest measured location with a similar noise environment was used as the existing ambient noise level for each receiver. The measured values during daytime and nighttime hours were influenced by other area noise sources not related to Quarry operations. Therefore, ambient noise levels at each of the receiver locations are higher than the modeled noise levels that would be generated by Quarry operations under conditions with the Project. Noise from Quarry operations would, however, create the potential to increase ambient noise levels. Thus, using the existing ambient measurement and the modeled Quarry onsite operations noise levels, the predicted increase at each residential receiver was calculated.

Table 5-3 presents modeled noise levels associated with Quarry activities under existing/baseline conditions and under conditions with the Project, excluding ambient noise experienced by these receivers due to other noise sources. "Existing Quarry Activities" noise levels were modeled using onsite noise measurement data collected as discussed in Section 4.2. "Project Quarry Activities" noise levels were modeled as discussed in Section 5.2.1. As shown in Table 5-3, the cumulative sound levels generated by Quarry activities (inclusive of existing Quarry and Project-related activities) would not exceed the County daytime or nighttime residential noise standards. Note that this analysis conservatively assesses noise levels by assuming that Project noise sources would occur simultaneously and that these sources would be in addition to existing sources. Under actual future operations with the Project, the simultaneous occurrence of all activities would rarely, if ever, occur.

Table 5-3: Modeled Quarry Activities Noise Levels at Noise Sensitive Receivers

Receiver Location	Existing Quarry Activities (dBA)	Existing + Project Quarry Activities (dBA)	Santa Clara County Limit (dBA)	Existing + Project Exceed County Limit?
Daytime				
Rec01	34.2	38.4	55	N
Rec02	35.2	38.0	55	N
Rec03	33.9	36.0	55	N
Rec04	28.8	31.0	55	N
Rec05	34.3	37.4	55	N
Rec06	33.1	43.1	55	N
Rec07	29.0	33.8	55	N
Rec08	30.8	33.3	55	N
Rec09	20.7	25.5	55	N
Rec10	22.9	30.1	55	N
Nighttime				
Rec01	30.8	34.3	45	N
Rec02	31.9	34.0	45	N
Rec03	32.5	33.7	45	N
Rec04	28.3	28.9	45	N
Rec05	33.9	35.0	45	N
Rec06	33.1	36.3	45	N
Rec07	28.3	30.2	45	N
Rec08	30.6	32.0	45	N
Rec09	19.8	22.8	45	N
Rec10	22.2	28.7	45	N

Table 5-4 presents the predicted hourly change in ambient noise levels at receiver locations as a result of the Project. As shown in the table, the Project increase in hourly noise levels ranges from no increase (0 dBA) at some locations to maximum increase of 0.3 dBA daytime increase at Rec05, the maximum nighttime increase at Rec01 is 0.8 dBA. The maximum increase does not represent a substantial increase and would not exceed the significance threshold for onsite noise impacts. No receivers exceed the County residential daytime standard of 55 dBA or nighttime standard of 45 dBA.

Table 5-4: Predicted Noise Levels Increase at Residential Receivers

Receiver Location	Measured Existing Ambient[a] (dBA)	Project Quarry Activities (dBA)	Existing Ambient + Project (dBA)	Predicted Increase due to Project (dBA)	Substantial Increase?[b]
Daytime					
Rec01	49.4	36.4	49.6	0.2	N
Rec02	49.4	34.7	49.5	0.1	N
Rec03	46.9	31.8	47.0	0.1	N
Rec04	48.5	27.0	48.5	0.0	N
Rec05	45.7	34.4	46.0	0.3	N
Rec06	68.1	42.6	68.1	0.0	N
Rec07	59.3	32.1	59.3	0.0	N
Rec08	47.4	29.8	47.5	0.1	N
Rec09	47.4	23.8	47.4	0.0	N
Rec10	47.4	29.2	47.5	0.1	N
Nighttime					
Rec01	38.7	31.8	39.5	0.8	N
Rec02	38.7	29.9	39.2	0.5	N
Rec03	41.5	27.7	41.7	0.2	N
Rec04	32.3	19.8	32.5	0.2	N
Rec05	48.5	28.4	48.5	0.0	N
Rec06	54.3	33.5	54.3	0.0	N
Rec07	38.5	25.7	38.7	0.2	N
Rec08	36.5	26.3	36.9	0.4	N
Rec09	36.5	19.8	36.6	0.1	N
Rec10	36.5	27.6	37.0	0.5	N

(a) Measured values are the L_{eq} values from the nearest measurement location and inclusive of existing Quarry related noise and non-Quarry related noise. Existing Quarry related sound levels are shown to be in compliance with Santa Clara County noise standards in Table 5-3.
(b) As shown in Table 5-3, existing noise levels associated with Quarry operations at all receiver locations are below the County daytime and nighttime noise limits; therefore, a substantial increase is defined as 5-dBA above the existing noise level.

Table 5-5 presents the predicted change in day-night ambient noise levels at receiver locations as a result of onsite activities associated with the Project. As shown in the table, the Project increase in day-night noise levels ranges from no increase (0 dBA) at some locations to a maximum increase of 0.4 dBA at Rec01. The maximum increase does not represent a substantial increase and would not exceed the significance threshold for onsite noise impacts. Note that at some receivers ambient noise levels without

the Project exceed the County residential day-night land use standard. However, as shown in the table, the Project would not result in any increase in ambient day-night noise levels at these locations.

Table 5-5: Predicted Day-Night Noise Levels Increase at Residential Receivers

Receiver Location	Measured Existing Day-Night Ambient[a] (dBA L_{dn})	Project Quarry Activities (dBA L_{dn})	Existing Ambient + Project (dBA L_{dn})	Predicted Increase due to Project (dBA L_{dn})	Substantial Increase?[b]
Rec01	49.2	39.2	49.6	0.4	N
Rec02	49.2	37.4	49.4	0.3	N
Rec03	49.2	35.0	49.4	0.2	N
Rec04	47.0	28.3	47.1	0.1	N
Rec05	54.6	36.4	54.7	0.1	N
Rec06	67.0	43.0	67.0	0.0	N
Rec07	57.5	33.8	57.5	0.0	N
Rec08	47.1	33.4	47.3	0.2	N
Rec09	47.1	27.1	47.1	0.0	N
Rec10	47.1	34.3	47.3	0.2	N

(a) The ambient L_{dn} values are calculated from the measured L_{eq} values at the nearest measurement location and inclusive of existing Quarry related noise and non-Quarry related noise.
(b) For receivers where the ambient sound level exceeds 55 dBA L_{dn}, a substantial increase is defined as a 3-dBA for receivers above the day-night ambient noise level. For receivers where the existing day-night ambient sound levels are below 55 dBA L_{dn}, a substantial increase is defined as 5-dBA above the existing ambient noise level.

Based on the analysis above, onsite noise generated from Quarry activities under conditions with the Project would not contribute to or result in noise levels that exceed Santa Clara County daytime or nighttime noise standards and would not increase noise levels by more than the 5-dBA significance threshold. Receivers that currently experience a day-night ambient level less than the Santa Clara County land use standard of 55 dBA L_{dn} are predicted to have less than a 3-dBA increase above the existing ambient sound level. Receivers that currently experience a day-night ambient level greater than the Santa Clara County land use standard of 55 dBA L_{dn} are predicted to have no increase to the ambient sound levels due to Project related activities. Therefore, noise impacts from onsite Quarry activities associated with the Project would be less than significant.

5.2.3 Onsite Quarry Activities Noise Impact Summary

The results of the noise analysis were used to determine if the Project-related noise would result in any significant impacts according to the previously described thresholds of significance. A discussion of each potential impact follows:

a) A significant impact would be identified if the Project generates noise levels in excess of a daytime noise level of 55-dBA or nighttime noise level of 45-dBA when measured at a residential property line.

No residential receivers would experience Project-related noise levels in excess of the daytime or nighttime standards established in the County Code; therefore, the Project would have a less than significant impact, and no mitigation is required.

b) A significant impact would be identified if the Project increases ambient noise levels at a residential receiver by 3 dBA or more if the existing noise environment is in excess of the daytime standard of 55 dBA, the nighttime standard of 45 dBA, or the day-night standard of 55 dBA L_{dn} when measured at a residential property line.

No noise levels at residential receivers were predicted to exceed the limits established in the County Code or have an increase of 3-dBA or more above existing ambient noise levels. The day-night ambient sound levels at two receivers currently exceed the Santa Clara County land use standard of 55 dBA L_{dn}; however, the Project is not expected to increase the ambient day-night sound level at these locations. Based on this analysis, the Project would result in a less than significant impact, and no mitigation is required.

c) A significant impact would be identified if the Project increases ambient noise levels at a residential receiver by 5 dBA or more if the existing noise environment is at or below the daytime standard of 55-dBA, nighttime standard of 45-dBA, or the day-night standard of 55 dBA L_{dn} when measured at a residential property line.

No residential receivers were predicted to have an increase of 5-dBA or more above existing noise levels; therefore, the Project would result in a less than significant impact, and no mitigation is required.

5.3 Vibration Analysis

5.3.1 Vibration Modeling Methodology

Vibration modeling was performed with estimations of future Project equipment locations and a vibration magnitude attenuation formula utilized by Caltrans. The vibration attenuation equation is shown below where PPV_{ref} at a distance of D_{ref} is correlated to $PPV(D)$ at a distance of D:

$$PPV(D) = PPV_{ref}\left(\frac{D_{ref}}{D}\right)^{1.5}$$

5.3.2 Predicted Vibration Levels

The prominent source of existing and future vibration impacts is related to blasting activities. Future blasting activities are to occur in the North Quarry, the North Highwall Reserve, and the Rock Plant Reserve area. Although mining within the Rock Plant Reserve area is a vested right and is not a component of the proposed Project, this evaluation includes vibration sources associated with mining within the Rock Plant Reserve for the purposes of disclosure and to provide a conservative (i.e., tending to overstate impacts) evaluation of potential vibration impacts. Blasting commonly occurs in the North Quarry under the existing operations and is considered to be part of the baseline vibration environment. A 2010 study, *Environmental Noise & Vibration Assessment Lehigh Permanente Quarry Project* (Bollard Acoustical Consultants, May 2010) at the Quarry collected vibration data during blasting operations and provides suitable site-specific vibration data for this current evaluation. This measurement data was used as the vibration reference level emitted from blasting operations at the Quarry. The measurements were taken 1,500 feet from the blasting, and the PPV is provided in Table 5-6.

Table 5-6: Blasting Vibration Measurement

Equipment	PPV (in/s)	Distance from Source (feet)
Excessive Vibration Threshold	*0.2*	--
Blasting	0.128	1,500

The vibration levels associated with blasting are the highest as compared to all other vibration levels associated with Quarry operation. Thus, for the purposes of this study, vibration levels from blasting operations are analyzed to determine potential effects at residential locations.

The same representative potentially sensitive receiver locations used for the noise evaluation discussed in Section 5.2 (shown in Figure 5-1), were also used to predict potential vibration impacts. As discussed, the receiver locations were selected as they are the nearest residential locations surrounding the Quarry and would be the most likely to be potentially affected by onsite Project-related noise and vibration sources. These receiver locations are also representative of other residences within their proximity at which potential Project vibration impacts would be the same or less than those of the representative receiver.

Project blasting techniques would be the same as those under existing Quarry operations. The blasting reference PPV of 0.128 in/s at a distance of 1,500 feet was used based on the data from the 2010 study

discussed above. The maximum PPV as a result of blasting was predicted for each receiver using the blasting reference PPV and accounting for attenuation and distance between each receiver location and areas where blasting will occur (i.e., the North Highwall Reserve and Rock Plant Reserve). Table 5-7 presents the relevant data for each receiver and shows that the maximum predicted PPV at a receiver location is 0.03 in/s, which is well below the Caltrans excess vibration threshold of 0.2 in/s. Vibration levels will be equal the threshold of excessive vibration at an approximate distance of 1,750 feet from the blasting activities and no sensitive receptors are located within that distance.

Table 5-7: Modeled Vibration Levels at Residential Receivers

Blasting Location	Receiver Location	Distance from Source	Predicted PPV (in/s)	Significant Impact?[a]
Excessive Vibration Threshold			*0.2*	--
North Wall Highwall	Rec01	8,300	0.01	N
	Rec02	7,800	0.01	N
	Rec03	9,000	0.01	N
	Rec04	10,500	0.01	N
	Rec05	9,000	0.01	N
	Rec06	8,800	0.01	N
	Rec07	7,700	0.01	N
	Rec08	5,100	0.02	N
	Rec09	5,100	0.02	N
	Rec10	7,800	0.01	N
Rock Plant Reserve	Rec01	7,500	0.01	N
	Rec02	5,000	0.02	N
	Rec03	3,800	0.03	N
	Rec04	3,700	0.03	N
	Rec05	7,500	0.01	N
	Rec06	9,400	0.01	N
	Rec07	10,000	0.01	N
	Rec08	10,000	0.01	N
	Rec09	11,500	0.01	N
	Rec10	14,000	--	N

(a) Significant Impact = Excessive vibration defined as 0.2 in/s over the range of 1 to 100 Hz

5.3.3 Blasting Vibration Impact Summary

The results of the vibration analysis were used to determine if Project-generated vibration would result in any significant impacts according to the previously described thresholds of significance. A discussion of the potential impact follows:

d) A significant impact would be identified if the Project generates excessive groundborne vibration of 0.2 in/s PPV over the range of 1 to 100 Hz at residential structures.

As shown in Table 5-7, no residential structures would experience Project-related blasting vibrations in excess of 0.2 in/s PPV over the range of 1 to 100 Hz; therefore, the Project would have a less than significant impact, and no mitigation is required.

5.4 Traffic Noise Analysis

The Project proposes the import of approximately 1 million cubic yards of soil per year for use in reclamation. Haul trucks would deliver soil to the site from regional locations and use Foothill Boulevard between Interstate 280 and Stevens Creek Boulevard and Stevens Creek Boulevard to access the site. An average of approximately 333 loads per day would be required, resulting in approximately 666 truck trips per day. Haul trucks would typically be 5-axle dump trucks. Since no other components of the proposed Project would substantially change the number of on-road haul truck or other vehicle trips as compared to existing conditions, this evaluation considers the potential increase in noise at sensitive receivers along haul routes that would be used by soil import trucks.

As discussed in Section 4.3, vibration measurements taken during onsite activities, including haul truck drive-bys, concludes that truck drive-by vibration levels were 0.0013 in/s, which is substantially lower than the excessive vibration PPV threshold of 0.2 in/s. Thus, further analysis of potential vibration effects associated with haul trucks not warranted.

5.4.1 Traffic Noise Analysis Methodology

Traffic noise modeling was performed using estimations based on observed traffic patterns during the site visit on October 4 and 5, 2018 and a traffic study prepared for the Project (*Permanente Quarry Soil Import Transportation Impact Analysis*, Fehr & Peers, April 2019). Noise levels, car counts and truck counts were taken by Burns & McDonnell to quantify the existing roadway conditions as detailed in Section 4.4. CadnaA roadway computer modeling software was utilized to model the baseline roadway conditions. Modeling traffic inputs are provided Table 5-8. Baseline traffic volumes are based on the "background" traffic scenario as described in the *Permanente Quarry Soil Import Transportation Impact Analysis* (Fehr & Peers, 2019) (TIA), and include existing conditions adjusted to account for Permanente

operational baseline trips using the 10-year annual average (2008 to 2018) and traffic from approved developments as discussed in the TIA (pg. 47). Offsite Project-related vehicle noise levels are based on an increase of 666 one-way truck trips (333 round trips) per day on the segment of Stevens Creek Boulevard from the Quarry to Foothill Boulevard and two segments of Foothill Boulevard between Stevens Creek Boulevard and Cristo Ray Drive and between Cristo Ray Drive and Interstate 280. Modeling traffic inputs for baseline plus Project conditions are provided Table 5-9. An estimation of daytime and nighttime trip distribution was derived from typical traffic distribution profiles in conjunction with observed traffic patterns during the site visit.

Table 5-8: Sound Modeling Inputs for Baseline Traffic Data

Roadway	Stevens Creek Boulevard (Quarry to Foothill Boulevard)	Foothill Boulevard (Stevens Creek Boulevard to Cristo Ray Drive)	Foothill Boulevard (Cristo Ray Drive to I-280)
Baseline Traffic AM Peak Hour[a]	486	2,213	2,649
Baseline ADT [b]	4,860	27,660	33,100
Approximate Day Truck Percentage [b]	7%	3%	3%
Approximate Night Truck Percentage[c]	1%	1%	1%
Percentage of Total ADT during Day[d]	80%	80%	80%
Percentage of Total ADT during Night[d]	20%	20%	20%

a) Values derived from Figure 9 of TIA (pg. 49).
b) Assumes AM peak hour is 10% of ADT on Stevens Creek Boulevard and 8% of ADT on Foothill Boulevard.
c) 1% reflects assumed proportion.
d) Day and night percentages estimated based on typical traffic patterns.

Table 5-9: Sound Modeling Inputs for Baseline + Project Traffic Data

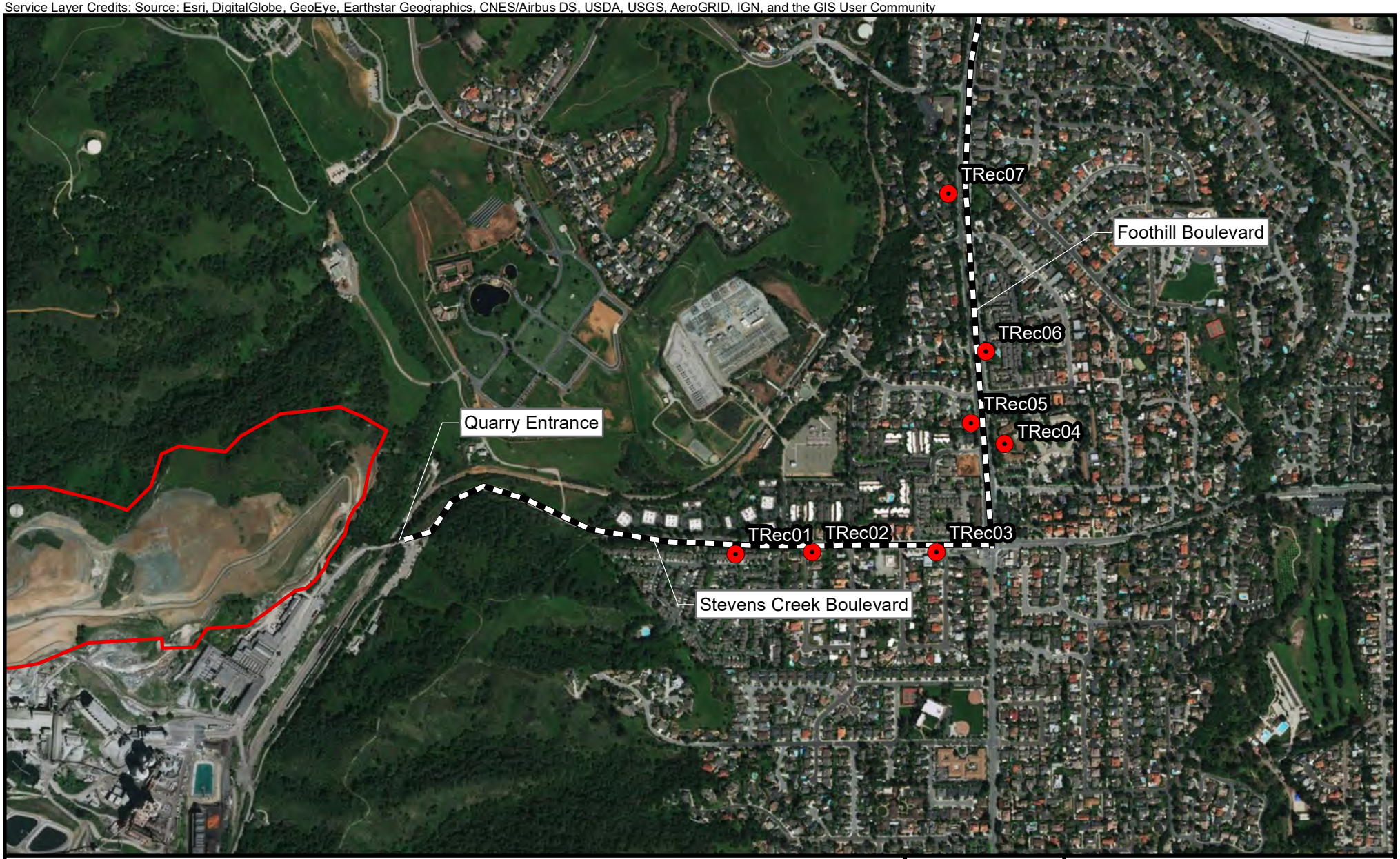
Roadway	Stevens Creek Boulevard (Quarry to Foothill Boulevard)	Foothill Boulevard (Stevens Creek Boulevard to Cristo Ray Drive)	Foothill Boulevard (Cristo Ray Drive to I-280)
Baseline + Project Traffic AM Peak Hour[a]	552	2,279	2,715
Baseline + Project ADT [b]	5,526	28,326	33,766
Approximate Day Truck Percentage[c]	19%	6%	5%
Approximate Night Truck Percentage[d]	7%	2%	2%
Percentage of Total ADT during Day[e]	81%	80%	80%
Percentage of Total ADT during Night[e]	19%	20%	20%

a) Values increase by 66 trips Project trips during AM peak hour reflecting 33 inbound loaded soil import trucks and 33 outbound unloaded trucks.
b) Total ADT is sum of baseline and 666 Project related haul truck trips reflecting 333 inbound loaded soil import trucks and 333 outbound unloaded trucks.
c) All Project trips are import soil trucks.
d) Percentages account for 66 trips during the nighttime period (10:00 PM to 7:00 AM).

5.4.2 Predicted Traffic Noise Levels

Seven residential receivers were selected along the truck route and were modeled to quantify the Project influence on existing noise levels due to increased truck trips associated with soil import. The receivers are representative of the nearest residences with the greatest potential to experience truck noise associated with the Project. The receivers are labeled TRec01-TRec07 and their locations are shown on Figure 5-3. Receivers include single-family homes, multi-family residences and the Sunny View Bay Area Retirement Community. As shown in Table 5-10, each of the receiver locations experiences noise levels in excess of 60 dBA under existing conditions. The Project addition of truck trips associated with soil imports is predicted to result in potential increases ranging from 0.5 dBA to 2.2 dBA at residential receiver locations.

Path: Z:\Clients\ENS\LehighSouthw\110515_CEQANoiseStudy\Studies\Permitting\Modeling\GIS\Figure 5-3 - Traffic Receiver Locations.mxd irbrewe 5/3/2019
COPYRIGHT © 2019 BURNS & McDONNELL ENGINEERING COMPANY, INC.
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Representative Residential Traffic Noise Receivers (TRec)

Modeled Roads

Reclamation Plan Boundary (proposed)

NORTH

1,000 500 0 1,000

Scale in Feet

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Figure 5-3
Permanente Quarry Noise and Vibration Study
Traffic Receiver Locations

Source: ESRI, Burns & McDonnell Engineering Company, Inc.

Issued: 5/3/2019

Table 5-10: Predicted Traffic Noise Levels at Residential Receivers

Receiver Location	Existing (dBA L_{dn})	Existing + Project (dBA L_{dn})	Increase (dBA L_{dn})	Existing Conditions Exceeds 60-dBA L_{dn}?	Substantial Increase?
TRec01	65.9	68.1	2.2	Yes	No
TRec02	68.0	70.2	2.2	Yes	No
TRec03	67.6	69.6	2.0	Yes	No
TRec04	67.2	67.7	0.5	Yes	No
TRec05	70.5	71.0	0.5	Yes	No
TRec06	72.1	72.6	0.5	Yes	No
TRec07	68.2	68.7	0.5	Yes	No

5.4.3 Traffic Noise Impact Summary

The results of the noise analysis were used to determine if the Project-related traffic noise would result in any significant impacts according to the previously determined thresholds of significance. A discussion of each potential impact is as follows:

e) A significant impact would be identified if the Project causes noise levels to exceed 60-dBA L_{dn} at the exterior areas for single-family residences.

Existing traffic noise levels at residences along study area road segments exceed the L_{dn} standard of 60-dBA under existing conditions without the Project. The Project would not cause noise levels at any additional residential receivers to exceed 60-dBA; therefore, the Project would have a less than significant impact, and no mitigation is required.

f) A significant impact would be identified if the traffic noise from the Project causes an increase in the ambient noise levels by 3 dBA or more if the existing noise environment is currently greater than 60-dBA L_{dn} at the exterior areas for single-family residences.

Existing traffic noise levels at residences along study area road segments exceed 60-dBA L_{dn} under existing conditions without the Project. Project-related trucks would increase the noise levels by 0.6 to 2.3 dB at residential receivers. The Project increase would not exceed the threshold of 3-dBA or more; therefore, the Project would have a less than significant impact, and no mitigation is required.

g) A significant impact would be identified if the traffic noise from the Project causes an increase in the ambient noise levels by 5 dBA or more if the existing noise environment is currently less than 60-dBA L_{dn} at the exterior areas for single-family residences.

Existing traffic noise levels at residences along study area road segments exceed 60-dBA L_{dn} under existing conditions without the Project. It is expected that residential receivers further away from Stevens Creek Boulevard and Foothill Boulevard currently experience traffic noise levels less than 60-dBA L_{dn}. At these residences, the 5 dBA threshold would apply. However, as established in the preceding sections, the Project would not result in increases in traffic noise levels that exceed 5 dBA; therefore, the Project would not have the potential to result in an increase of 5-dBA or more at any such residential receivers.

6.0 CONCLUSION

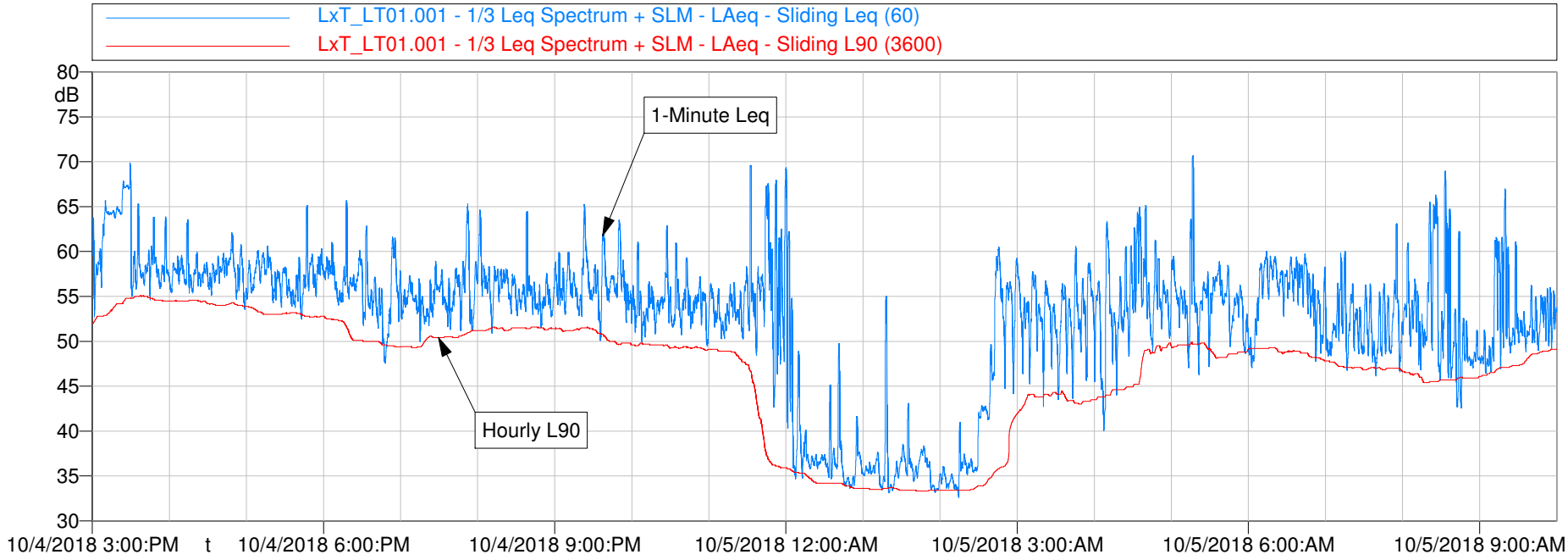
Burns & McDonnell conducted this environmental noise study of the proposed Permanente Quarry reclamation plan amendment for Lehigh.

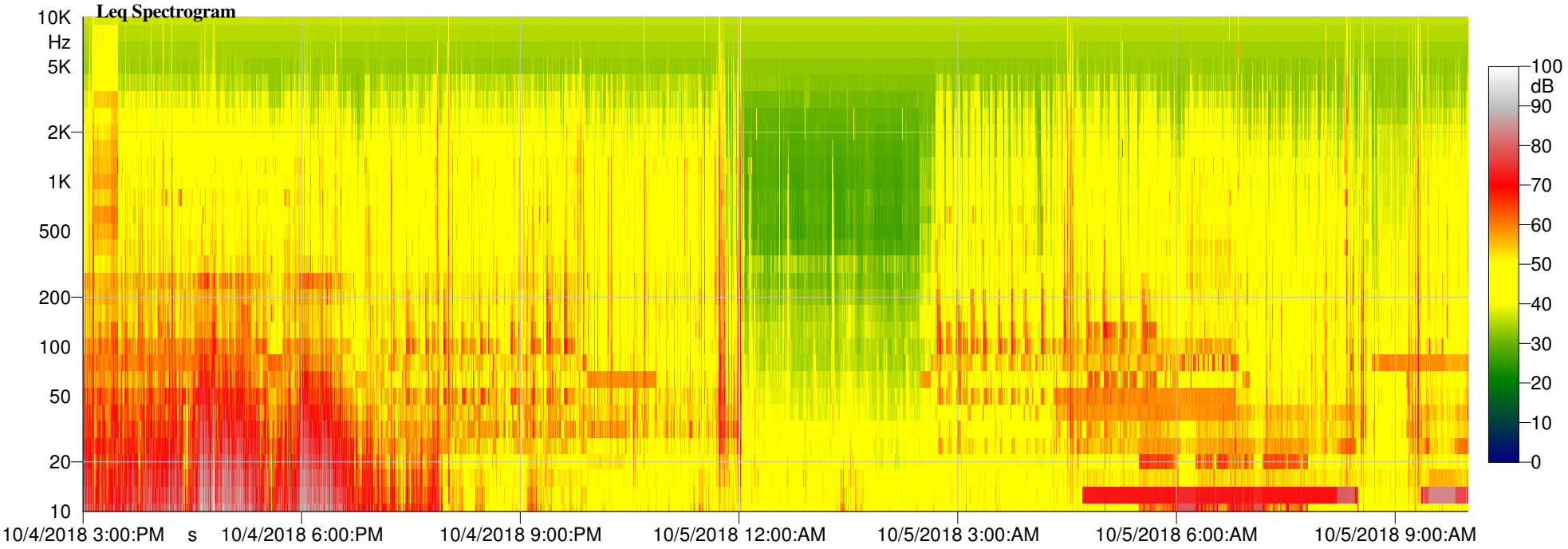
An operational noise survey was conducted to establish the existing noise environment in the surrounding community. Noise and vibration predictive modeling was performed using industry-accepted software and algorithms to quantify Project-generated noise and vibration levels compared to existing levels. Both models were a representation of the worst-case scenario where all phases of the Project were operating simultaneously.

After analyzing each far-field potentially affected representative residential receiver, no noise or vibration levels in exceedance of applicable regulations are expected to occur as a result of, or be exacerbated by, the Project. Thresholds of significance used in this study were developed from local regulations and in accordance with CEQA Guidelines. Based on the thresholds of significance established and the predicted noise and vibration levels, the Project is not expected to have significant impacts, and no mitigation is required.

APPENDIX A - LONG-TERM FAR-FIELD MEASUREMENT GRAPH

Measurement: Lehigh
Location: LT01
Metric: 1-Minute Leq / Hourly L90





APPENDIX B - SHORT-TERM FAR-FIELD MEASUREMENT DATA

Appendix B - Short-Term Far-Field Measurement Data

CEQA Study - Lehigh

Point Number	*LAeq*	*LA90*	*Notes*
10/04/18 - 2:00 PM			
73°F, 51% hm, 54°F dp, calm, clear			
ST01	49.4 dBA	29.3 dBA	Facility not audible, planes, trucks passing, backup alarm from vineyard, walker
ST02	46.9 dBA	37.6 dBA	Facility audible, gun range, planes, cars passing, birds, backup alarms
ST03	48.5 dBA	46.0 dBA	Stevens Creek quarry dominant, backup alarms, planes
ST04	68.1 dBA	37.3 dBA	Traffic dominant, birds, distant I-280 traffic, planes
ST05	59.3 dBA	45.6 dBA	Facility not audible, I-280 traffic, birds, cars passing, trees, planes
ST06	47.4 dBA	39.8 dBA	Facility not audible, I-280 traffic, birds, planes
10/04/18 - 11:00 PM			
59°F, 72% hm, 50°F dp, calm, clear			
ST01	38.7 dBA	28.2 dBA	Facility barely audible, constant insects, distant traffic, planes, backup alarms
ST02	41.5 dBA	39.9 dBA	Facility barely audible, constant insects, planes
ST03	32.3 dBA	30.0 dBA	Facility not audible, Stevens Creek quarry shutdown and not audible, constant insects, planes
ST04	54.3 dBA	39.3 dBA	Facility not audible, constant insects, constant substation noise, cars/trucks passing
ST05	38.5 dBA	31.6 dBA	Facility not audible, I-280 traffic, planes
ST06	36.5 dBA	33.1 dBA	Facility not audible, I-280 traffic, constant insects
08/23/18 - 5:30PM			
72°F, 50% hm, 55°F dp, 1-3 mph, clear			
ST07	48.5 dBA	38.8 dBA	Facility not audible, dog bark, distant traffic, birds, crows (18:46), cars passing, conversation
ST08	45.6 dBA	37.3 dBA	Facility not audible, planes, distant traffic, birds, music, cars passing
ST09	45.7 dBA	31.6 dBA	Facility audible, constant transmission line buzz, birds, insects, conversation, cars passing, planes, dog barking, biker
08/23/18 - 11:00PM			
68°F, 65% hm, 55°F dp, 1-3 mph, clear			
ST07	38.9 dBA	33.8 dBA	Facility clearly audible, cars passing, insects, conversation
ST08	37.3 dBA	34.8 dBA	Facility clearly audible, insects, constant crickets, birds, truck
ST09	48.5 dBA	47.0 dBA	Facility clearly audible, constant dominant crickets, insects, animals, high frequencies, planes

Note: no tones measured were attributable to Facility operation.

Appendix B - Short-Term Far-Field Measurement Data

CEQA Study - Lehigh

Point Number	Sound Pressure Level (dB) Octave Band Frequency (Hz)																																				
	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
10/04/18 - 2:00 PM																																					
73°F, 51% hm, 54°F dp, calm, clear																																					
ST01	69.6	67.4	64.0	61.5	58.2	54.9	51.6	49.0	46.6	45.1	44.9	43.3	47.6	47.4	44.6	43.3	43.1	41.9	43.2	44.6	44.5	44.1	38.7	36.9	35.1	33.2	32.6	32.7	33.3	34.2	35.3	36.4	37.5	38.6	40.0	41.4
ST02	54.3	52.8	51.6	52.4	46.1	44.9	48.0	46.0	53.3	50.7	48.8	48.4	49.5	49.2	46.9	46.3	44.9	41.2	40.3	39.3	38.1	38.0	36.8	35.4	34.1	33.6	33.6	33.7	34.1	34.8	36.2	37.0	37.8	38.7	40.0	41.4
ST03	64.0	61.8	61.4	65.5	55.0	52.5	52.2	50.0	52.5	50.1	49.5	48.7	48.4	46.1	47.6	44.7	42.8	41.2	38.7	38.4	38.7	39.8	40.1	40.3	38.7	37.8	35.8	34.0	33.6	34.3	35.3	36.4	37.5	38.6	39.7	41.3
ST04	58.3	56.3	54.2	54.9	52.0	52.4	54.8	55.0	55.9	60.5	65.2	62.6	66.1	69.9	66.8	66.1	63.0	62.3	59.8	59.0	59.2	59.7	59.2	58.2	55.0	53.4	51.1	50.3	51.0	48.9	50.5	50.3	46.7	44.0	43.6	46.3
ST05	67.0	64.8	62.1	59.6	58.1	56.3	54.3	56.1	53.9	52.2	52.0	51.9	51.7	50.4	50.3	51.3	51.8	48.5	48.0	49.0	50.2	52.1	52.6	51.5	49.8	45.5	42.0	39.1	37.2	36.1	36.2	36.8	37.6	38.6	39.6	41.3
ST06	58.3	56.0	53.4	52.3	49.6	45.4	44.2	43.9	44.1	44.4	43.4	43.4	44.6	47.1	47.8	44.8	45.5	44.9	42.7	41.2	39.6	38.2	36.8	35.0	33.1	32.3	31.9	32.6	35.5	36.2	35.3	36.4	37.5	38.6	39.6	41.3
10/04/18 - 11:00 PM																																					
59°F, 72% hm, 50°F dp, calm, clear																																					
ST01	49.2	49.0	45.1	45.3	44.3	44.6	45.1	46.0	45.4	44.5	42.7	40.5	40.8	41.8	41.1	38.0	38.4	36.5	35.6	33.2	31.5	30.4	29.6	29.7	30.5	31.1	31.7	32.7	33.7	34.7	35.8	37.0	38.2	39.2	40.3	41.9
ST02	48.5	50.4	48.5	42.3	42.8	42.1	40.8	41.3	41.1	41.2	40.7	39.3	37.4	36.5	34.0	31.8	29.7	28.5	27.7	28.4	29.9	28.5	28.8	29.4	32.5	39.7	32.1	34.3	34.2	34.6	35.8	37.0	38.0	39.1	40.1	41.9
ST03	47.0	49.0	48.3	46.5	45.4	44.4	45.6	44.7	43.9	42.4	39.7	36.9	34.2	33.2	31.2	28.5	27.7	27.6	27.2	27.4	27.8	30.8	28.8	29.2	30.7	32.6	32.0	32.9	33.6	34.5	35.6	37.0	38.0	39.0	40.1	41.8
ST04	52.3	50.2	49.2	48.9	48.0	47.1	46.5	45.7	44.8	42.9	49.8	43.8	46.2	46.3	46.6	46.6	47.6	46.5	43.6	43.8	44.9	47.1	48.2	45.8	43.1	41.8	37.8	35.8	35.3	35.3	36.0	37.2	38.1	39.1	40.1	41.8
ST05	49.2	48.3	43.6	44.8	44.9	44.0	43.5	43.9	42.9	42.5	41.1	40.2	41.4	43.0	38.6	35.8	34.3	35.3	33.1	32.7	32.1	32.7	31.9	30.9	30.8	31.5	31.9	32.8	33.6	34.5	35.7	37.0	38.0	39.0	40.1	41.9
ST06	49.9	47.6	45.7	44.0	43.2	41.7	41.5	40.5	39.0	38.0	37.4	35.9	35.0	35.9	32.4	31.2	30.7	30.4	29.9	30.6	31.8	32.2	31.6	30.4	31.3	31.9	31.8	32.8	33.6	34.7	35.8	37.0	38.0	39.0	40.1	41.8
08/23/18 - 5:30PM																																					
72°F, 50% hm, 55°F dp, 1-3 mph, clear																																					
ST07	51.9	48.8	49.0	46.2	45.1	43.8	46.0	45.8	44.6	43.6	43.5	43.8	43.3	44.0	44.1	43.2	41.6	40.9	39.0	40.4	39.4	38.5	38.4	38.7	40.1	39.6	36.6	35.0	34.8	35.0	35.9	36.8	37.8	38.9	39.9	41.6
ST08	50.6	51.2	47.4	46.8	44.5	44.0	49.2	46.7	45.3	44.9	43.8	42.2	41.8	41.0	38.7	38.5	38.6	35.8	36.7	37.3	38.2	38.2	37.5	37.4	36.4	34.3	33.6	33.4	33.9	34.7	35.7	36.7	37.8	38.9	39.9	41.6
ST09	48.3	45.9	45.6	47.5	46.9	45.2	45.3	45.2	42.8	45.9	44.7	48.8	49.5	41.4	41.5	42.5	40.7	39.1	37.7	37.5	37.3	38.3	36.9	35.8	34.6	33.7	34.2	34.0	34.4	35.0	36.2	36.9	37.9	38.9	40.0	41.6
08/23/18 - 11:00PM																																					
68°F, 65% hm, 55°F dp, 1-3 mph, clear																																					
ST07	50.2	47.8	47.0	46.1	43.4	41.3	41.7	46.0	40.9	42.3	41.5	43.1	45.8	42.6	38.9	38.1	35.5	35.7	32.0	32.2	31.0	31.1	30.7	30.5	30.9	32.2	32.3	32.6	33.4	34.4	35.6	36.6	37.7	38.8	39.8	41.6
ST08	51.9	48.2	48.1	47.7	45.7	43.5	41.3	42.0	41.8	41.0	41.8	38.3	37.1	38.4	34.7	33.3	33.3	33.1	30.8	31.7	30.6	29.5	29.6	29.9	30.7	33.8	31.9	32.4	33.3	34.3	35.5	36.6	37.7	38.8	39.8	41.6
ST09	52.1	50.3	48.9	48.1	46.9	44.2	43.9	43.4	42.8	42.1	42.4	40.3	43.2	42.5	39.0	35.8	35.5	36.1	31.8	30.8	30.3	30.4	30.1	31.0	32.5	38.8	45.8	35.3	34.3	36.2	36.4	36.8	37.9	39.0	39.9	41.6

Measured pure tone at residential property attributable to Facility operation

Measured pure tone at residential property attributable to extraneous noises

Note: no tones measured were attributable to Facility operation.

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Permanente Quarry Soil Import Transportation Impact Analysis



Permanente Quarry Soil Import

Transportation Impact Analysis

Prepared for:

Lehigh Southwest Cement Company

April 2019

FEHR PEERS

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EXECUTIVE SUMMARY

This report presents the results of a transportation impact analysis (TIA) conducted for the soil import component of Lehigh Southwest Cement Company's (Lehigh) proposed reclamation plan amendment (the Project) for the Permanente Quarry in unincorporated Santa Clara County near Cupertino, California. The TIA was conducted to evaluate the potential transportation impacts of the Project and to identify recommended mitigation to address potentially significant transportation impacts per the California Environmental Quality Act (CEQA).

This TIA concludes that the Project would contribute to an existing operational deficiency at the unsignalized intersection of Interstate (I) 280 southbound ramps and Foothill Boulevard. Signalization of this intersection would address the deficiency and is already identified in the County's 2040 Expressway Study. Lehigh's contribution of funding for the installation of a traffic signal in an amount proportionate to the number of Project vehicle trips at the intersection is the recommended mitigation. The Project would not result in any other significant adverse transportation-related impacts. The TIA and other studies conducted for the Project also find that the Project would reduce vehicle miles traveled (VMT) by providing a local reuse option for surplus construction soil generated in the region compared to other available reuse sites.

Project Description

The Project component evaluated in this TIA is the import of surplus construction soil for use in reclamation of the site. Reclamation would require imports of up to approximately 1 million cubic yards of soil per year for up to approximately 30 years. Based on the *Suitable Surplus Soil Availability Study for Permanente Quarry* (Pinnacle Consulting 2019), it is estimated that the majority of the imported soil would come from construction sites in San Francisco, San Mateo, and Santa Clara Counties. Other aspects of the proposed reclamation plan amendment would not result in changes to transportation characteristics associated with quarry operations and reclamation and are not addressed in this TIA.

Study Area

The study area includes the primary road segments and intersections that would be used by haul trucks transporting soil to Permanente Quarry. The study area includes Stevens Creek Boulevard between the Project site access and Foothill Boulevard, and Foothill Boulevard between Stevens Creek Boulevard and I-280, which are authorized truck routes. The study area also includes freeway segments between the Foothill Boulevard / I-280 interchange and areas within San Francisco, San Mateo, and Santa Clara Counties where various construction projects would generate the soil.

Study Intersections

Study intersections were selected in accordance with VTA's *Transportation Impact Analysis Guidelines* (2014), which indicates that an intersection should be evaluated if a project contributes ten vehicle trips per lane during the morning or evening peak hour. A total of four intersections were identified as meeting these criteria and were selected as study locations.

Freeway Segments

Pursuant to VTA guidelines, the impacts of the Project on freeway operations would be evaluated at locations where the amount of Project traffic is equal to or greater than 1% of the freeway segment's capacity. The Project would add less than 1% of the freeway segments' capacities and therefore a freeway segment analysis is not needed and was not conducted.

Pedestrian, Bicycle, and Transit Facilities

The study area for potential Project impacts to pedestrian facilities, bicycle facilities, and transit services and facilities includes facilities along Stevens Creek Boulevard between the Project site access and Foothill Boulevard, and along Foothill Boulevard between Stevens Creek Boulevard and I-280.

Project Traffic Estimates

The number of soil haul truck trips that would be generated by the Project and added to the roadways and intersections in the study area is based on the number of trucks needed to transport soil to the site. No additional site workers would be needed, so the Project would not generate new vehicle trips due to worker vehicles.

With deliveries of up to approximately 1,000,000 cubic yards of soil per year and each truck accommodating 10 cubic yards of soil, 100,000 truckloads would be generated per year. Soil would be delivered approximately 300 days a year, resulting in an average of 333 truckloads a day and 666 truck trips per day (333 inbound loaded trucks and 333 outbound empty trucks). The timing of fill deliveries is expected to be variable from day to day; it will depend on the schedule of the project generating fill, the distance between the project and Permanente, and traffic conditions at that time. For purposes of traffic analysis, deliveries of fill are assumed to be evenly spaced throughout the 10-hour workday; approximately 10 percent of the truck trips would occur during each hour, including each AM and PM peak hour. The resulting estimated weekday daily and AM and PM peak hour truck volumes are presented in **Table ES-1.**

As compared to passenger cars, haul trucks are longer and heavier and require more acceleration and deceleration time. Therefore, to provide a more accurate measure of their potential traffic impacts, the haul truck trips were converted to "passenger car equivalents" (PCEs) for use in the traffic operations analysis. The Project vehicle trip generation in PCEs is also presented in Table ES-1.

Table ES-1: Project Vehicle Trip Generation Estimates

Vehicle Type	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
		In	Out	Total	In	Out	Total
Trucks	666	33	33	66	33	33	66
PCEs	1,500	82	66	148	82	66	148

Notes:
PCEs = Passenger Car Equivalents
Inbound trucks PCE = 2.5; Outbound trucks PCE = 2.0
Source: Fehr & Peers, 2019.

The soil would be generated at construction sites in various locations, primarily within Santa Clara, San Mateo, and San Francisco Counties. The *Suitable Surplus Soil Availability*

Study for Permanente Quarry (Pinnacle Consulting 2019) estimates that approximately 14% of the fill would come from San Francisco County, 32% from San Mateo County, and 54% from Santa Clara County. This information was used to estimate the regional Project-related truck distribution percentages and used to assign the project traffic to the study intersections and freeway segments.

Intersection Operations

Traffic operations of the study intersections were evaluated with level of service calculations during the weekday morning (AM) and weekday evening (PM) peak hours for the following scenarios:

Scenario 1: Existing Conditions – Existing volumes obtained from counts.

Scenario 2: Existing with Project Conditions – Scenario 1 volumes plus vehicle trips generated by the Project.

Scenario 3: Background Conditions – Existing volumes obtained from counts, adjusted to include typical site operations based on a historical average of Permanente truck volumes, plus vehicle trips from approved developments in the area.

Scenario 4: Background with Project Conditions – Scenario 3 volumes plus vehicle trips generated by the Project.

Scenario 5: Cumulative Without Project Conditions – Background volumes plus regional growth to 2040 plus vehicle trips generated by approved and pending developments in the area.

Scenario 6: Cumulative with Project Conditions – Scenario 5 volumes plus vehicle trips generated by the Project.

The results are summarized in **Table ES-2.**

Table ES-2: Intersection Level of Service Summary

#	Intersection	Jurisdiction (LOS Threshold)[1]	Peak Hour[2]	Existing		Existing with Project		Background		Background with Project		Cumulative		Cumulative with Project	
				Delay[3]	LOS[4]	Delay[3]	LOS[4]	Delay[3]	LOS[4]	Delay[3]	LOS[4]	Delay[3]	LOS[4]	Delay[3]	LOS[4]
1	Foothill Expressway/I-280 Northbound Ramps	Santa Clara County (E)	AM PM	23.7 24.9	C C	25.5 26.9	C C	24.9 26.2	C C	26.7 28.3	C C	26.6 30.2	C C	28.5 33.2	C C-
2	Foothill Boulevard/I-280 Southbound Ramps	Santa Clara County (D)	AM PM	**48.0** **133.8**	**E** **F**	**57.5** **168.7**	**F** **F**	**64.6** **>180**	**F** **F**	**79.7** **>180**	**F** **F**	**152** **>180**	**F** **F**	**>180** **>180**	**F** **F**
3	Foothill Boulevard/Cristo Rey Drive	Los Altos (D)	AM PM	33.8 23.2	C- C	34.0 23.5	C- C	34.3 23.8	C- C	34.7 24.3	C- C	37.4 26.6	D+ C	38.7 28.3	D+ C
4	Stevens Creek Boulevard/ Foothill Boulevard	Cupertino (D)	AM PM	35.8 21.9	D+ C+	38.6 23.5	D+ C	37.6 21.2	D+ C+	41.1 22.8	D C+	43.7 20.7	D C+	49.8 22.3	D C+

Notes: **Bold text** indicates intersection operates at unacceptable level of service.

1. Intersection jurisdiction and associated LOS threshold applied.
2. AM = morning peak hour, PM = evening peak hour.
3. Whole intersection weighted average control delay expressed in seconds per vehicle calculated using methods described in the 2000 Highway Capacity Manual, with adjusted saturation flow rates to reflect Santa Clara County Conditions for signalized intersections. For side-street stop-controlled intersections, delay and LOS are reported for the worst-case approach.
4. LOS = Level of Service. LOS calculations conducted using the TRAFFIX analysis software packages, which apply the methods described in the 2000 *Highway Capacity Manual*.

Source: Fehr & Peers, 2019.

The three signalized intersections (#s 1, 2, and 4 in the table) are projected to operate at acceptable levels of service during both the AM and PM peak hours under all analysis scenarios. However, the left-turn movement on the eastbound approach at the intersection of the one unsignalized intersection, Foothill Boulevard and I-280 southbound ramps, currently operates at unacceptable levels during both the AM and PM peak hours. The addition of Project trips would increase the delays. The increases in delays are considered a significant impact of the Project.

The four hour and peak hour traffic signal warrants were evaluated to determine whether the traffic volumes at the one unsignalized intersection, Foothill Boulevard and I-280 southbound ramps, meet the level where traffic signal installation can be considered. The Existing volumes (and therefore the volumes for all subsequent scenarios) meet both the four hour and peak hour signal warrants.

Impacts and Mitigation Measures

Potential Project-related impacts are addressed for freeway segments, intersections, and on transit, bicycle, and pedestrian transportation.

Freeway Segments

Project-related truck trips would increase freeway segment volumes by less than 1% percent of the segments' capacities on all study freeway segments. Therefore, the Project impact to freeways is **less-than-significant**.

Intersections

Project-related truck trips would exacerbate unacceptable operations which currently exist at the unsignalized intersection of Foothill Boulevard and I-280 southbound ramps under Existing with Project, Background with Project, and Cumulative with Project conditions. This is a **significant impact**. The Project would not have a significant impact on traffic operations at any of the other three study area intersections.

The installation of traffic signals at the Foothill Boulevard and I-280 southbound ramps intersection is identified by Santa Clara County as a Tier 1 (i.e., high priority) project in the County's 2040 Expressway Study. With traffic signals, and associated curb and gutter, and signing and striping improvements, this intersection would operate at LOS A or B during the AM peak hour and LOS C during the PM peak hour under all evaluation scenarios and

would avoid the Project's significant impact at this location. Delay and LOS results for the intersection with signalization are presented in **Table ES-3.**

Table ES-3: Foothill Boulevard/I-280 Southbound Ramps (#2) Intersection Levels of Service with Signalization

Scenario	Jurisdiction (LOS Threshold)[1]	Peak Hour[2]	Without Project		With Project	
			Delay[3]	LOS[4]	Delay[3]	LOS[4]
Existing + Mitigation	Santa Clara County (D)	AM PM	8.8 20.5	A C+	10.0 21.4	A C+
Background + Mitigation		AM PM	10.6 21.4	B+ C+	11.7 22.4	B+ C+
Cumulative + Mitigation		AM PM	11.2 23.9	B+ C	12.3 25.2	B C

Source: Fehr & Peers, 2019.

The Project would contribute 148 AM and 148 PM peak hour trips (in PCEs) at the Foothill Boulevard and I-280 southbound ramps intersection. This represents about 1% of the total Existing AM or PM peak hour volume at this intersection. (The Project's percentage contribution under Background and Cumulative analysis scenarios is lower, because the amount of non-Project-related trips at the intersection is higher than under Existing Conditions.)

Since the need for signalization of the Foothill Boulevard and I-280 southbound ramps intersection exists under Existing Conditions and is not caused by the Project, the recommended mitigation is to require Lehigh to contribute funding in an amount proportional to the Project's contribution of PCE trips or 1% of the cost of traffic signal installation and associated improvements.

With signalization and associated improvements, the resulting impact would be **less-than-significant**. However, the timing of signal installation is presently undetermined, and it is possible that even with the Project's funding through the above mitigation measure, the Project could generate trips prior to the installation of the signal. Therefore, in the absence of actual installation or until the County secures sufficient funds to complete the installation, the Project's contribution of proportionate funding would not ensure mitigation of the impact.

Transit Facilities

The Project would not require additional workers or otherwise generate or increase the demand for transit trips. Therefore, the Project does not need to provide facilities for pedestrians or bicyclists to access transit routes or stops, nor would the Project cause a transit route to exceed its available capacity. No potential for conflicts with existing or planned transit facilities is anticipated. Thus, the impact of the Project on transit facilities is

less-than-significant.

Bicycle Facilities

Project traffic would primarily be added to freeways where bicyclists are prohibited. The local streets with added Project vehicle trips have bicycle lanes to separate vehicle traffic from bicyclists. Therefore, the Project would not create a hazardous condition, nor does it conflict with existing or planned bicycle facilities. Thus, the impact of the Project on bicycle facilities is **less-than-significant**.

Pedestrian Facilities

Similar to bicycle facilities, the Project would not create a hazardous condition as the local streets with added project traffic have sidewalks and pedestrian accommodations (e.g., crosswalks) at intersections, including pedestrian signals at signalized intersections. The Project also does not conflict with existing or planned pedestrian facilities. Thus, the impact of the Project on pedestrian facilities is **less-than-significant**.

Vehicle Miles Traveled (VMT)

Daily vehicle miles traveled (VMT) estimates were prepared for scenarios without the Project (No Project) and with the Project.

No Project Scenario VMT

Conditions without the Project reflect a scenario in which Permanente Quarry would not be available to accept soil from construction sites in San Francisco County, San Mateo County, and Santa Clara County. The *Suitable Surplus Soil Availability Study for Permanente Quarry* (Pinnacle Consulting 2019) found that as a result of diminishing capacity at reuse sites within the region, surplus construction soil would likely need to be

transported for reuse or disposal at sites in Marin, Solano, Contra Costa, San Joaquin, and San Benito Counties under conditions without the Project. Under these conditions, the No Project daily VMT estimate is 35,500.

Project Scenario VMT

The daily VMT estimate for the with-Project condition assumes that the same amount of soil from San Francisco, San Mateo, and Santa Clara Counties as under the No Project scenario would be transported to Permanente Quarry for use in reclamation. The with-Project daily VMT estimate is 11,760.

Net VMT Reduction

The Project would reduce regional VMT associated with the movement of surplus construction soil by an average of 23,740 vehicle miles each day by providing a location for the reuse of soil generated at construction sites in San Francisco, San Mateo, and Santa Clara Counties that is closer than alternative reuse or disposal sites.

1. INTRODUCTION

Lehigh Southwest Cement Company (Lehigh) operates the Permanente Quarry in unincorporated Santa Clara County near Cupertino, California. Lehigh proposes to amend the existing (2012) reclamation plan for the quarry. This report presents the results of a transportation impact analysis (TIA) conducted for the soil import component of the proposed reclamation plan amendment (Project). The TIA was conducted to evaluate the potential transportation impacts of the Project and to identify recommended mitigation to address potentially significant transportation impacts. This TIA provides information relevant to environmental review of the Project under the California Environmental Quality Act (CEQA) and was prepared in accordance with guidelines of the Santa Clara Valley Transportation Authority (VTA) (the congestion management agency for Santa Clara County), Santa Clara County, and the City of Cupertino.

This TIA concludes that the Project would contribute to an existing operational deficiency at one intersection in the study area – the unsignalized Interstate (I) 280 southbound ramps intersection with Foothill Boulevard. Signalization of this intersection would address the deficiency and is already identified in the County's 2040 Expressway Study. This TIA recommends mitigation that would result in Lehigh's contribution of funding for the installation of a traffic signal in an amount proportionate to the number of Project vehicle trips at the intersection. The Project would not result in any other significant adverse transportation-related impacts. The TIA and other studies conducted for the Project also find that the Project would reduce vehicle miles traveled associated with the transport of surplus construction soil by providing a local reuse option for surplus construction soil generated in the region.

Project Description

The Project site is located at the western end of Permanente Road, which is an extension of Stevens Creek Boulevard. The site location is shown on **Figure 1.**

The Project component evaluated in this TIA is the import of soil for use in reclamation of the site. Reclamation would require imports of up to approximately 1 million cubic yards of soil per year for up to approximately 30 years. Based on the *Suitable Surplus Soil Availability Study for Permanente Quarry* (Pinnacle Consulting 2019), it is estimated that the majority of the imported soil would come from construction sites in San Francisco,

San Mateo, and Santa Clara Counties. Other aspects of the proposed reclamation plan amendment and related entitlements would not result in changes to transportation characteristics associated with quarry operations and reclamation and are not addressed in this TIA.

The soil that would be received at Permanente Quarry would be generated at development construction sites or other projects that are unrelated to the Permanente Quarry. Therefore, traffic impacts associated with those projects due to their need to export surplus soil is not attributable to the proposed Project. Thus, this TIA does not evaluate local traffic impacts of soil movement in the areas near the future construction projects – attempting to do so would be speculative and would not provide further information regarding potential impacts of the proposed Project. Instead, this TIA appropriately considers potential traffic impacts associated with the regional transport of that soil on freeways and expressways and the local transport of that soil to Permanente Quarry.

Regulatory Agencies

This section describes the transportation regulatory agencies that are responsible for some or all aspects of the planning, implementation, operations, and maintenance of transportation facilities and services near the Project site, which include State, regional, and local agencies and their relevant programs and plans.

The County of Santa Clara has jurisdiction over streets in unincorporated areas and County expressways. The City of Cupertino has jurisdiction over all City streets and City-operated traffic signals. The California Department of Transportation (Caltrans) has jurisdiction over State facilities, including Interstate (I)-280 and State Route (SR) 85. Caltrans also has jurisdiction over on- and off-ramp intersections with local streets. The Santa Clara Valley Transportation Authority (VTA) provides transit service in Santa Clara County. It is also the Congestion Management Agency (CMA) for Santa Clara County and oversees improvements on the congestion management program (CMP) roadway system.

State Agencies

The State transportation agency, applicable plans, and applicable legislation are described in the following sections.

California Department of Transportation (Caltrans)

Caltrans has authority over the State highway system, including freeways, interchanges, and arterial routes. Caltrans operates and maintains State and interstate highways in Cupertino. The *Guide for the Preparation of Traffic Impact Studies* (Caltrans 2002) provides information that Caltrans uses to review impacts on State highway facilities, including freeway segments. However, VTA is responsible for monitoring operations on most Caltrans facilities within Santa Clara County because it is the Congestion Management Agency (CMA) for Santa Clara County.

Regional Agencies

This section describes regional transportation agencies and plans.

Metropolitan Transportation Commission

Metropolitan Transportation Commission (MTC) is the Bay Area's regional transportation planning agency and federally designated Metropolitan Planning Organization (MPO). MTC is responsible for preparing the Regional Transportation Plan (RTP), a comprehensive blueprint for the development of mass transit, highway, airport, seaport, railroad, bicycle, and pedestrian facilities. The RTP is a 20-year plan that is updated every three years to reflect new planning priorities and changing projections of future growth and travel demand. The long-range plan must be based on a realistic forecast of future revenues, and the transportation projects must help improve regional air quality. The MTC also screens requests from local agencies for State and federal grants for transportation projects to determine compatibility with the RTP.

Bay Area Air Quality Management District (BAAQMD)

BAAQMD is the regional agency with the authority to develop and enforce regulations for the control of air pollution throughout the Bay Area. The Clean Air Plan is BAAQMD's plan for reducing the emissions of air pollutants that combine to produce ozone. BAAQMD has published guidelines for evaluating the air quality impact of projects and plans. One criterion calls for plans, including general plans, to demonstrate reasonable efforts to implement the transportation control measures (TCMs) included in the Clean Air Plan that identify local governments as the implementing agencies. To address air pollution impacts of on-road motor vehicles, the California Clean Air Act requires air districts to adopt, implement, and enforce TCMs.

Association of Bay Area Governments (ABAG)

ABAG is a voluntary membership and advisory organization with limited statutory authority. It was created by local governments to meet their planning and research needs related to land use, environmental and water resource protection, disaster resilience, energy efficiency and hazardous waste mitigation, and to provide risk management, financial services, and staff training to local counties, cities and towns. ABAG frequently collaborates with regional agencies, such as MTC and BAAQMD, to address matters of regional concern, including but not limited to infrastructure planning, land use planning, and transportation planning.

Santa Clara County Agencies

This section describes Santa Clara County agencies with primary roles in transportation management.

Santa Clara Valley Transportation Authority (VTA)

VTA serves two roles in Santa Clara County—first, as the primary transit operator, and second, as the Congestion Management Agency (CMA). In its role as transit operator, VTA is responsible for development, operation, and maintenance of the bus and light-rail system within the County. VTA operates more than 70 bus lines and three light-rail lines, in addition to shuttle and paratransit service. It also provides transit service to major regional destinations and transfer centers in adjoining counties.

As the County's CMA, VTA is responsible for developing the County's comprehensive transportation improvement program among local jurisdictions that will improve multimodal transportation system performance, land use decision-making, and air quality. VTA is authorized to set State and federal funding priorities for transportation improvements that affect the Santa Clara Congestion Management Plan (CMP) transportation system. The CMP roadway network includes all freeways and expressways within Santa Clara County and 252 intersections throughout the County.

Transportation Impact Analysis Guidelines

VTA requires local jurisdictions to analyze impacts of new developments, or land use policy changes, on CMP facilities if they are expected to generate 100 or more new peak-hour trips. VTA developed the Transportation Impact Analysis Guidelines (March 2009), which was adopted by all cities and the County, to provide local jurisdictions with a

uniform program for evaluating the transportation impacts of land use decisions on the designated CMP system. VTA updated the Transportation Impact Analysis Guidelines in 2014. The VTA Board of Directors adopted these guidelines in October of 2014 and they are the basis of the TIA for this Project.

Valley Transportation Plan (VTP) 2040

As the CMA for Santa Clara County, VTA is responsible for the development of a long-range countywide transportation plan, called Valley Transportation Plan (VTP) 2040. VTP 2040 provides programs, projects, and policies for roadways, transit, Intelligent Transportation Systems (ITS) and Systems Operations Management, bicycle and pedestrian facilities, and land use and transportation integration. VTP 2040 projects serve as VTA's recommendations for the RTP known as the Plan Bay Area. VTP 2040 was adopted by the VTA Board of Directors in September of 2014.

Short-Range Transit Plan (SRTP)

VTA's Short-Range Transit Plan (SRTP) is a federally mandated planning document that describes the plans, programs, and goals of VTA's transit service. It has a 10-year planning horizon and is updated annually. It focuses on the characteristics and capital needs of the existing system and on committed (funded) expansion plans. The current plan includes keeping bus and light-rail service at existing levels, expanding community bus services (neighborhood-based circulator and feeder routes that travel within a limited area), continuing to contribute monetarily to Caltrain service, and replacing and expanding the bus vehicle fleet.

Santa Clara Countywide Bicycle Plan

The Santa Clara Countywide Bicycle Plan synthesizes other local and county plans into a comprehensive 20-year cross-County bicycle corridor network and expenditure plan. Near the Project area, the plan identifies Stevens Creek Boulevard (Foothill Boulevard to Tantau Avenue) as a Priority Cross-County Bicycle Corridor. Prioritization for funding of countywide bicycle facilities is documented in Valley Transportation Plan (VTP) 2040.

County of Santa Clara

Streets in unincorporated areas of Santa Clara County, as well as all County expressways, are maintained and operated by the Santa Clara County Roads and Airports Department. Santa Clara County's "Expressway Planning Study – 2008 Update" was adopted in March

2009. The planned expressway improvements were re-prioritized in 2016 for inclusion in the Measure B Expressway Improvement Program.

City of Cupertino (City)

The City has adopted several plans that provide guidance for managing the City's transportation system.

General Plan: Community Vision 2015-2040

The City's General Plan includes goals, policies, and strategies regarding land use and community design, transportation, housing, environmental resources, and municipal services to 2040. The Mobility Element of the General Plan establishes the link between land use and transportation with future growth focused along mixed-use corridors and in PDAs. Other key themes in the General Plan are: (a) improved regional coordination by participating in regional projects and infrastructure planning and pursuing funding for city projects, (b) enhanced connectivity for easy walking and bicycle access through streetscape and pathway improvements and supplemental transit services such a community shuttles, and (c) reduced demand by encouraging alternative modes of transportation. It also recognizes that under Senate Bill 743 of 2013 (SB 743), automobile level of service (LOS) will be replaced as a criterion for evaluating transportation impacts. However, it acknowledges that until impact thresholds are developed for Vehicle Miles Traveled (VMT) analysis, mobility for all modes will be optimized while striving to maintain current intersection LOS thresholds of LOS D during the AM and PM peak hours, with LOS E+ for three key intersections. (See Section Chapter 2 for additional discussion of amendments to the CEQA Guidelines resulting from SB 743.)

City of Cupertino 2016 Bicycle Transportation Plan

The City of Cupertino Bicycle Transportation Plan was adopted in June 2016 and includes an assessment of the bicycle environment in Cupertino by mapping existing bicycle facilities, bicycle-related collisions between 2009 and 2014, and bicycle network stress assessments. It also includes recommended improvements, including a Cupertino loop trail that includes a series of shared use paths that when joined together with low-stress on-street facilities support bicycle access around the City.

City of Cupertino Pedestrian Transportation Plan

The City of Cupertino Pedestrian Transportation Plan (PTP) was adopted in February 2018. The PTP is the blueprint for the city "to achieve its vision of an inviting, safe, and connected pedestrian network that enhances the quality of life for all community members and visitors." It is the culmination of a three-phase planning process. Phase 1 identified existing conditions and needs assessment, Phase 2 included the development of preliminary recommendations, and Phase 3 was development of the implementation strategy and final plan.

Study Area

The study area for this TIA includes the primary road segments and intersections that would be used by haul trucks transporting soil to Permanente Quarry. The study area includes Stevens Creek Boulevard between the Project site access and Foothill Boulevard, and Foothill Boulevard between Stevens Creek Boulevard and I-280, which are authorized truck routes. The study area also includes freeway segments between the Foothill Boulevard / I-280 interchange and areas within San Francisco, San Mateo, and Santa Clara Counties where various construction projects would generate soil that would be transported to Permanente Quarry for use in reclamation. The Project site location and study area freeway segments are shown on **Figure 1.** The surface street segments and four intersections in the study area are shown on **Figure 2.**

Study Intersections

Project impacts on study area transportation facilities were determined by measuring the effect Project traffic would have on intersection operations during the morning (7:00 to 10:00 am) and evening (4:00 to 7:00 pm) peak traffic periods. Study intersections were selected in accordance with VTA's *Transportation Impact Analysis Guidelines* (2014), which indicates that an intersection should be evaluated if a project contributes ten vehicle trips per lane during the morning or evening peak hour. A total of four intersections were identified as meeting these criteria and were selected as study locations. These intersections and the governing jurisdictions are included in **Table 1.**

Table 1: Study Intersections

	Intersection[1]	Jurisdiction
1	Foothill Expressway/I-280 Northbound Ramps	Santa Clara County
2	Foothill Boulevard/I-280 Southbound Ramps	Santa Clara County
3	Foothill Boulevard/Cristo Rey Drive	Los Altos
4	Foothill Boulevard/Stevens Creek Boulevard	Cupertino

Notes:
1. The listed intersections were selected based on VTA's ten-trip-per-lane guideline, which indicates that intersections should be included if the proposed project adds 10 or more peak hour vehicles per lane to any intersection movement.

Source: Fehr & Peers, 2019.

Freeway Segments

Pursuant to VTA guidelines, the impacts of the Project on freeway operations would be evaluated at locations where the amount of Project traffic is equal to or greater than 1% of the freeway segment's capacity. This criterion was also used to identify study freeway segments in San Mateo and San Francisco Counties. Since the Project trip generation would be limited to truck trips, only freeways that are designated truck routes were included in this evaluation. SR 85 south of I-280, although located close to the site, has special restrictions and therefore no Project trucks would use it. The Project would add less than 1% of the freeway segments' capacities and therefore a freeway segment analysis is not needed and was not conducted. The analysis used to develop this conclusion is presented in Chapter 5, *Existing with Project Conditions*.

Pedestrian, Bicycle, and Transit Facilities

The study area for potential Project impacts to pedestrian facilities, bicycle facilities, and transit services and facilities includes facilities along Stevens Creek Boulevard between the Project site access and Foothill Boulevard, and along Foothill Boulevard between Stevens Creek Boulevard and I-280.

Analysis Scenarios

Traffic operations of the study intersections were evaluated during the weekday morning (AM) and weekday evening (PM) peak hours for the following scenarios as presented in **Chapters 3, 5, 6, and 7**.

Scenario 1: Existing Conditions – Existing volumes obtained from counts.

Scenario 2: Existing with Project Conditions – Scenario 1 volumes plus vehicle trips generated by the Project.

Scenario 3: Background Conditions – Existing volumes obtained from counts with Permanente truck volumes reflecting typical site operations plus vehicle trips from approved developments in the area.

Scenario 4: Background with Project Conditions – Scenario 3 volumes plus vehicle trips generated by the Project.

Scenario 5: Cumulative Without Project Conditions – Background volumes plus regional growth to 2040 plus vehicle trips generated by approved and pending developments in the area.

Scenario 6: Cumulative with Project Conditions – Scenario 5 volumes plus vehicle trips generated by the Project.

Report Organization

The remainder of this report is divided into the following chapters:

- **Chapter 2 – Analysis Methods and Thresholds of Significance** presents the analysis methods, level of service standards, and thresholds of significance for each jurisdiction for intersections and for freeway segments, transit, bicycle, and pedestrian facilities.
- **Chapter 3 – Existing Conditions** describes the transportation system near the Project site, including the surrounding roadway network, morning and evening peak hour intersection turning movement volumes, existing bicycle, pedestrian, and transit facilities, intersection levels of service, and freeway segment levels of service.
- **Chapter 4 – Project Traffic Estimates** describes the Project trip generation, distribution and assignment process. It also includes an analysis showing that the Project vehicle trips do not meet the threshold for a freeway segment analysis.
- **Chapter 5 – Existing with Project Conditions** presents intersection operations with Project vehicle trips added to existing volumes.
- **Chapter 6 – Background Conditions** presents the traffic forecasts and intersection operations with and without the Project under Background Conditions. ("Background" is analogous with the "Baseline".)
- **Chapter 7 – Cumulative Conditions** presents the traffic forecasts and intersection operations with and without the Project under Cumulative Conditions.
- **Chapter 8 – Impacts and Mitigation Measures** presents the Project-level and Cumulative impacts and recommended mitigation measures.
- **Chapter 9 – Vehicle Miles Traveled (VMT)** presents projected vehicle miles traveled associated with regional surplus construction soil transport for conditions with the Project and for conditions if the soil is transported to other locations.
- **Chapter 10 – Traffic Indices** presents a discussion regarding traffic indices (a measurement of road surface conditions and durability) for study area road segments.

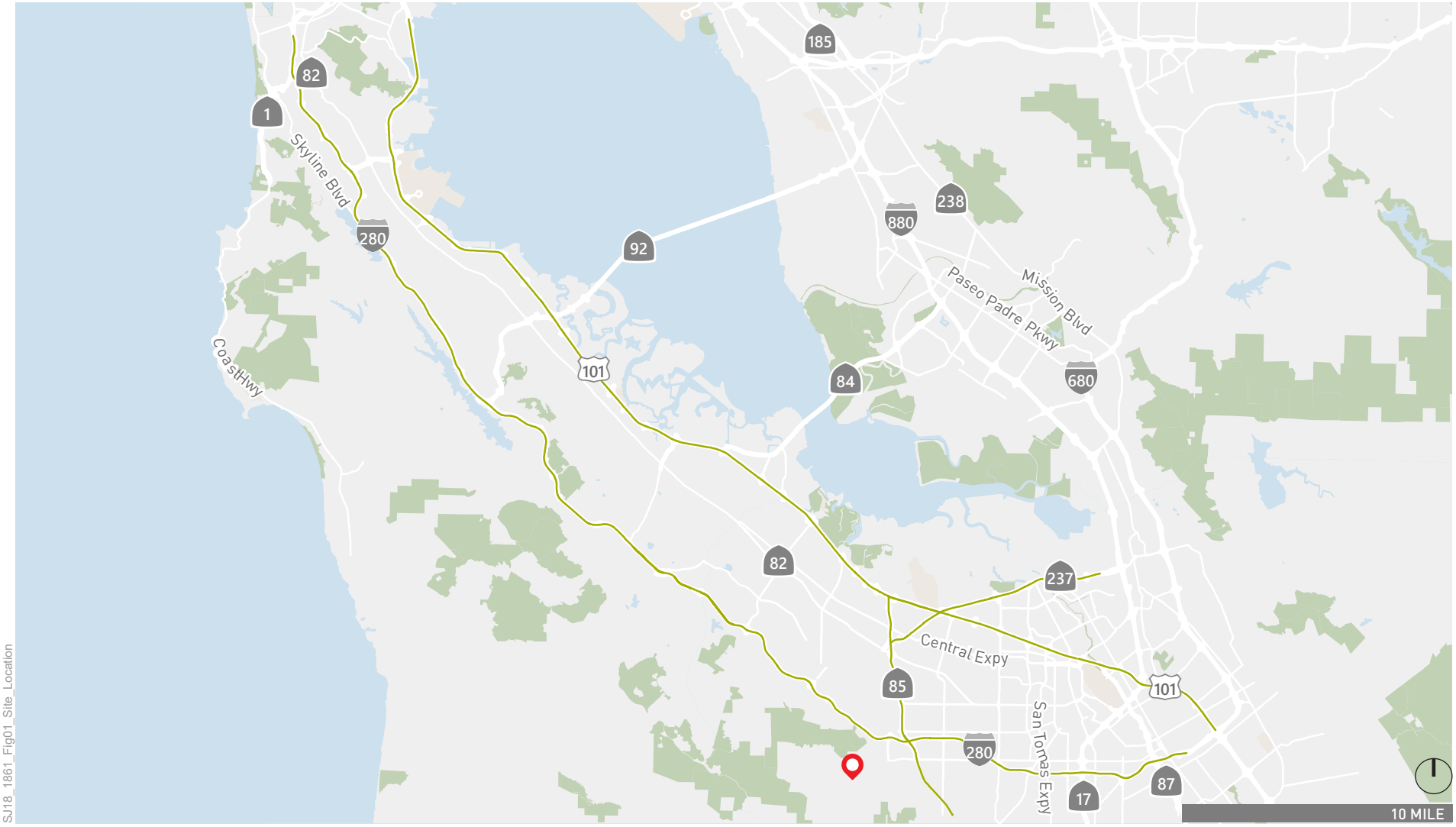
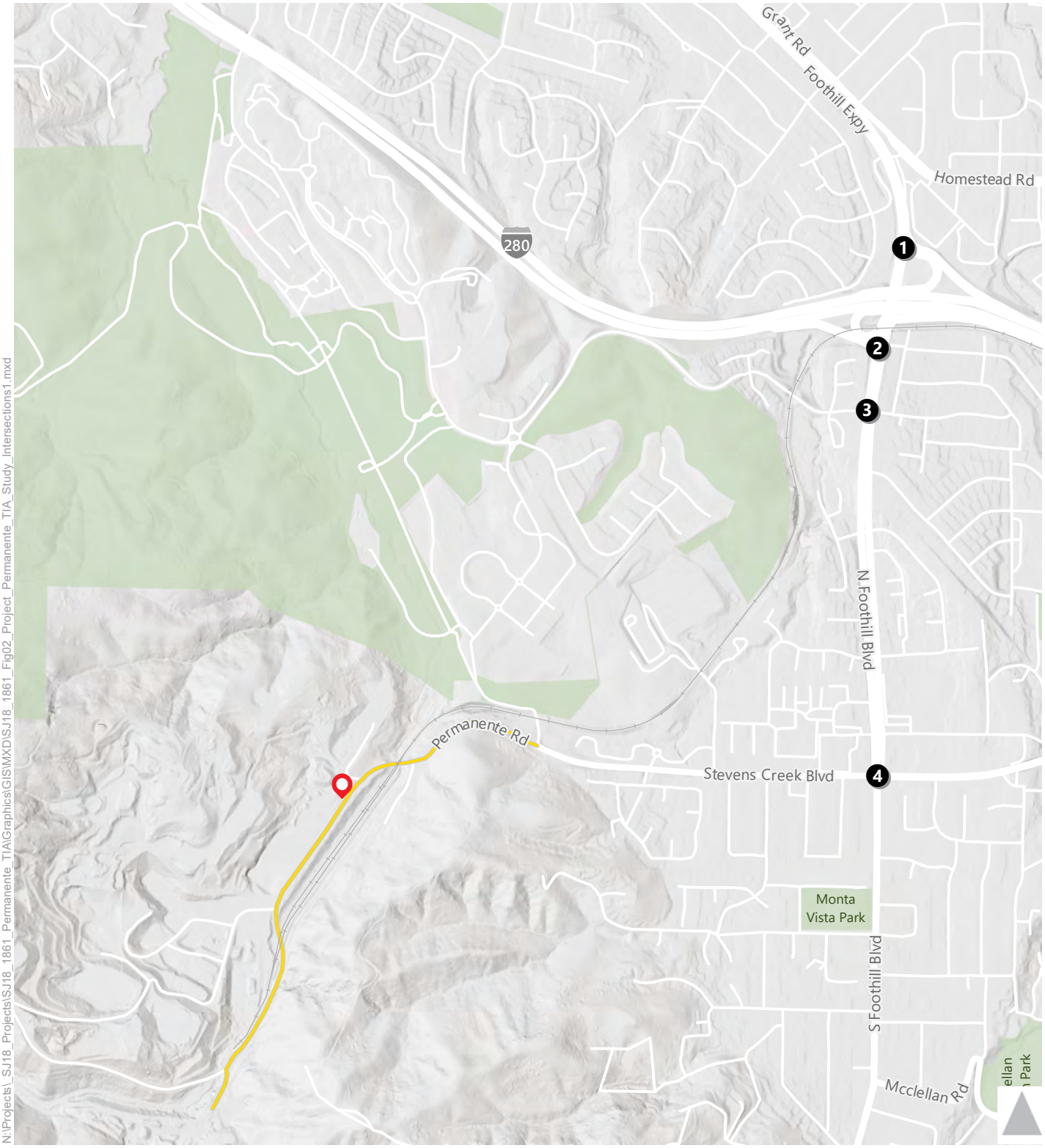


Figure 1

Site Location



Study Intersections

Project Site

Figure 2

Study Intersections

2. ANALYSIS METHODS AND THRESHOLDS OF SIGNIFICANCE

This chapter describes the analysis methods used to evaluate potential transportation impacts for vehicle, bicycle, pedestrian, and transit facilities.

Level of Service and Vehicle Miles Traveled

The operations of roadway facilities have traditionally been described with the term *level of service*. Level of Service (LOS) describes traffic flow from the driver's perspective based on factors such as speed, travel time, delay, and freedom to maneuver. There are six levels from LOS A, with little or no delay, to LOS F, with excessive delay. LOS E represents "at-capacity" operations. When traffic volumes exceed the capacity, stop-and-go conditions result, and operations are designated as LOS F.

Senate Bill (SB) 743 was adopted in 2013 and directed that the CEQA Guidelines be amended to require that CEQA lead agencies use vehicle mile traveled (VMT) instead of LOS for evaluating transportation impacts under CEQA. The CEQA Guideline amendments incorporating the requirements of SB 743 were adopted in December 2018. In accordance with the adopted CEQA Guideline amendments, lead agencies may elect to be governed by the new provisions immediately, and the provisions apply statewide on July 1, 2020.

VTA is expected to develop a VMT estimation methodology for local agency consideration by mid-2019. Because VTA has not yet developed the methodology and Santa Clara County has not yet adopted VMT thresholds, the approach to the analysis of motorized vehicle transportation impacts uses both the traditional intersection level of service approach and an analysis of VMT. This approach provides for full disclosure of the Project's potential traffic impacts.

Level of Service Analysis Methods

This section describes the intersection and freeway segment level of service (LOS) analysis methods for this TIA.

Signalized Intersections

The method described in Chapter 16 of the 2000 *Highway Capacity Manual* (HCM) (Special Report 209, Transportation Research Board) was used to prepare the LOS calculations for the three signalized study intersections. This method, which is adopted by the City of Cupertino (General Plan Policy M-7.1), City of Los Altos, Santa Clara County, and the VTA, analyzes intersection operations based on average control delay per vehicle. Control delay includes the initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay is calculated using TRAFFIX analysis software and is correlated to a LOS designation as shown in **Table 2.**

Table 2: Signalized Intersection Level of Service Definitions

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	≤ 10.0
B+ B B-	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 12.0 12.1 to 18.0 18.1 to 20.0
C+ C C-	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 23.0 23.1 to 32.0 32.1 to 35.0
D+ D D-	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, and high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 39.0 39.1 to 51.0 51.1 to 55.0
E+ E E-	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	55.1 to 60.0 60.1 to 75.0 75.1 to 80.0
F	Operations with delays unacceptable to most drivers occurring due to over-saturation, poor progression, or very long cycle lengths.	> 80.0

Source: *Traffic Level of Service Analysis Guidelines*, October 2014; VTA Congestion Management Program, June 2003; *Highway Capacity Manual*, Transportation Research Board, 2000.

Unsignalized Intersections

The operation of the one unsignalized study intersection was evaluated using the method contained in Chapter 17 of the *2000 HCM*. LOS ratings for stop-sign-controlled intersections are based on the average control delay expressed in seconds per vehicle. **Table 3** summarizes the relationship between delay and LOS for unsignalized intersections.

Table 3: Unsignalized Intersection Level of Service Definitions

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Little or no delay.	≤ 10.0
B	Short traffic delay.	10.1 to 15.0
C	Average traffic delays.	15.1 to 25.0
D	Long traffic delays.	25.1 to 35.0
E	Very long traffic delays.	35.1 to 50.0
F	Extreme traffic delays with intersection capacity exceeded.	> 50.0

Sources: *Traffic Level of Service Analysis Guidelines*, VTA Congestion Management Program, June 2003; *Highway Capacity Manual*, Transportation Research Board, 2000.

Freeway Segments

The operations of freeway segments within Santa Clara County are evaluated using the VTA analysis procedure, which is based on the density of the traffic flow using methods described in the 2000 HCM. Density is expressed in passenger cars per mile per lane. The Congestion Management Program ranges of densities for freeway segment levels of service are shown in **Table 4.**

Table 4: Level of Service Definitions for Freeway Segments in Santa Clara County

Level of Service	Description	Density (passenger cars per mile per lane)
A	Free Flow	≤ 11
B	Reasonably Free Flow	11.1 to 18.0
C	Stable Flow	18.1 to 26.0
D	Unstable Flow	26.1 to 46.0
E	Capacity Flow	46.1 to 58.0
F	Forced Flow	> 58.0

Sources: *Traffic Level of Service Analysis Guidelines*, VTA Congestion Management Program, June 2003; *Highway Capacity Manual*, Transportation Research Board, 2000.

Level of Service Standards

Level of service standards for acceptable operations for intersections and freeway segments are set by the jurisdiction that controls that portion of the transportation infrastructure. In Santa Clara County, the County and each city sets the thresholds for the transportation facilities within their jurisdictions through their adopted General Plan policies, and VTA sets thresholds for CMP-designated facilities, including freeway segments and select intersections, through its CMP. The following LOS standards were applied to the study intersections and freeway segments.

Signalized Intersection LOS Standards

Signalized intersection operations and impacts were evaluated based on the applicable jurisdiction's LOS standards as summarized in **Table 5.**

Table 5: Signalized Intersection LOS Standards

Local Jurisdiction	LOS Minimum Standard
City of Cupertino[1]	LOS D, except at the Stevens Creek Boulevard/De Anza Boulevard, Stevens Creek Boulevard/Stelling Road, and the De Anza Boulevard/Bollinger Road intersections (LOS E+ threshold)
City of Los Altos[2]	LOS D
Santa Clara County[3]	LOS E for expressway intersections, otherwise LOS D

Notes:
1. City of Cupertino General Plan, 2015.
2. City of Los Altos General Plan, 2002.
3. Santa Clara County General Plan, 1984.

Source: Fehr & Peers, 2019.

Unsignalized Intersection LOS Standard

The County does not have an adopted LOS policy for unsignalized intersections. However, based on its threshold of LOS D for signalized non-expressway intersections, LOS D is also used in this study as the threshold for the unsignalized intersection. The evaluation of the need for improvements at this intersection is based the peak hour traffic signal warrant

analyses pursuant to the *California Manual on Uniform Traffic Control Devices* (CA MUTCD).[1]

Warrant 3 – Peak hour vehicle volume

This warrant determines if the minor street traffic suffers undue delay when entering or crossing the major street for a minimum of one hour of an average day. This is based on the major street left-turn volume, the higher-volume minor-street approach volume, and calculated delay for vehicles on the higher-volume minor-street approach.

Freeway Segment LOS Standard

Based on the Congestion Management Program (CMP) for Santa Clara County, the LOS standard for freeway segments in Santa Clara County is LOS E.

Thresholds of Significance

The criteria for evaluating the significance of a project's environmental impacts are based on the CEQA Guidelines and applicable standards recognized by Santa Clara County and other applicable jurisdictions. According to Appendix G of the CEQA Guidelines (as amended in December 2018), transportation impacts are considered significant if a proposed project would:

- Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities;
- Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)[2];

[1] Signal warrant analysis is intended to examine the general correlation between the planned level of future development and the need to install new traffic signals. It estimates future development-generated traffic compared to a sub-set of the standard traffic signal warrants recommended in the 2014 California *Manual on Uniform Traffic Control Devices* (CA *MUTCD*) guidelines. While satisfying one or more of these warrants could justify the installation of a signal at an intersection, this analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated by an experienced engineer based on field-measured rather than forecast traffic data and a thorough study of traffic and roadway conditions. Furthermore, the decision to install a signal should not be based solely upon the warrants, since the installation of signals may lead to certain types of collisions.

- Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or
- Result in inadequate emergency access.

Intersection Impact Criteria

Based on the guidelines and thresholds used by Santa Clara County and other applicable jurisdictions, the following significance criteria were used to evaluate project-level and cumulative intersection impacts of the Project.

Signalized Intersections

Signalized intersection operations and impacts were evaluated based on the applicable jurisdiction's LOS standards as summarized in Table 5 and are included in the impact criteria discussion below.

Santa Clara County

The LOS standard for Santa Clara County expressway intersections is LOS E. Traffic impacts at County expressway intersections would be considered significant if the addition of vehicle trips associated with the Project would cause:

- Intersection operations to deteriorate from an acceptable level (LOS E or better) to an unacceptable level (LOS F); or
- An exacerbation of unacceptable operations by increasing the average critical delay by four seconds or more and increasing the critical volume-to-capacity (V/C) ratio by 0.01 or more at an intersection operating at LOS F; or
- An increase in the V/C ratio by 0.01 or more at an intersection with unacceptable operations (LOS F) when the change in critical delay is negative (i.e., decreases). This can occur if the critical movements change.

[2] This criterion replaces the traditional use of level of service with VMT, as discussed previously in this TIA. Santa Clara County has not yet adopted VMT significance criteria or thresholds so specific thresholds for VMT are not applied in this analysis. However, this TIA does provide estimated VMT under with and without Project scenarios.

City of Cupertino and Los Altos

Significant impacts at the signalized Cupertino and Los Altos intersections would occur if the addition of Project vehicle trips would cause one of the following:

- Intersection operations to deteriorate from an acceptable level (LOS D or better) to an unacceptable level (LOS E or F); or
- An exacerbation of unacceptable operations by increasing the average critical delay by four seconds or more and increasing the critical volume-to-capacity (V/C) ratio by 0.01 or more at an intersection operating at LOS E or F; or
- An increase in the V/C ratio by 0.01 or more at an intersection with unacceptable operations (LOS E or F) when the change in critical delay is negative (i.e., decreases). This can occur if the critical movements change.

Unsignalized Intersections

Significant impacts at the unsignalized County intersections would occur if the addition of vehicle trips associated with the Project would cause:

- Operations of the critical movement to deteriorate from an acceptable level (LOS D or better) to an unacceptable level (LOS E or F) or cause a substantial increase in delay at an intersection operating at an unacceptable level; and
- Traffic volumes to meet one or more warrants for traffic signal installation.

Mitigation

For all jurisdictions, a significant impact is mitigated to a less-than-significant level when measures are implemented that would either:

- Achieve acceptable LOS in accordance with the jurisdiction's LOS standard, or
- Achieve an average delay that is equal to or less than the delay under conditions without the Project.

Transit Impact Criteria

VTA's TIA Guidelines require that project effects on the transit system, in terms of transit facilities, transit vehicle delay[3], and pedestrian and bicyclist access be evaluated. Transit impacts are considered significant if a project:

- Conflicts with existing or planned transit facilities, or
- Does not provide adequate facilities for pedestrians and bicyclists to access transit routes and stops, or
- Generates potential transit trips that cause the transit route's load factor to exceed available capacity.

The potential for the Project to result in transit impacts is discussed in **Chapter 8.**

Pedestrian and Bicycle Impact Criteria

Significant impacts to these facilities would occur if the Project would:

- Disrupt or eliminate existing pedestrian and bicycle facilities, or
- Create a hazardous condition that currently does not exist for pedestrians or bicyclists, or otherwise interfere with bicycle and pedestrian accessibility to adjoining areas; or
- Increase conflicts between drivers, pedestrians, and/or bicyclists, or
- Conflict with a planned pedestrian or bicycle facility; or
- Conflict with policies related to bicycle and pedestrian activity adopted by the local jurisdictions.

The potential for the Project to result in impacts associated with pedestrian and bicycle transportation is discussed in **Chapter 8.**

[3] Santa Clara County and the VTA do not have adopted standards related to transit corridor performance associated with congestion resulting from new development projects. Pursuant to the VTA TIA Guidelines, i*f increased transit vehicle delay is found, the Lead Agency should work with VTA to identify feasible transit priority measures near the affected facility and include contributions to any applicable projects that improve transit speed and reliability in the TIA.*

3. EXISTING CONDITIONS

This chapter describes the existing transportation conditions, including the nearby transportation facilities - the roadway network, transit service, and pedestrian and bicycle facilities. It also describes existing operations of the study intersections with the results of the level of service calculations. Planned transportation facilities that will increase mobility near the site are also described.

Roadway Network

Interstate 280 (I-280) provides regional vehicle access to surface streets used for local access to the Project site. Project-related vehicle trips (i.e., surplus construction soil haul trucks) would also use SR 85 (north of I-280) and US 101. Foothill Boulevard and Stevens Creek Boulevard provide local access to the Project site. Figure 1 and Figure 2 show the locations of these roadway facilities in relation to the Project site.

I-280 is located north of the Project site and provides regional freeway access between the cities of San Francisco and San José. Near the Project site, I-280 has three mixed-flow lanes and one high occupancy vehicle (HOV) lane in each direction. HOV lanes, also known as diamond or carpool lanes, restrict use to vehicles with two or more persons (carpool, vanpool, and buses), motorcycles, and clean-air vehicles during the morning (5:00 am to 9:00 am) and evening (3:00 pm to 7:00 pm) commute periods on weekdays. Access to/from I-280 is provided via its interchange with Foothill Boulevard.

SR 85 connects I-280 to US 101 both to the north and to the south. Truck traffic is restricted on the portion south of I-280. The portion between I-280 and US 101 to the north has two mixed-flow lanes and one HOV lane in each direction.

US 101 is located north of the project and provides freeway access between the cities of San Francisco, San José, and continues far south ending in Los Angeles. Near the project site, US 101 has three mixed-flow lanes and one HOV lane in each direction. Access to/from US 101 is provided via SR 85 and SR 237.

Stevens Creek Boulevard is an east-west roadway that extends between western Cupertino and downtown San José (as West San Carlos Street). The section between the Project site and Foothill Boulevard has one travel lane in each direction. The segments

between the west city limits and Foothill Boulevard and between SR 85 and the east city limits are designated truck routes per the City of Cupertino's Municipal Code.

Foothill Boulevard is located east of the Project site and serves as a connecting road for vehicles traveling between the Project site and I-280. The roadway is a four-lane, divided arterial with a raised median, sidewalks along both sides of the roadway, and a Class II bicycle lane along both sides of the roadway. Under the City's Municipal Code, the roadway is a designated truck route.

Planned Roadway Facilities

As the Congestion Management Agency for Santa Clara County, VTA, regularly updates its 25-year long-range regional transportation plan which outlines transportation strategies and projects. The latest plan, VTA's *Valley Transportation Plan 2040,* includes two highway improvement projects located near the Project site and relevant to the Project:

- H47 – Second exit lane to Foothill Expressway from northbound I-280
- H73 - I-280 northbound braided ramps between SR 85 and Foothill Expressway

In 2016, Santa Clara County voters approved Measure B which provides for a 30-year, half-cent countywide sales tax to enhance transit, highways, expressways and active transportation (e.g., bicycle and pedestrian) facilities. Collection of the tax began on April 1, 2017. Similar projects to those listed above were identified in the Measure B language, which will provide funding for road improvement projects including:

- SR 85/I-280 Area Improvements in Cupertino, Los Altos, and Sunnyvale to address regional connectivity through a northbound I-280 braided ramp between SR 85 and Foothill Expressway and improvements at the northbound I-280 off-ramp to Foothill Expressway
- I-280/Foothill Expressway Interchange Modifications and Auxiliary Lane to Homestead

The following road improvement projects are also identified in the list of Santa Clara County Measure B Expressway Improvement Program projects:

- Signalizing the southbound I-280 off-ramp intersection with Foothill Boulevard

- Adding improvements to the intersection of the I-280 northbound ramps and Foothill Expressway

A conceptual design of these improvements is included in **Appendix A**.

Roadway Operations

The existing operations of the study intersections and freeway segments were evaluated for the highest one-hour traffic volume during the weekday morning (7:00 am to 10:00 am) and evening (4:00 pm to 7:00 pm) peak (commute) periods.

Intersection Operations

Existing Intersection Volumes and Lane Configurations

AM and PM three-hour peak-period intersection turning movement counts were conducted on Tuesday, January 23, 2019, and the results are included in **Appendix B.** This day was selected due to its fair weather and area schools being in session. (The previous weeks were rainy.) The AM and PM peak hour volumes, representing the highest one-hour traffic volumes during each of the peak periods, were compared to the results of other counts at the intersections and it was determined that traffic conditions on the day of the counts were typical. **Figure 3** presents the existing AM and PM peak-hour turning movement volumes, lane configurations, and traffic control devices at the study intersections.

Existing Intersection Levels of Service

Existing intersection lane configurations, signal timings, and peak-hour turning movement volumes were used to calculate the levels of service for the study intersections during the AM and PM peak hours. Trucks were accounted for in the LOS calculations with heavy vehicle percentages obtained from the counts applied to each movement. The results of the LOS analysis are presented in Table 6**. Appendix C** contains the corresponding calculation sheets.

Table 6: Existing Intersection Levels of Service

#	Intersection	Jurisdiction (LOS Threshold)[1]	Peak Hour[2]	Count Date	Delay[3]	LOS[4]
1	Foothill Expressway/I-280 Northbound Ramps	Santa Clara County (E)	AM PM	1/23/2019	23.7 24.9	C C
2	Foothill Boulevard/I-280 Southbound Ramps	Santa Clara County (D)	AM PM	1/23/2019	**48.0** **133.8**	**E** **F**
3	Foothill Boulevard/Cristo Rey Drive	Los Altos (D)	AM PM	1/23/2019	33.8 23.2	C- C
4	Stevens Creek Boulevard/Foothill Boulevard	Cupertino (D)	AM PM	1/23/2019	35.8 21.9	D+ C+

Notes: **Bold text** indicates intersection operates at unacceptable level of service.

1. Intersection jurisdiction and associated LOS threshold applied.
2. AM = morning peak hour, PM = evening peak hour.
3. Whole intersection weighted average control delay expressed in seconds per vehicle calculated using methods described in the 2000 *Highway Capacity Manual*, with adjusted saturation flow rates to reflect Santa Clara County Conditions for signalized intersections. For side-street stop-controlled intersections, delay and LOS are reported for the worst-case approach.
4. LOS = Level of Service. LOS calculations conducted using the TRAFFIX analysis software packages, which apply the methods described in the 2000 *Highway Capacity Manual*.

Source: Fehr & Peers, 2019.

The three signalized intersections (#s 1, 3 and 4 in Table 6) currently operate at acceptable levels of service during both the AM and PM peak hours. The left-turn movement on the eastbound (off-ramp) approach at the intersection of Foothill Boulevard and I-280 southbound ramps (#2 in Table 6) is controlled with a stop sign. This movement is currently operating at LOS E and F for the AM and PM peak hours, respectively. These are unacceptable levels.

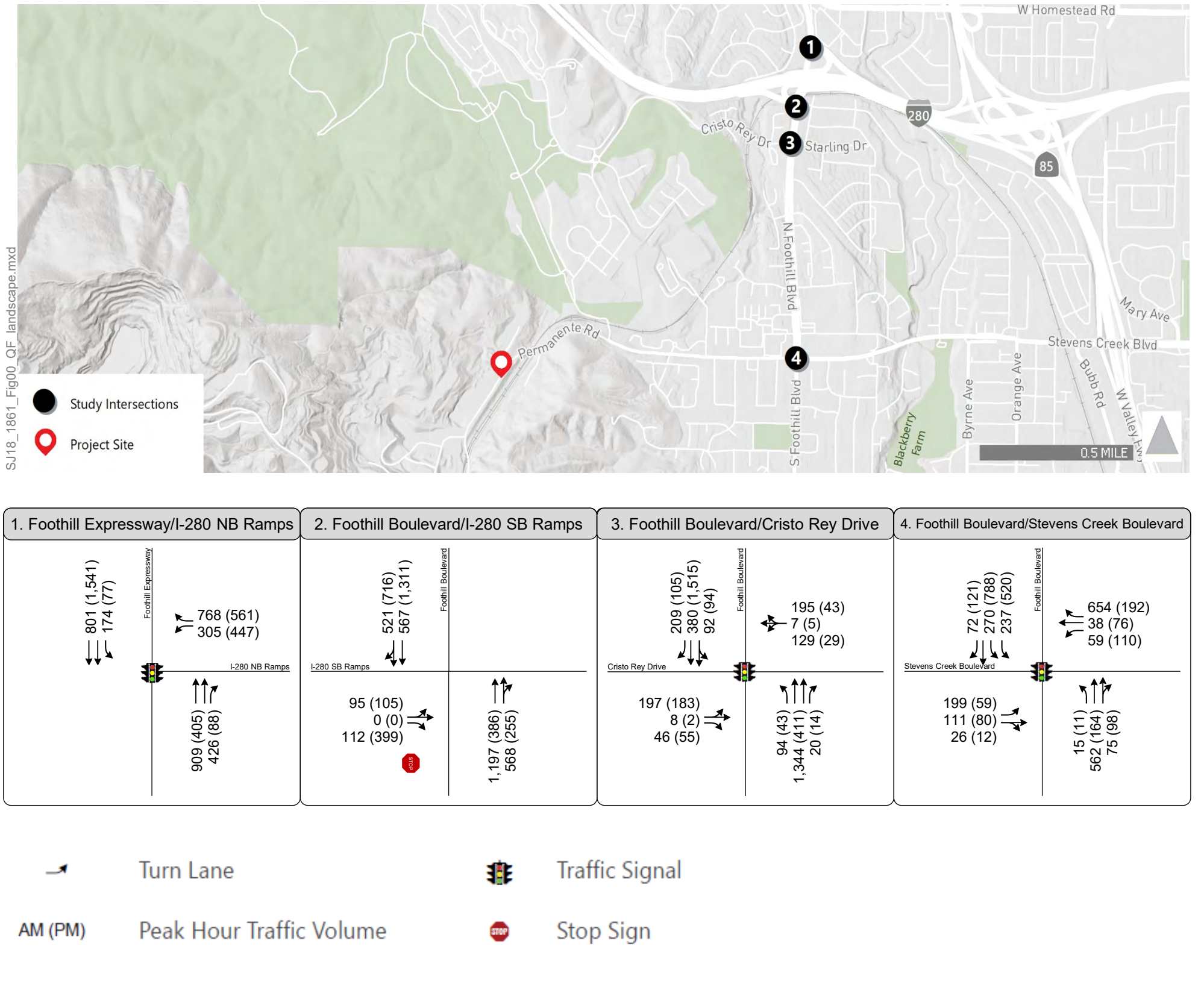


Figure 3

Existing Peak-Hour Intersection Turning Movement Volumes, Lane Configurations, and Traffic Control Devices

Freeway Segments

The existing operations of the freeway segments near the site were obtained from *2016 Annual Monitoring and Conformance Report*, VTA. During the AM peak hour, northbound SR 85 between I-280 and SR 237 and northbound I-280 from US 101 to Foothill Expressway operate at LOS F. The southbound directions on these segments and both directions of I-280 north of Foothill Expressway operate at LOS D or better. During the PM peak hour, southbound I-280 between Page Mill Road and Magdalena Avenue, SR 85 and Wolfe Road, Lawrence Expressway and Winchester Boulevard, and Bascom Avenue and 10th Street operate at LOS F. Northbound I-280 operates at LOS D or better. Southbound SR 85 between US 101 and Homestead Road operates at LOS F while northbound operates at LOS D or better.

Freight Rail Service

The Project site is at the western terminus of a freight rail spur. Freight rail is not a component of the Project nor will it be affected by the Project.

Transit Service

Transit service in the Project site vicinity is provided by the Santa Clara Valley Transportation Authority (VTA). In 2017 VTA finalized its redesign of its transit network which strives for a better balance between service frequency and coverage in VTA's service area. It is scheduled to be implemented in Fall of 2019 when Bay Area Rapid Transit (BART) is extended to the Berryessa Station in San José. Bus stops are located on Stevens Creek Boulevard east of Foothill Boulevard, and on Foothill Boulevard north of Stevens Creek Boulevard. The closest bus stop is located approximately one mile from Project site. The bus route that serves the area is described below and summarized in **Table 7.**

Bus Route 51 operates on Stevens Creek Boulevard and Foothill Boulevard, and provides service between West Valley Transit Center and Moffett Field/Ames Center. Route 51 serves bus stops at the intersection of Stevens Creek Boulevard and Foothill Boulevard.

Figure 4 shows the routing of Bus Route 51 (and other bus routes in the area) and the locations of the bus stops.

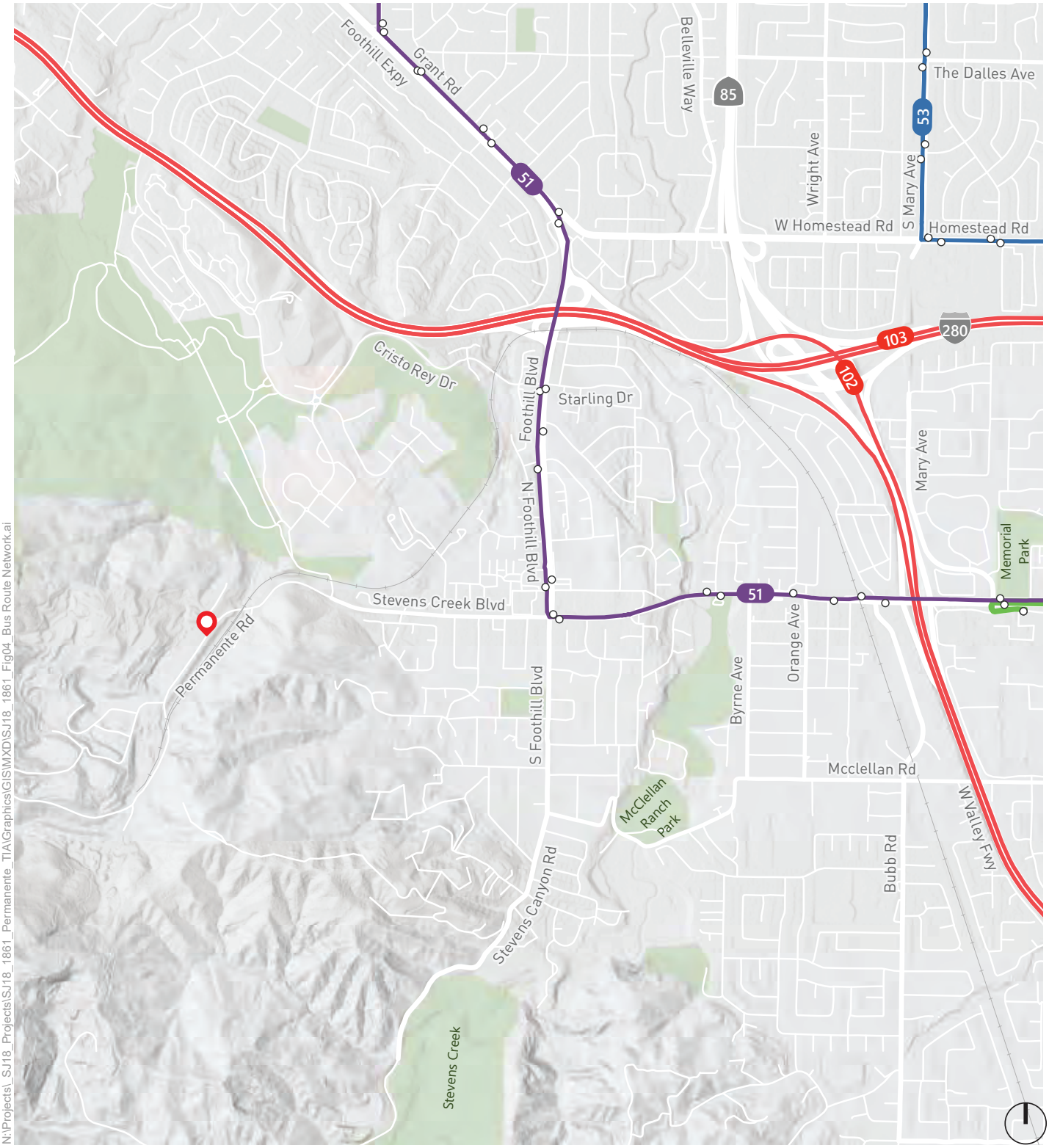
Table 7: Nearby Transit Service

Route	From	To	Distance to Nearest Stop[1]	Weekdays		Saturdays	
				Operating Hours[5]	Peak Headway[3] (minutes)	Operating Hours	Peak Headway[3] (minutes)
Bus Service (VTA)							
51	West Valley Transit Center	Moffett Field/Ames Center	1.0	6:30a – 6:30p	30	n/a	n/a

Notes:

1. Approximate distance in miles from nearest stop to Permanente Quarry entrance gate.
2. Headways are defined as the time interval between two transit vehicles traveling in the same direction over the same route.

Source: VTA, November 2018.



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Source: Santa Clara Valley Transportation Authority (VTA)

Project Site

Route Frequency

- 15 minutes
- 30 minutes
- > 30 minutes
- Express

Bus Stop

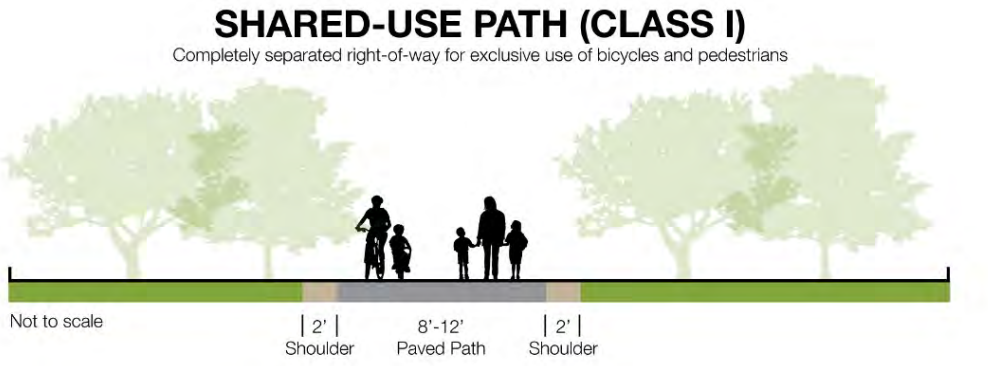
Figure 4

Bus Route Network

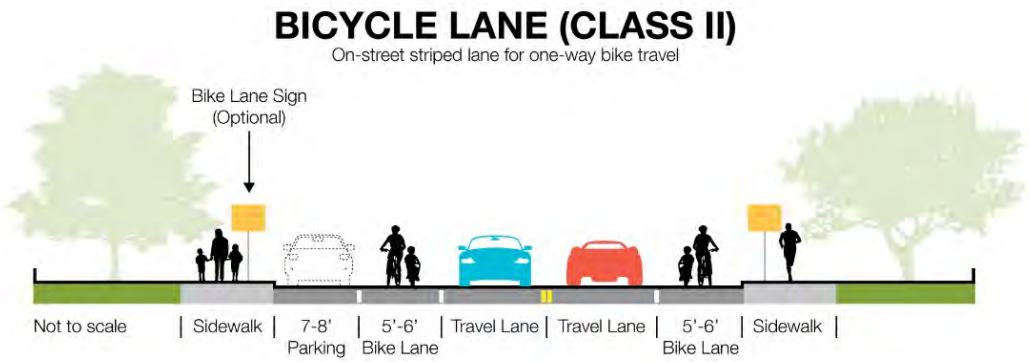
Bicycle Facilities

There are four types of bicycle facilities according to the design standards established by California Department of Transportation (Caltrans) in the *Highway Design Manual* (Chapter 1000: Bikeway Planning and Design). They are described below and shown in the accompanying illustrations:

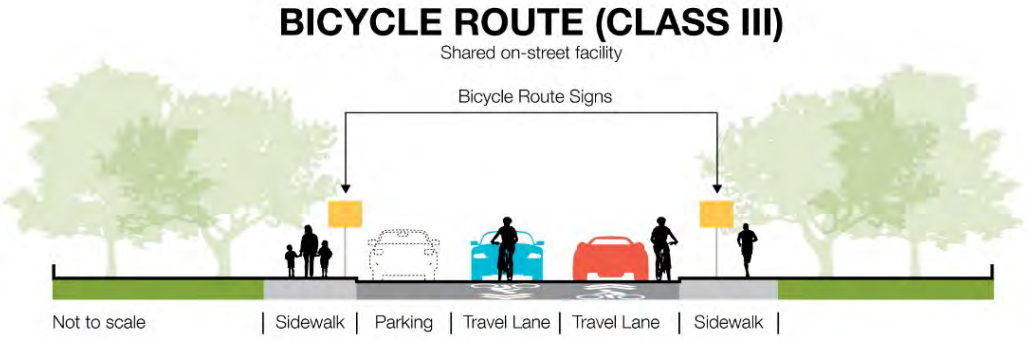
- **Class I Bikeway (Bike Path)** provides a completely separate right-of-way and is designated for the exclusive use of bicycles and pedestrians with vehicle and pedestrian cross-flow minimized. In general, bike paths serve corridors not served by streets and highways or where sufficient right-of-way exists to allow such facilities to be constructed away from the influence of parallel streets and numerous vehicle conflicts.



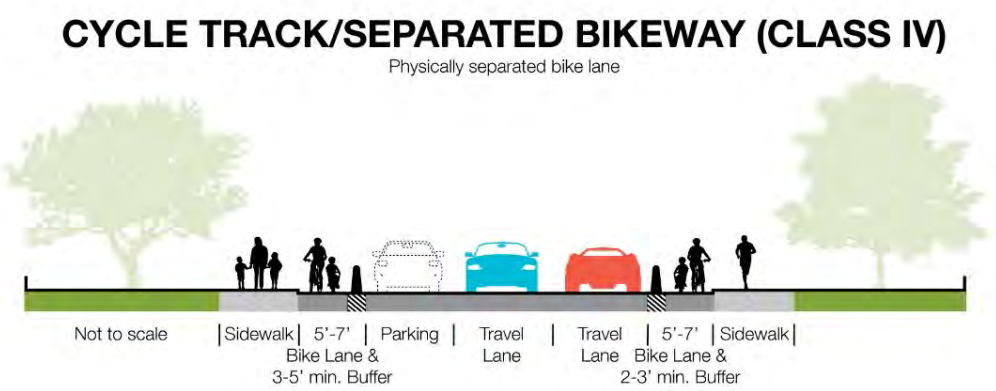
- **Class II Bikeways (Bike Lanes)** are lanes for bicyclists adjacent to the outer vehicle travel lanes. These lanes have special lane markings, pavement legends, and signage. Bicycle lanes are generally five (5) feet wide. Adjacent vehicle parking and vehicle/pedestrian cross-flow are permitted. For instance, right-turning vehicles must merge into the lane before turning.



- **Class IIIa Bikeways (Bike Routes)** are designated by signs or pavement markings for shared use with pedestrians or motor vehicles, but have no separated right-of-way or lane striping. Bike routes serve either to: a) provide continuity to other bicycle facilities, or b) designate preferred routes through high demand corridors.
- **Class IIIb Bikeways (Bike Boulevards)** are a modified Class IIIa bicycle route providing a more convenient and efficient through route for cyclists of all skill levels. A bike boulevard includes signage, pavement markings, traffic calming, and in some cases midblock closures to vehicles.



- **Class IV Bikeways (cycle tracks or "separated" bike lanes)** provide a right-of-way designated exclusively for bicycle travel within a roadway and are protected from other vehicle traffic with devices, including, but not limited to, grade separation, flexible posts, inflexible physical barriers, or parked cars.



The *VTA Bicycle Technical Guidelines* (revisions dated December 2012) recommends that Caltrans standards regarding bicycle facility dimensions be used as a minimum and provides supplemental information and guidance on when and how to better accommodate the many types of bicyclists in Santa Clara County.

Study Area Bicycle Facilities

Figure 5 shows the location of the existing (and planned) bicycle facilities within the Project study area.

Shared-Use Paths (Class I) include:

- Stevens Creek Trail
- Hammond Snyder Loop Trail

Bicycle lanes (Class II) are provided on:

- Portions of Stevens Creek Boulevard
- Foothill Boulevard
- Portions of Bubb Road
- McClellan Road east of Byrne Avenue
- Stevens Canyon Road

Buffered bike lanes (Class IV with painted buffers) are provided on:

- Portions of Stevens Creek Boulevard
- Portions of Bubb Road

Class III Bike Routes are provided on:

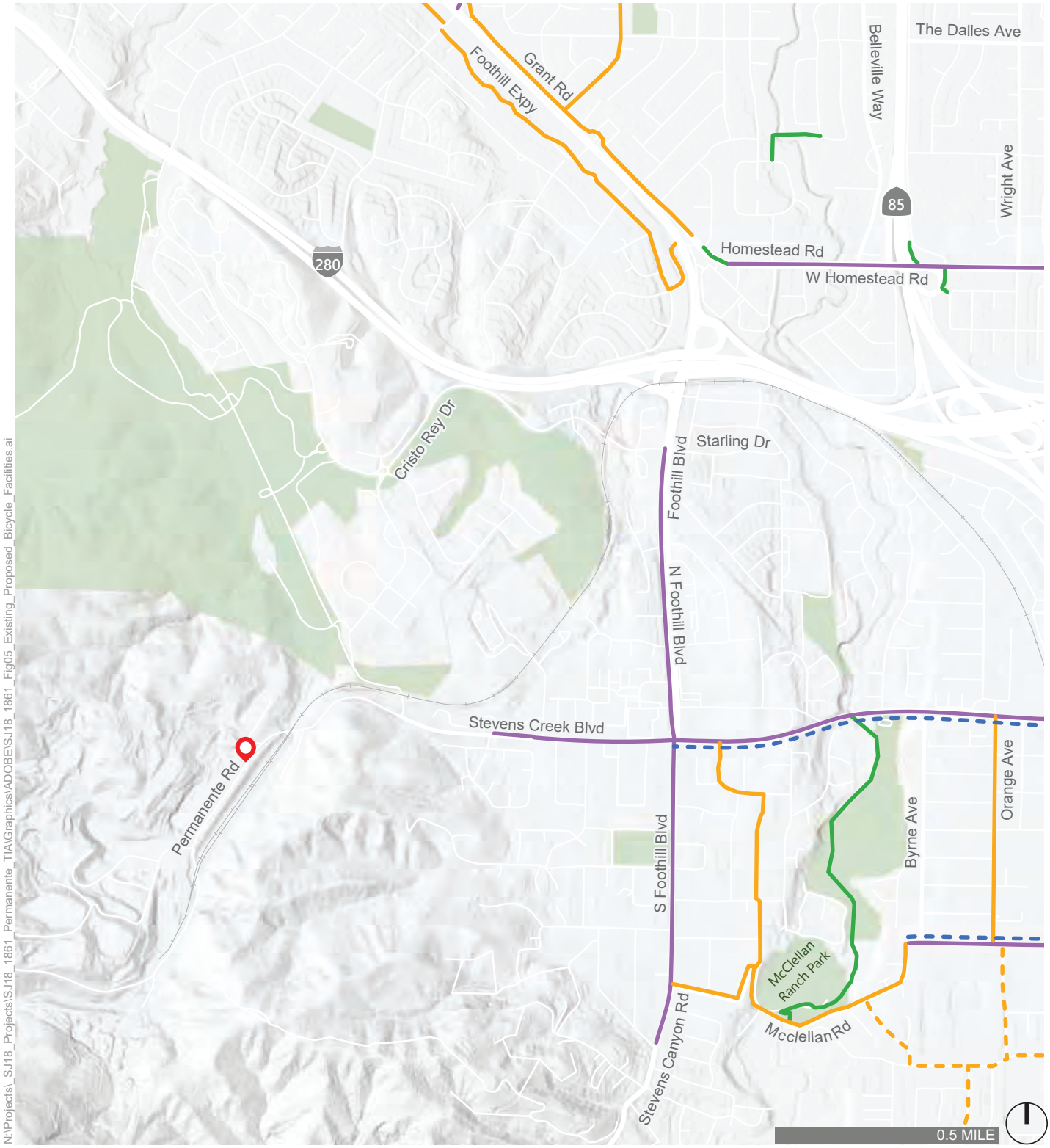
- McClellan Road west of Byrne Avenue

Planned Bicycle Facilities

In 2016 the City of Cupertino adopted a *Bicycle Transportation Plan*, which illustrates the current bicycle network, identifies gaps in the network, and proposes improvement projects to address the identified gaps. The City is in the final design stages of modifying the existing bike lanes on Stevens Creek Boulevard to be separated from the vehicle lane with concrete buffers (Class IV) between the Cupertino city limits west of Foothill Boulevard and Tantau Avenue. The outside through lanes on Stevens Creek Boulevard will be converted to right-turn-only lanes at several intersections along the corridor. This project will also include separate bicycle signal phasing at several intersections along the corridor. Other new or improved facilities are planned for McClellan Road, Orange Avenue/Fort Baker Drive, Hyannisport Drive/Linda Vista Drive, and Santa Teresa Drive/Terrace Drive.

The VTA *Santa Clara Countywide Bicycle Plan* (CBP) guides the development of major bicycle facilities in the County by identifying Cross County Bicycle Corridors and other bicycle projects of countywide or intercity significance. The final draft 2018 CBP identifies several corridors near the Project area as Priority Cross-County Bicycle Corridors, which having funding priority. The Priority Cross-County Bicycle Corridors near the Project site include Stevens Creek Boulevard (Foothill Boulevard to Tantau Avenue), North Foothill Boulevard (Stevens Creek Boulevard to West Homestead Road), West Homestead Road (North Foothill Boulevard to San Tomas Expressway) Cristo Rey Drive (Via Ventura to North Foothill Boulevard), Mary Avenue (Stevens Creek Boulevard to Fremont Avenue), and the Union Pacific Railroad Trail (Stevens Creek Boulevard to Winchester Boulevard).

Bicycle volumes were collected during the morning and evening commute periods at all study intersections. The AM and PM peak hour bicycle volumes on Foothill Boulevard range between 1 and 10 bicycles.



Project Site

Existing

- I Bicycle Path
- II Bicycle Lane
- III Bicycle Route

Planned

- III Bicycle Route
- IV Cycle Track

Figure 5

Existing and Proposed Bicycle Facilities

Pedestrian Facilities

Pedestrian facilities consist of sidewalks, crosswalks, and pedestrian signals. Sidewalks are provided on the north side of Stevens Creek Boulevard from its terminus to Foothill Boulevard. There is a gap in the sidewalks on the south side just to the west of Foothill Boulevard. Separate from the Project evaluated in this TIA, Lehigh is currently finalizing plans to construct a sidewalk between Camino Vista Drive and Foothill Boulevard to improve pedestrian access in the area.

Sidewalks are provided on the east side of Foothill Boulevard from Stevens Creek Boulevard to Starling Drive, and north of the I-280 southbound on-ramp. Sidewalks on the west side of Foothill Boulevard are provided between Stevens Creek Boulevard and near the intersection of Vista Knoll Boulevard.

Pedestrian volumes were counted at the intersections during the morning and evening peak periods. No pedestrians were observed at the intersections at the I-280/Foothill Boulevard interchange. The intersection of Foothill Boulevard and Stevens Creek Boulevard had the highest pedestrian volumes with 21 during the AM peak hour and 28 during the PM peak hour.

4. PROJECT TRAFFIC ESTIMATES

This chapter presents the estimates of the number of soil haul truck trips that would be generated by the Project and added to the roadways and intersections in the study area. The process used to create these estimates incorporates three steps:

1. **Trip Generation** – The *number* of truck trips entering/exiting the Project site is estimated.

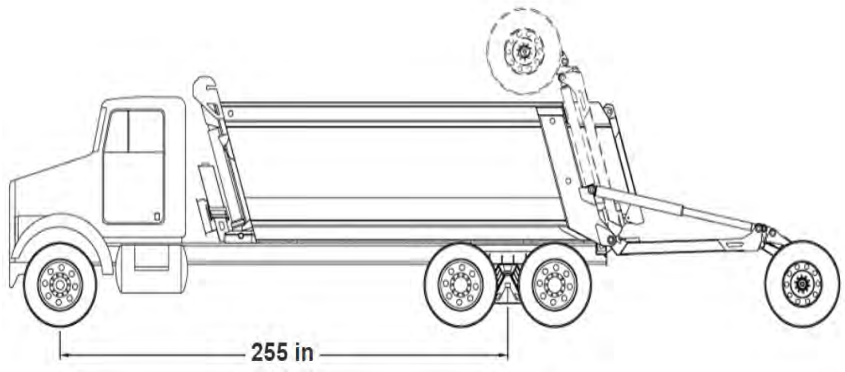
2. **Trip Distribution** – The *directions* the trucks would use to approach and depart the site are projected.

3. **Trip Assignment** – The results of previous two steps are combined to *assign* the truck trips to specific roadway segments and intersection turning movements.

Vehicle Trip Generation

The amount of traffic generated by the Project is based on the number of trucks needed to transport soil to the site. No additional site workers would be needed, so the Project would not generate new vehicle trips due to worker vehicles.

The types of haul trucks used to deliver soil to the site would vary, however, it is anticipated that the most common and typical haul truck would be a 4-axle "super dump" truck, as illustrated below:



Source: https://www.superdumps.com/bridge_laws/?state=California

When loaded, a super dump's fourth axle is lowered and engaged. Once unloaded, the fourth axle is raised for unloaded driving.

The Project would result in deliveries of up to approximately 1,000,000 cubic yards of soil to the site per year. With each truck accommodating approximately 10 cubic yards of soil (Pinnacle Consulting 2019), 100,000 truckloads would be generated per year. Soil would be delivered to the site approximately 300 days a year, resulting in an average of 333 truckloads a day and 666 truck trips per day (333 inbound loaded trucks and 333 outbound empty trucks). The timing of fill deliveries is expected to be variable from day to day; it will depend on the schedule of the project generating fill, the distance between the project and Permanente, and traffic conditions at that time. For purposes of traffic analysis, deliveries of fill are assumed to be evenly spaced throughout the 10-hour workday; thus, approximately 10 percent of the truck trips would occur during each hour, including the AM and PM peak hours. The resulting estimated weekday daily and AM and PM peak hour truck volumes are presented in **Table 8.**

As compared to passenger cars, haul trucks are longer and heavier and require more acceleration and deceleration time. Therefore, to provide a more accurate measure of their potential traffic impacts, the haul truck trips were converted to "passenger car equivalents" (PCEs) for use in the traffic operations analysis. A PCE factor of 2.5 (i.e., one haul truck is equivalent to 2.5 passenger cars) was used to convert the inbound trucks when the fourth axle is down and the trucks are weighted by their loads. A PCE factor of 2.0 was used for the outbound trucks when the axle is up and the trucks are empty. These PCE conversion factors reflect standard traffic engineering industry practice and provide an appropriate average PCE for the various types of trucks that could be used to deliver soil to the Project site. The Project vehicle trip generation in PCEs is also presented in Table 8.

Table 8: Project Vehicle Trip Generation Estimates

Vehicle Type	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
		In	Out	Total	In	Out	Total
Trucks	666	33	33	66	33	33	66
PCEs	1,500	82	66	148	82	66	148

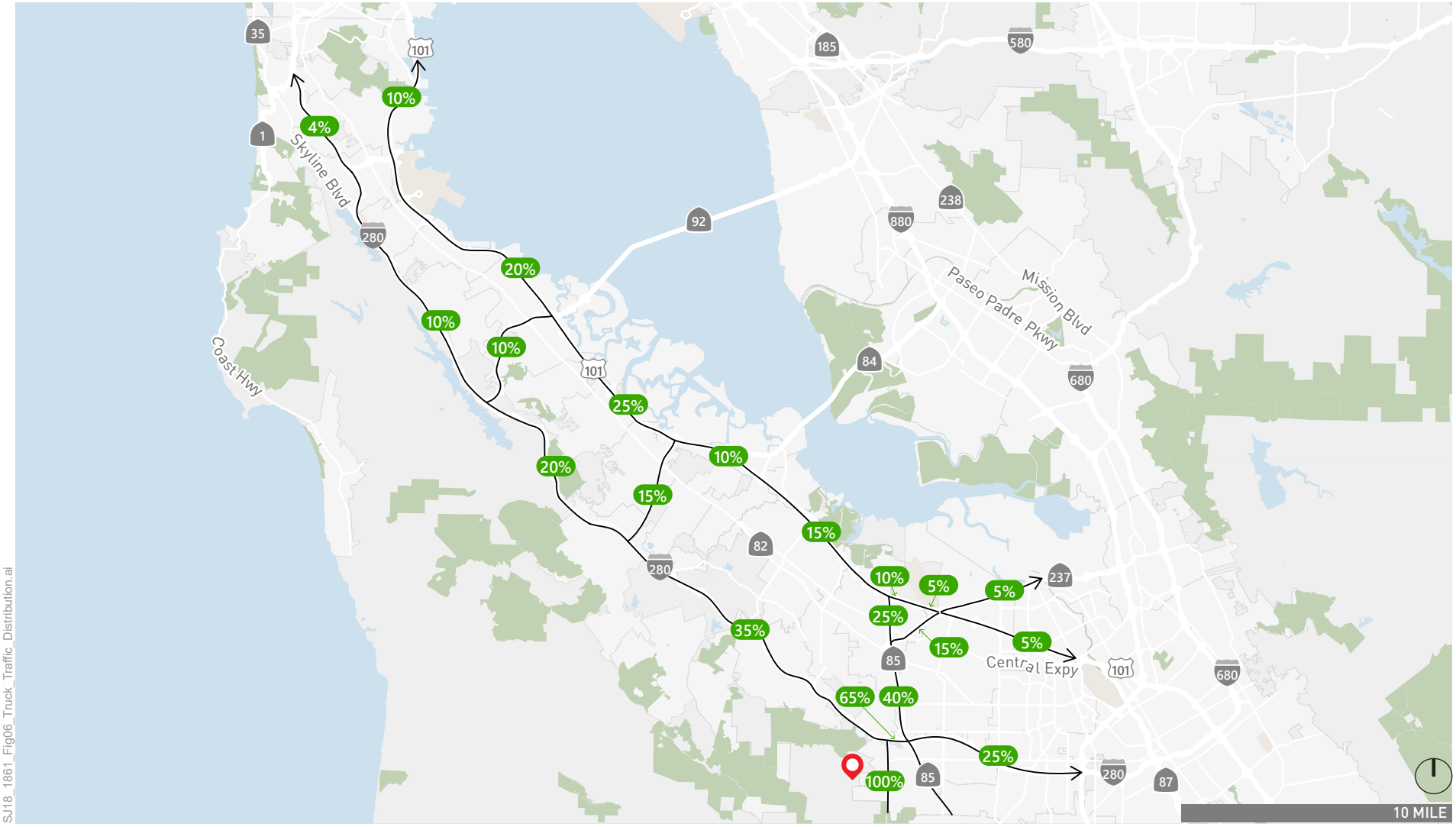
Notes:
PCEs = Passenger Car Equivalents
Inbound trucks PCE = 2.5; Outbound trucks PCE = 2.0
Source: Fehr & Peers, 2019.

Vehicle Trip Distribution

Trip distribution is defined as the directions of approach and departure that vehicles would use to arrive at and depart from the site. The estimated 1,000,000 cubic yards of soil that could be received by Permanente Quarry annually would be generated at construction sites in various locations, primarily within Santa Clara, San Mateo, and San Francisco Counties. The *Suitable Surplus Soil Availability Study for Permanente Quarry* (Pinnacle Consulting 2019) estimates that approximately 14% of the fill would come from San Francisco County, 32% from San Mateo County, and 54% from Santa Clara County. This information was used to estimate the regional Project-related truck distribution percentages, as shown on **Figure 6.** The specific locations of future construction sites that would be sources of soil for Permanente Quarry cannot be presently determined. However, the estimates here provide a reasonably foreseeable projection based on available information and professional judgment.

Vehicle Trip Assignment

Based on established truck routes and prohibitions, all Project-related vehicle trips between the Project site and regional freeways and expressways would use Stevens Creek Boulevard and North Foothill Boulevard. Vehicle trips at the I-280/North Foothill Boulevard interchange were assigned to and from either northbound I-280 or southbound I-280 based on the directions of approach and departure discussed above. **Figure 7** shows the resulting Project vehicle trips in PCEs assigned to turning movements at the study intersections. The Project vehicle trips (in PCEs) assigned to the freeway segments are shown in **Table 9.**



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XX% Truck Traffic Distribution

Project Site

Figure 6

Truck Traffic Distribution

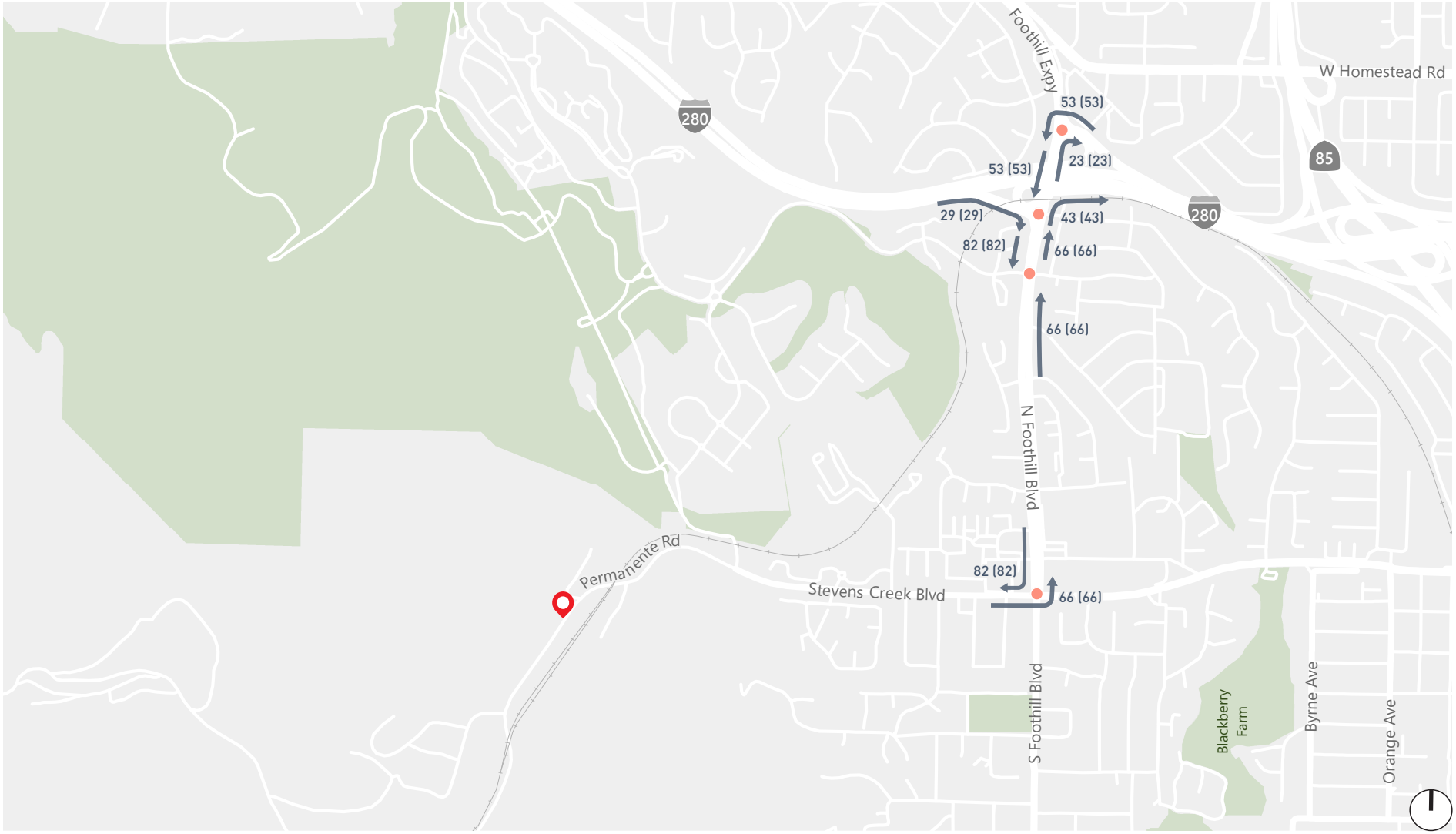

Figure 7

Trip Assignment at Study Intersections (in PCEs)

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Freeway Segment Evaluation

The impacts of a project on freeway operations are evaluated at locations where the amount of project traffic is equal to or greater than 1% of the freeway segment's capacity, per the VTA's transportation impact analysis guidelines. A freeway segment's capacity is based on the number of travel lanes and the per-lane capacity, with each direction evaluated separately. The per-lane capacities are 2,200 passenger cars per hour per lane (pcphpl) for segments with two lanes in one direction and 2,300 pcphpl for segments with three or more lanes in one direction.

The freeway segments in the study area, their capacities, and the number of added Project vehicle trips in PCEs are presented in **Table 9.**[4] Since the trucks would travel in the mixed-flow lanes, not the high-occupancy vehicle (HOV) or carpool lanes, only information for the mixed-flow lanes is presented.

Based on the trip generation estimates in Table 8 and the trip distribution pattern on Figure 6, the Project would not add vehicle trips greater than 1% of any freeway segment's capacity. Therefore, a freeway segment analysis is not needed, and the Project has a **less-than-significant** Project-specific and cumulative freeway impact.

Table 9: Project Trips (in PCEs) and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips (PCE[3])
I-280	Lawrence Expressway to SR 85	EB	6,900	69	AM PM	10 10
		WB	6,900	69	AM PM	21 21
I-280	SR 85 to Foothill Expressway	EB	6,900	69	AM PM	43 43
		WB	6,900	69	AM PM	58 58
I-280	Foothill Expressway to Woodside Road	EB	6,900	69	AM PM	29 29

[4] Freeway segments with the same capacity and the same amount of added Project traffic have been aggregated for ease of reading. A more-detailed freeway segment evaluation is included in **Appendix D.**

Table 9: Project Trips (in PCEs) and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips (PCE[3])
		WB	6,900	69	AM PM	24 24
I-280	Woodside Road to SR 92	EB	9,200	92	AM PM	17 17
		WB	9,200	92	AM PM	14 14
I-280	SR 92 to San Bruno Avenue	EB	9,200	92	AM PM	9 9
		WB	9,200	92	AM PM	7 7
I-280	San Bruno Avenue to Hickey Boulevard	EB	9,200	92	AM PM	4 4
		WB	9,200	92	AM PM	3 3
US 101	I-880 to Moffett Boulevard	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	Moffett Boulevard to SR 85	NB	6,900	69	AM PM	9 9
		SB	6,900	69	AM PM	7 7
US 101	SR 85 to Marsh Road	NB	9,200	92	AM PM	10 10
		SB	6,900	69	AM PM	13 13
US 101	Marsh Road to SR 84	NB	6,900	69	AM PM	7 7
		SB	6,900	69	AM PM	9 9
US 101	SR 84 to Whipple Avenue	NB	6,900	69	AM PM	17 17
		SB	6,900	69	AM PM	21 21
US 101	Whipple Avenue to SR 92	NB	9,200	92	AM PM	17 17
		SB	6,900	69	AM PM	21 21
US 101	SR 92 to Broadway	NB	9,200	92	AM PM	14 14
		SB	9,200	92	AM PM	17 17

Table 9: Project Trips (in PCEs) and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips (PCE[3])
US 101	Broadway to Millbrae Avenue	NB	9,200	92	AM PM	14 14
		SB	11,500	115	AM PM	17 17
US 101	Millbrae Avenue to Airport Boulevard	NB	11,500	115	AM PM	7 7
		SB	11,500	115	AM PM	9 9
SR 237	SR 85 to US 101	EB	4,400	44	AM PM	10 10
		WB	4,400	44	AM PM	13 13
SR 237	US 101 to Mathilda Avenue	EB	4,400	44	AM PM	3 3
		WB	4,400	44	AM PM	5 5
SR 237	Mathilda Avenue to N. Fair Oaks Avenue	EB	4,600	46	AM PM	3 3
		WB	6,900	69	AM PM	5 5
SR 237	N. Fair Oaks Avenue to I-880	EB	4,600	46	AM PM	3 3
		WB	4,600	46	AM PM	5 5
SR 85	I-280 to SR 237	NB	4,600	46	AM PM	27 27
		SB	4,600	46	AM PM	33 33
SR 85	SR 237 to US 101	NB	4,600	46	AM PM	17 17
		SB	4,600	46	AM PM	21 21

Notes:
1. Capacity in vehicles per hour (vph) based on number of lanes.
2. AM = morning peak hour (between 7:00 and 9:00 AM), PM = evening peak hour (between 4:00 and 6:00 PM).
3. PCEs = Passenger Car Equivalents. Inbound trucks PCE = 2.5; Outbound trucks PCE = 2.0.

Source: *2016 Annual Monitoring and Conformance Report*, VTA. Fehr & Peers, 2019.

5. EXISTING WITH PROJECT CONDITIONS

This chapter presents the operations of the study intersections under Existing with Project Conditions, which are defined as existing volumes plus Project-related truck trips (the Project's PCE trip assignment added to the existing volumes). Volumes for Existing with Project Conditions are presented on **Figure 8.**

Intersection Levels of Service

Intersection level of service calculations were conducted for Existing with Project Conditions to assess the effect of added Project-related truck trips on intersection operations. The results are presented in **Table 10.** This table also includes the results for Existing Conditions without the Project for comparison purposes.

Table 10: Existing and Existing with Project Intersection Levels of Service

#	Intersection	Jurisdiction (LOS Threshold)[1]	Peak Hour[2]	Existing		Existing with Project	
				Delay[3]	LOS[4]	Delay[3]	LOS[4]
1	Foothill Expressway/I-280 Northbound Ramps	Santa Clara County (E)	AM PM	23.7 24.9	C C	25.5 26.9	C C
2	Foothill Boulevard/I-280 Southbound Ramps	Santa Clara County (D)	AM PM	**48.0** **133.8**	**E** **F**	**57.5** **168.7**	**F** **F**
3	Foothill Boulevard/Cristo Rey Drive	Los Altos (D)	AM PM	33.8 23.2	C- C	34.0 23.5	C- C
4	Stevens Creek Boulevard/Foothill Boulevard	Cupertino (D)	AM	35.8 21.9	D+ C+	38.6 23.5	D+ C

Notes: **Bold text** indicates intersection operates at unacceptable level of service.

5. Intersection jurisdiction and associated LOS threshold applied.
6. AM = morning peak hour, PM = evening peak hour.
7. Whole intersection weighted average control delay expressed in seconds per vehicle calculated using methods described in the 2000 Highway Capacity Manual, with adjusted saturation flow rates to reflect Santa Clara County Conditions for signalized intersections. For side-street stop-controlled intersections, delay and LOS are reported for the worst-case approach.
8. LOS = Level of Service. LOS calculations conducted using the TRAFFIX analysis software packages, which apply the methods described in the 2000 *Highway Capacity Manual*.

Source: Fehr & Peers, 2019.

The three signalized intersections (#s 1, 2, and 4 in the table) are projected to operate at acceptable levels of service during both the AM and PM peak hours. However, the left-turn movement on the eastbound approach at the intersection of the one unsignalized intersection, Foothill Boulevard and I-280 southbound ramps, operates at LOS E during the AM peak hour under Existing Conditions and would operate at LOS F with the addition of Project trips. (LOS E and F are unacceptable levels.) During the PM peak hour, this intersection operates at LOS F under Existing Conditions, and the addition of Project trips would increase the delay. The increases in delays during the AM and PM peak hour at the Foothill Boulevard/I-280 southbound ramps intersection are considered a significant impact of the Project.

The four hour and peak hour traffic signal warrants were evaluated to determine whether the traffic volumes meet the level where traffic signal installation can be considered. The Existing volumes (and therefore the Existing with Project volumes) meet both the four hour and peak hour signal warrants. Santa Clara County identifies signalization of this intersection as a Tier 1 project in the County's 2040 Expressway Study. With the planned traffic signals, this intersection would operate at LOS A during the AM peak hour and LOS C during the PM peak hour. See Chapter 8 for further discussion of this impact and recommended mitigation.

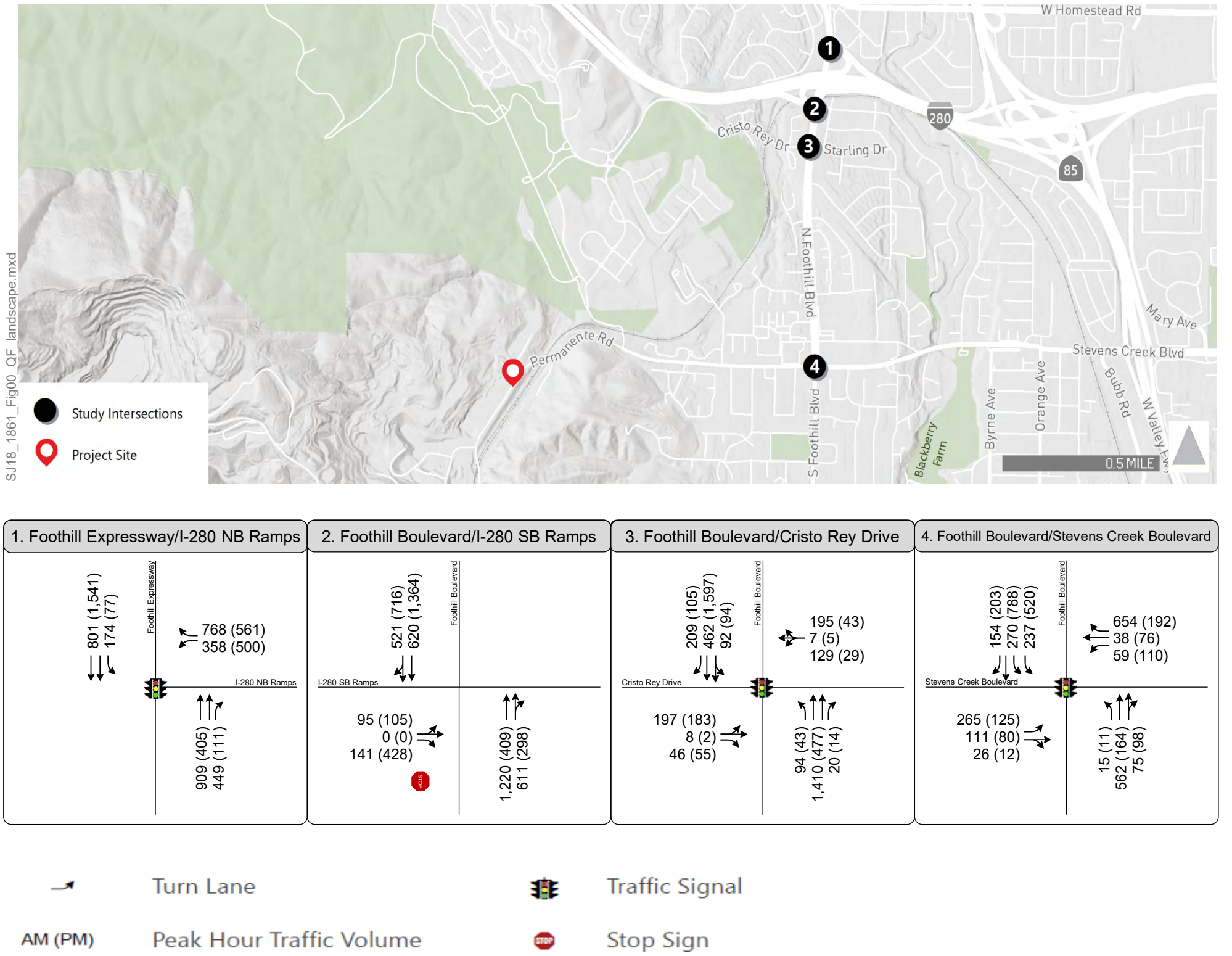

Figure 8

Existing with Project Intersection Volumes

6. BACKGROUND CONDITIONS

Background Conditions, also described as Baseline Conditions, were evaluated to include traffic generated by typical quarry/cement plant operations and to include traffic from approved but not yet constructed developments in the area. Lehigh provided historical truck data that were used to identify truck volumes under typical operations. Descriptions of the approved developments in the area were obtained from the Vallco Specific Plan transportation impact analysis[5] and The Forum DEIR[6]. The process used to estimate Background volumes is described below. The resulting intersection operations, both with and without the Project, are also presented.

Truck Traffic Adjustments

Existing operations at the Permanente Quarry site and adjacent cement production facility generate worker, haul truck, materials delivery, and service vehicle trips on an ongoing basis that use study area roads. The number of trucks entering and exiting the site varies day-to-day, month-to-month, and year-to-year depending on the amount of construction activity and the need for cement and aggregate. Lehigh provided historical truck count data that was used to estimate the average daily truck volume. (See **Appendix E.**) The number of average baseline daily trucks based on a ten-year average (September 2008 to September 2018) is 235 which generate 470 truck trips (235 in and 235 out).

On the day the data was collected for this study, a total of 374 truck trips were counted (187 in and 187 out), or 26 percent lower than on a day with typical operations. The level of construction activity in January is lower than average so this result is expected. The number of counted AM and PM peak hour truck trips (22 in and 16 out during the AM peak hour and 1 in and 1 out during the PM peak hour) were increased by 26 percent for the purposes of this TIA to reflect typical operations.

[5] Fehr & Peers, *Vallco Special Area Specific Plan Transportation Impact Analysis*, May 22, 2018

[6] Placeworks, *The Forum Senior Community Update Public Draft EIR*, City of Cupertino, December 15, 2017

Traffic from Approved Developments

The approved developments that will add traffic to the study intersections include:

- Hyatt House Hotel, Cupertino: 148 hotel rooms
- The Hamptons, Cupertino: 942 apartment units
- Marina Plaza, Cupertino: 188 apartment units, 22.6 ksf of retail, 122 hotel rooms
- Vallco Specific Plan, Cupertino: 460 ksf of retail, 1,750 ksf of office, 190 hotel rooms, 2,923 residential units, 30 acres of a roof garden, 10 ksf civic uses, and 25 ksf of educational uses
- The Forum, Cupertino: 61 senior adult dwelling units

Background Volumes

Vehicle trips from approved developments were added to the existing volumes on Figure 3. The resulting volumes which represent Background Conditions are shown on **Figure 9.** The Project trip assignment on Figure 7 was added to create volumes for Background with Project Conditions as shown on **Figure 10.**

Intersection Levels of Service

Intersection level of service calculations were conducted for Background and Background with Project Conditions to assess the effect of added traffic on intersection operations. The results are presented in **Table 11.**

Table 11: Background and Background with Project Intersection Levels of Service

#	Intersection	Jurisdiction (LOS Threshold)[1]	Peak Hour[2]	Background		Background with Project	
				Delay[3]	LOS[4]	Delay[3]	LOS[4]
1	Foothill Expressway/I-280 Northbound Ramps	Santa Clara County (E)	AM PM	24.9 26.2	C C	26.7 28.3	C C
2	Foothill Boulevard/I-280 Southbound Ramps	Santa Clara County (D)	AM PM	**64.6** **>180**	**F** **F**	**79.7** **>180**	**F** **F**

Table 11: Background and Background with Project Intersection Levels of Service

#	Intersection	Jurisdiction (LOS Threshold)[1]	Peak Hour[2]	Background		Background with Project	
				Delay[3]	LOS[4]	Delay[3]	LOS[4]
3	Foothill Boulevard/Cristo Rey Drive	Los Altos (D)	AM PM	34.3 23.8	C- C	34.7 24.3	C- C
4	Stevens Creek Boulevard/Foothill Boulevard	Cupertino (D)	AM PM	37.6 21.2	D+ C+	41.1 22.8	D C+

Notes: **Bold text** indicates intersection operates at unacceptable level of service.

1. Intersection jurisdiction and associated LOS threshold applied.
2. AM = morning peak hour, PM = evening peak hour.
3. Whole intersection weighted average control delay expressed in seconds per vehicle calculated using methods described in the 2000 Highway Capacity Manual, with adjusted saturation flow rates to reflect Santa Clara County Conditions for signalized intersections. For side-street stop-controlled intersections, delay and LOS are reported for the worst-case approach.
4. LOS = Level of Service. LOS calculations conducted using the TRAFFIX analysis software packages, which apply the methods described in the 2000 *Highway Capacity Manual*.

Source: Fehr & Peers, 2019.

The three signalized intersections (#s 1, 2, and 4 in the table) are projected to continue to operate at acceptable levels of service during both the AM and PM peak hours. However, the left-turn movement on the eastbound approach at the intersection of the one unsignalized intersection, Foothill Boulevard and I-280 southbound ramps, is projected to operate at LOS F during both the AM and PM peak hours, an unacceptable level, under Background Conditions. The addition of Project-related trips to Background Conditions would exacerbate its operation. The increased delays at the Foothill Boulevard/I-280 southbound ramps intersection are considered a significant impact of the Project.

As discussed in Chapter 5, the four hour and peak hour traffic signal warrants were evaluated to determine whether the traffic volumes meet the level where traffic signals installation can be considered. The Existing Conditions volumes (and therefore the Background volumes without and with Project) meet both the four hour and peak hour signal warrants. Santa Clara County identifies signalization of this intersection as a Tier 1 project in the County's 2040 Expressway Study. With the planned traffic signals, this intersection would operate at LOS B during the AM peak hour and LOS C during the PM peak hour. See Chapter 8 for further discussion of this impact and recommended mitigation.

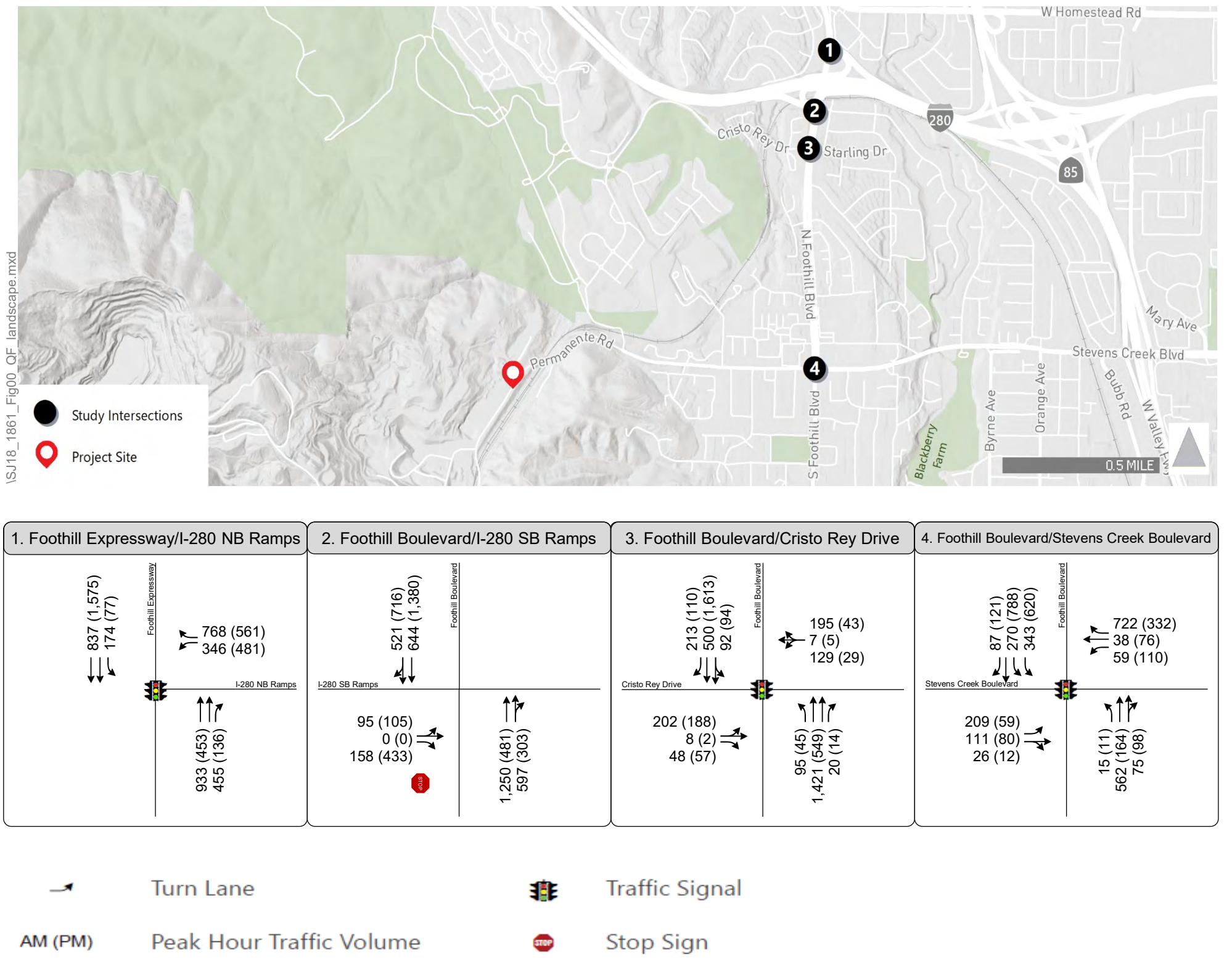

Figure 9

Background Intersection Volumes

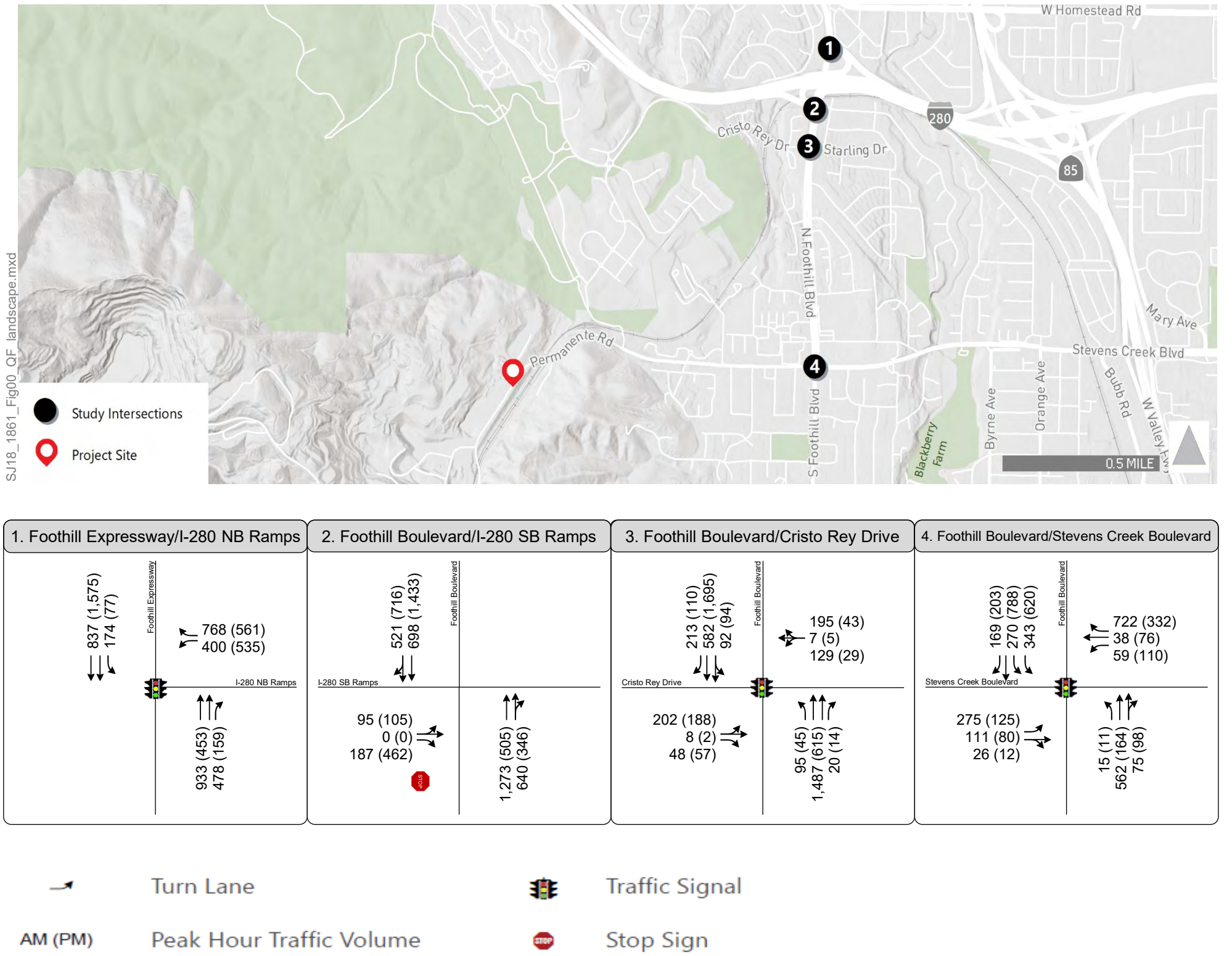

Figure 10

Background with Project Intersection Volumes

7. FUTURE YEAR (CUMULATIVE) CONDITIONS

Future Year (Cumulative) Conditions are evaluated to assess the Project's potential to contribute to traffic impacts in conjunction with traffic added to the study area over time as regional growth occurs and as approved and pending developments in the area are constructed and occupied. The time horizon used in this TIA to evaluate Cumulative Conditions is 2040, which is consistent with both the Valley Transportation Plan 2040 (VTP 2040) (2014) and the City of Cupertino General Plan (2015) planning horizons. Traffic volumes for Cumulative Conditions were estimated by applying growth factors to the Background volumes and adding vehicle trip estimates for identified pending developments in the Project area. Pending developments are defined as developments with submitted applications that are under review but are not yet approved.

The process used to estimate Cumulative volumes is described below. The resulting study area intersection operations under Cumulative Conditions, both with and without the Project, are also presented.

Traffic Growth Rate

The annual growth rate was derived by comparing existing traffic volumes and future (2040) projections for I-280 and Stevens Creek Boulevard from the transportation impact analysis prepared for the Vallco Specific Plan and dividing the traffic volume increases by the number of intervening years. (Foothill Boulevard was not a study roadway in that analysis.) The resulting annual vehicle trip growth rate is 0.6 percent per year.

Traffic from Pending Developments

The following pending development projects were included in the analysis:

- Cupertino Hotel, Cupertino: 156 hotel rooms
- Boutique Hotel, Cupertino: 185 hotel rooms
- The Oaks, Cupertino: 270 dwelling units, 280 ksf office, 170 hotel rooms, 69.5 ksf retail

Cumulative Volumes

The growth factor was applied to the Background volumes on the vehicle movements that would increase with regional growth in the area. These include all movements at the interchange ramp intersections, the through movements on Foothill Boulevard to the north of Stevens Creek Boulevard and the turning movements between the north leg and the east leg at the intersection of Foothill Boulevard and Stevens Creek Boulevard (the southbound left-turn movement and the westbound right-turn movement). Traffic estimates for the pending developments were estimated by applying appropriate trip generation rates based on their land uses and trip distribution patterns for similar uses. They were added "Background with added growth" volumes at the study intersections. The resulting volumes which represent Cumulative Conditions are shown on **Figure 11.** The Project trip assignments (in PCE) on Figure 7 were then added to determine volumes for Cumulative with Project Conditions as shown on **Figure 12.**

Intersection Levels of Service

Intersection level of service calculations were conducted for Cumulative and Cumulative with Project Conditions. The results are presented in **Table 12.**

Table 12: Cumulative and Cumulative with Project Intersection Levels of Service

#	Intersection	Jurisdiction (LOS Threshold)[1]	Peak Hour[2]	Cumulative		Cumulative with Project	
				Delay[3]	LOS[4]	Delay[3]	LOS[4]
1	Foothill Expressway/I-280 Northbound Ramps	Santa Clara County (E)	AM PM	26.6 30.2	C C	28.5 33.2	C C-
2	Foothill Boulevard/I-280 Southbound Ramps	Santa Clara County (D)	AM PM	**152** **>180**	**F** **F**	**>180** **>180**	**F** **F**
3	Foothill Boulevard/Cristo Rey Drive	Los Altos (D)	AM PM	37.4 26.6	D+ C	38.7 28.3	D+ C
4	Stevens Creek Boulevard/Foothill Boulevard	Cupertino (D)	AM PM	43.7 20.7	D C+	49.8 22.3	D C+

Notes: **Bold text** indicates intersection operates at unacceptable level of service.

1. Intersection jurisdiction and associated LOS threshold applied.
2. AM = morning peak hour, PM = evening peak hour.
3. Whole intersection weighted average control delay expressed in seconds per vehicle calculated using methods described in the 2000 Highway Capacity Manual, with adjusted saturation flow rates to reflect Santa Clara County Conditions for signalized intersections. For side-street stop-controlled intersections, delay and LOS are reported for the worst-case approach.
4. LOS = Level of Service. LOS calculations conducted using the TRAFFIX analysis software packages, which apply the methods described in the 2000 *Highway Capacity Manual*.

Source: Fehr & Peers, 2019.

The three signalized intersections (#1, 3, and 4 in the table) are projected to continue to operate at acceptable levels of service during both the AM and PM peak hours. The left-turn movement on the eastbound approach at the currently unsignalized intersection of Foothill Boulevard and I-280 southbound ramps is projected to operate at LOS F during both the AM and PM peak hours under Cumulative Conditions without the Project, an unacceptable level. Under Cumulative Conditions with the Project, the delay would increase in both the AM and PM peak hours. Under the Cumulative Conditions scenario, and assuming that signalization of the Foothill Boulevard / I-280 southbound ramps intersection has not occurred, the Project's contribution to delays may be considered substantial.

The four hour and peak hour traffic signal warrants were evaluated to determine whether the traffic volumes meet the level where traffic signals can be considered as mitigation for the impact at the Foothill Boulevard / I-280 southbound ramps intersection. The Existing volumes (and therefore the Cumulative Conditions volumes without and with the Project) meet both the four hour and peak hour signal warrants. Santa Clara County identifies signalization of this intersection as a Tier 1 project in the County's 2040 Expressway Study. With the planned traffic signals, this intersection would operate at LOS B during the AM peak hour and LOS C during the PM peak hour. See Section 8 for discussion of mitigation recommended for this impact.

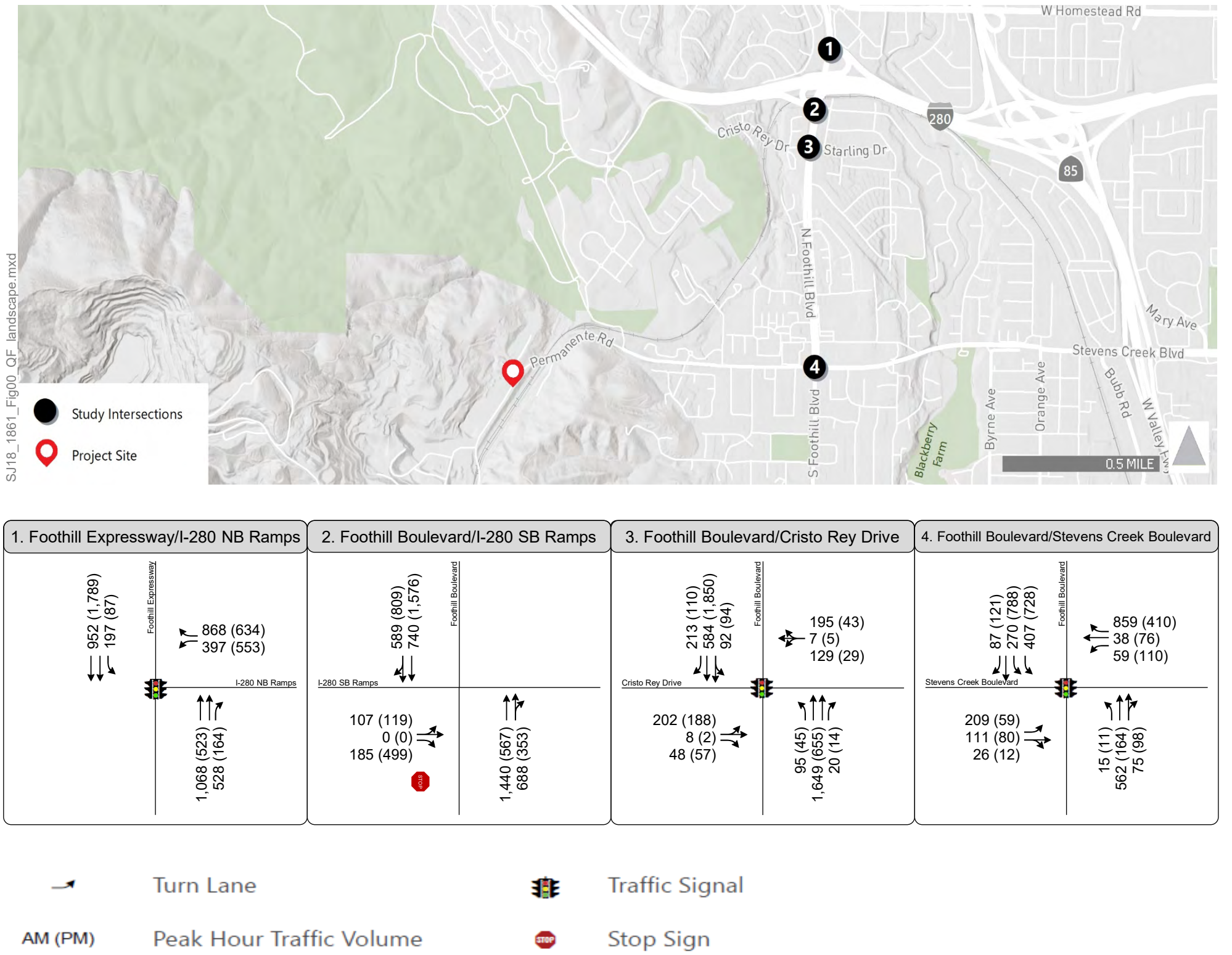

Figure 11

Cumulative Intersection Volumes

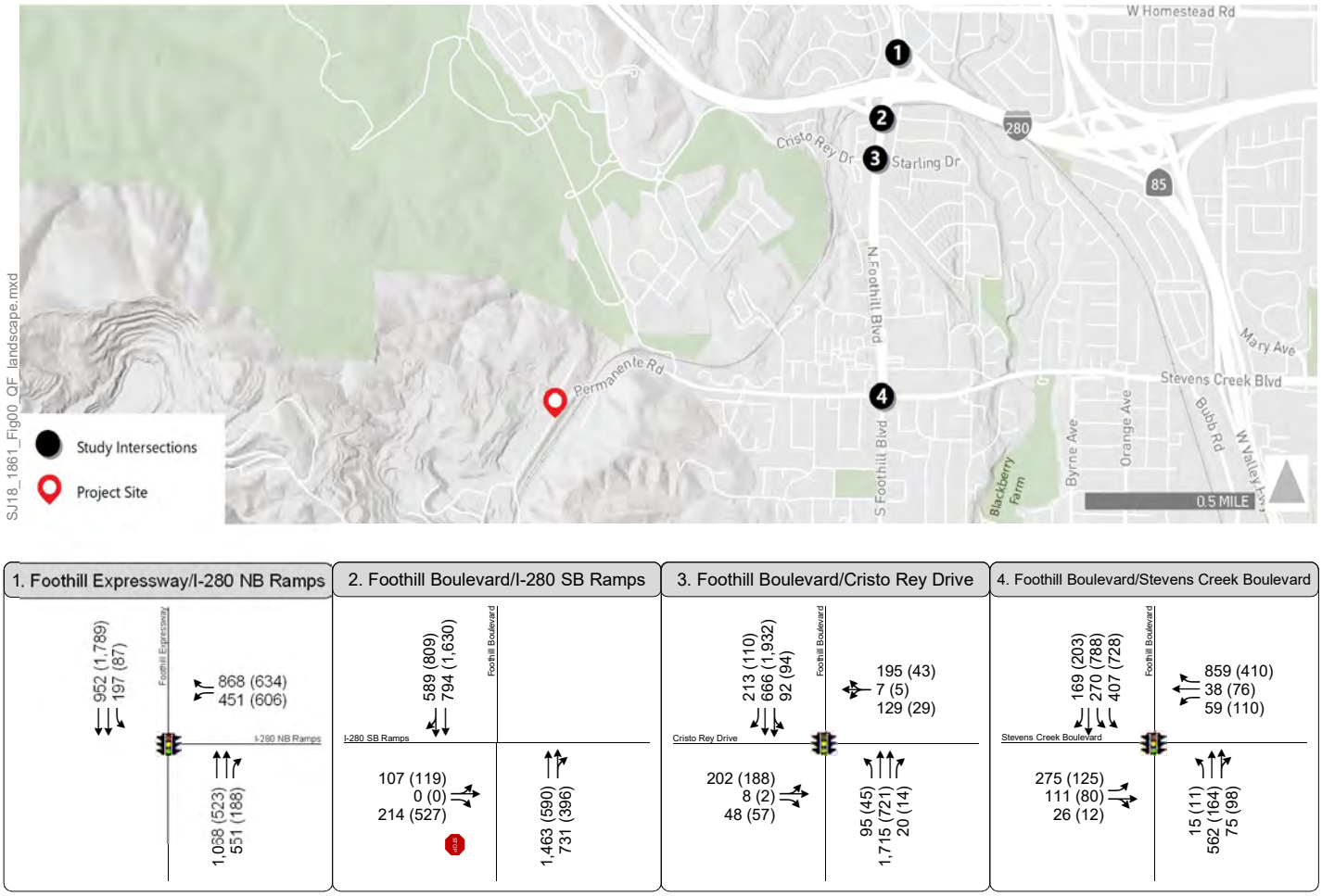

Figure 12

Cumulative with Project Intersection Volumes

8. IMPACTS AND MITIGATION MEASURES

This chapter summarizes traffic level of service impacts discussed in the preceding chapters and presents recommended mitigation for significant impacts. This chapter also discusses potential Project-related impacts on transit, bicycle, and pedestrian transportation.

Freeway Segments

As shown in Table 9 in Chapter 4, Project-related truck trips would increase freeway segment volumes by less than 1% percent of the segments' capacities on all study freeway segments. Therefore, the Project impact to freeways is **less-than-significant**.

Intersections

Project-related truck trips would exacerbate unacceptable operations at the unsignalized intersection of Foothill Boulevard and I-280 southbound ramps under Existing with Project, Background with Project, and Cumulative with Project conditions, as discussed further below. The Project would not have a significant impact on traffic operations at any of the other three study area intersections.

Foothill Boulevard/I-280 Southbound Ramps Impact Summary and Mitigation Recommendation

The left-turn movement on the eastbound approach at the intersection of Foothill Boulevard and I-280 southbound ramps is controlled with a stop sign. This movement operates at LOS E during the AM peak hour under Existing Conditions. With the addition of Project-related trips under Existing Conditions the intersection would operate at LOS F, both unacceptable levels. During the PM peak hour, the intersection operates at LOS F under Existing Conditions, and the addition of Project-related trips would increase the delay and exacerbate its operation. The Project impact under Existing Conditions is therefore considered significant. As discussed in Chapters 6 and 7, the Project impact at this intersection under Background and Cumulative Conditions is also considered significant, as Project-related trips would contribute additional delays.

The four hour and peak hour traffic signal warrants were evaluated to determine whether the traffic volumes meet the level where traffic signals can be considered. The Existing Conditions traffic volumes (and therefore volumes for all other study scenarios) meet both the four hour and peak hour traffic signal warrants.

The installation of traffic signals at the Foothill Boulevard and I-280 southbound ramps intersection is identified by Santa Clara County as a Tier 1 project in the County's 2040 Expressway Study. With traffic signals, and associated curb and gutter, and signing and striping improvements, this intersection would operate at LOS A or B during the AM peak hour and LOS C during the PM peak hour under all evaluation scenarios and would avoid the Project's significant impact at this location. Delay and LOS results for the Foothill Boulevard and I-280 southbound ramps intersection with signalization are presented in **Table 13.**

Table 13: Foothill Boulevard/I-280 Southbound Ramps (#2) Intersection Levels of Service with Signalization

Scenario	Jurisdiction (LOS Threshold)[1]	Peak Hour[2]	Without Project		With Project	
			Delay[3]	LOS[4]	Delay[3]	LOS[4]
Existing + Mitigation	Santa Clara County (D)	AM PM	8.8 20.5	A C+	10.0 21.4	A C+
Background + Mitigation		AM PM	10.6 21.4	B+ C+	11.7 22.4	B+ C+
Cumulative + Mitigation		AM PM	11.2 23.9	B+ C	12.3 25.2	B C

Source: Fehr & Peers, 2019.

The Project would contribute 148 peak hour trips (in PCEs) at the Foothill Boulevard and I-280 southbound ramps intersection. This represents about 1% of the total Existing AM or PM peak hour volume at this intersection. (The Project's percentage contribution under other analysis scenarios is lower, because the amount of non-Project-related trips at the intersection is higher than under Existing Conditions.)

Since the need for signalization of the Foothill Boulevard and I-280 southbound ramps intersection exists under Existing Conditions and is not caused by the Project, the recommended mitigation is to require Lehigh to contribute funding in an amount proportional to the Project's contribution of PCE trips at this intersection. Therefore, the

recommended mitigation is payment of 1% of the cost of traffic signal installation and associated intersection improvements at the Foothill Boulevard / I-280 southbound ramps.

With signalization and associated improvements, the resulting impact would be less-than-significant. However, the timing of signal installation is presently undetermined, and it is possible that even with the Project's funding through the above mitigation measure, the Project could generate trips prior to the installation of the signal. Therefore, in the absence of actual installation or until the County secures sufficient funds to complete the installation, the Project's contribution of proportionate funding would not ensure mitigation of the impact.

Transit Facilities

A significant impact to transit facilities would occur if the Project conflicts with existing or planned facilities, does not provide adequate facilities for pedestrians and bicyclists to access transit routes and stops, or if it generates potential transit trips that cause the transit route's load factor to exceed available capacity. The Project would not require additional workers or otherwise generate or increase the demand for transit trips. Therefore, the Project does not need to provide facilities for pedestrians or bicyclists to access transit routes or stops, nor would the Project cause a transit route to exceed its available capacity. No potential for conflicts with existing or planned transit facilities is anticipated. Thus, the impact of the Project on transit facilities is **less-than-significant**.

Bicycle Facilities

A significant impact to bicycle facilities would occur if the Project creates a hazardous condition that currently does not exist for bicyclists, or if the Project conflicts with planned facilities or local agency policies regarding bicycle facilities. Project traffic would primarily be added to freeways where bicyclists are prohibited. The local streets with added Project vehicle trips have bicycle lanes to separate vehicle traffic from bicyclists. Therefore, the Project would not create a hazardous condition, nor does it conflict with existing or planned bicycle facilities. Thus, the impact of the Project on bicycle facilities is **less-than-significant**.

Pedestrian Facilities

A significant impact to pedestrian facilities would occur if the Project creates a hazardous condition that currently does not exist for pedestrians, or if the Project conflicts with planned facilities or local agency policies regarding pedestrian facilities. Similar to bicycle facilities, the Project would not create a hazardous condition as the local streets with added project traffic have sidewalks and pedestrian accommodations (e.g., crosswalks) at intersections, including pedestrian signals at signalized intersections. The Project also does not conflict with existing or planned pedestrian facilities. Thus, the impact of the Project on pedestrian facilities is **less-than-significant**.

9. VEHICLE MILES TRAVELED (VMT)

Daily vehicle miles traveled (VMT) estimates were prepared for scenarios without the Project (No Project) and with the Project, as discussed in the following sections. Estimated surplus construction soil generating locations are based on the *Suitable Surplus Soil Availability Study for Permanente Quarry* (Pinnacle Consulting 2019). Additional detail is provided in that report and is incorporated herein by this reference. That assessment's findings are summarized, and daily VMT estimates are provided in the following sections.

No Project Scenario VMT

Conditions without the Project reflect a scenario in which Permanente Quarry would not be available to accept soil from construction sites in San Francisco County, San Mateo County, and Santa Clara County. The *Suitable Surplus Soil Availability Study for Permanente Quarry* (Pinnacle Consulting 2019) found that as a result of diminishing capacity at reuse sites within the region, surplus construction soil would likely need to be transported for reuse or disposal at sites in Marin, Solano, Contra Costa, San Joaquin, and San Benito Counties under conditions without the Project. The assessment estimated annual volumes of material and annual VMT associated with moving a total of 1,000,000 cubic yards of soil between construction project sites in San Francisco, San Mateo, and Santa Clara Counties and locations where the soil would be disposed or reused in Marin, Solano, Contra Costa, San Joaquin, or San Benito County. The amount of soil transported between counties and trip lengths based on central locations in each county were estimated by Pinnacle Consulting, and are used for the VMT estimates. The annual estimates by Pinnacle Consulting were translated for this TIA into estimated daily volumes and daily VMT assuming 300 work days per year. The process and results for the No Project scenario are presented in **Table 14.** The No Project daily VMT estimate is 35,500.

Table 14: "No Project" Daily VMT Estimate

Soil Generating County	Soil Disposal or Reuse County	Annual Soil Volume[1] (CY)	Daily Soil Volume[2] (CY)	Daily Truck Loads[3]	Daily Truck Trips[4]	Trip Length to Disposal Site[5] (miles)	Daily VMT[6]
San Francisco	Marin	28,000	93	9	18	25	450
San Francisco	Solano	70,000	233	23	46	39	1,790
San Francisco	Contra Costa	42,000	140	14	28	29	810
San Mateo	San Joaquin	224,000	747	75	150	57	8,550
San Mateo	San Benito	96,000	320	32	64	64	4,100
Santa Clara	San Joaquin	324,000	1,080	108	216	59	12,740
Santa Clara	San Benito	216,000	720	72	144	49	7,060
Total		*1,000,000*	*3,333*	*333*	*666*		*35,500*

Source: Pinnacle Consulting and Fehr & Peers, 2019.
Notes:
1. Estimated annual volume from Pinnacle Consulting
2. Annual volume divided by 300 days per year
3. Daily volume divided by 10 CY per truck
4. Truck loads multiplied by 2 (one inbound and one outbound trip per truck)
5. Estimated distance between a central location in each county
6. Daily trips multiplied by trip length

Project Scenario VMT

The daily VMT estimate for the with-Project condition assumes that the same amount of soil from San Francisco, San Mateo, and Santa Clara Counties as under the No Project scenario would be transported to Permanente Quarry for use in reclamation. The trip lengths were estimated as the distances between the Permanente site and a central location in each county. The daily VMT estimation process and results for the with-Project scenario are presented in **Table 15.** The with-Project daily VMT estimate is 11,760.

Table 15: Project Daily VMT Estimate

Soil Generating County	Annual Soil Volume[1] (CY)	Daily Soil Volume[2] (CY)	Daily Truck Loads[3]	Daily Truck Trips[4]	Trip Length to Permanente[5] (miles)	Daily VMT[6]
San Francisco	140,000	466	46	92	43	3,960
San Mateo	320,000	1,067	107	214	23	4,920
Santa Clara	540,000	1,800	180	360	8	2,880
Total	*1,000,000*	*3,333*	*333*	*666*		*11,760*

Source: Pinnacle Consulting and Fehr & Peers, 2019.
Notes:
1. Estimated annual volume from Pinnacle Consulting
2. Annual volume divided by 300 days per year
3. Daily volume divided by 10 CY per truck
4. Truck loads multiplied by 2 (one inbound and one outbound trip per truck)
5. Estimated distance between Permanente Quarry and a central location in each county
6. Daily trip trips multiplied by trip length

Net VMT Reduction

The above analysis concludes that the Project would reduce regional VMT associated with the movement of soil by an average of 23,740 vehicle miles each day by providing a location for the reuse of soil generated by construction sites in San Francisco, San Mateo, and Santa Clara Counties that is closer than alternative reuse or disposal sites.

10. TRAFFIC INDICIES

Traffic index, or TI, is used in the design of the pavement structural section for roadways. The value is based on the type and volume of traffic; roadways with high truck volumes have higher TIs than roadways with lower truck volumes.

Permanente Road, Stevens Creek Boulevard west of Foothill Boulevard, and Foothill Boulevard historically (and currently) carry high truck volumes due to ongoing quarry and cement plant operations. These roadways were designed to carry this type of traffic. The Project would not appreciably change conditions relative to TI. Therefore, it is anticipated that the current pavement structural sections would accommodate the projected truck volumes associated with the Project.

Appendix A:
Conceptual Design of I-280/Foothill Improvements





LEGEND:

- RIGHT-OF-WAY
- EX RIGHT-OF-WAY
- EX EDGE OF PAVEMENT
- PROPOSED CURB
- TRAVEL LANE
- SIGNAL INTERSECTION

SCALE
0 80 160 240 FEET

FOOTHILL EXPRESSWAY
NB 280 OFFRAMP TO HOMESTEAD ROAD
ALTERNATIVE 1 - EXTEND WB RIGHT TURN LANE AND ADD WB AUXILIARY LANE

Appendix B:
Intersection Turning Movement Counts



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Groups Printed- Lights - Buses - Trucks

	FOOTHILL EXPY Southbound					I-280 NB RAMPS Westbound					FOOTHILL EXPY Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	76	27	0	103	239	0	58	0	297	47	71	0	0	118	0	0	0	0	0	518
07:15 AM	0	82	20	0	102	272	0	44	0	316	60	92	0	0	152	0	0	0	0	0	570
07:30 AM	0	153	44	0	197	268	0	50	0	318	87	147	0	0	234	0	0	0	0	0	749
07:45 AM	0	165	45	0	210	217	0	48	1	266	98	174	0	0	272	0	0	0	0	0	748
Total	0	476	136	0	612	996	0	200	1	1197	292	484	0	0	776	0	0	0	0	0	2585
08:00 AM	0	210	34	0	244	191	0	61	1	253	106	195	0	0	301	0	0	0	0	0	798
08:15 AM	0	220	58	0	278	222	0	53	0	275	114	222	0	0	336	0	0	0	0	0	889
08:30 AM	0	202	33	0	235	187	0	91	0	278	111	245	0	0	356	0	0	0	0	0	869
08:45 AM	0	212	40	0	252	175	0	92	3	270	96	194	0	0	290	0	0	0	0	0	812
Total	0	844	165	0	1009	775	0	297	4	1076	427	856	0	0	1283	0	0	0	0	0	3368
09:00 AM	0	167	43	0	210	184	0	69	2	255	105	248	0	0	353	0	0	0	0	0	818
09:15 AM	0	155	39	0	194	208	0	66	3	277	96	198	0	0	294	0	0	0	0	0	765
09:30 AM	0	169	22	0	191	210	0	53	0	263	75	205	0	0	280	0	0	0	0	0	734
09:45 AM	0	129	24	0	153	204	0	77	2	283	93	158	0	0	251	0	0	0	0	0	687
Total	0	620	128	0	748	806	0	265	7	1078	369	809	0	0	1178	0	0	0	0	0	3004
Grand Total	0	1940	429	0	2369	2577	0	762	12	3351	1088	2149	0	0	3237	0	0	0	0	0	8957
Apprch %	0	81.9	18.1	0		76.9	0	22.7	0.4		33.6	66.4	0	0		0	0	0	0		
Total %	0	21.7	4.8	0	26.4	28.8	0	8.5	0.1	37.4	12.1	24	0	0	36.1	0	0	0	0	0	
Lights	0	1898	421	0	2319	2504	0	648	12	3164	1013	2112	0	0	3125	0	0	0	0	0	8608
% Lights	0	97.8	98.1	0	97.9	97.2	0	85	100	94.4	93.1	98.3	0	0	96.5	0	0	0	0	0	96.1
Buses	0	19	0	0	19	7	0	2	0	9	5	12	0	0	17	0	0	0	0	0	45
% Buses	0	1	0	0	0.8	0.3	0	0.3	0	0.3	0.5	0.6	0	0	0.5	0	0	0	0	0	0.5
Trucks	0	23	8	0	31	66	0	112	0	178	70	25	0	0	95	0	0	0	0	0	304
% Trucks	0	1.2	1.9	0	1.3	2.6	0	14.7	0	5.3	6.4	1.2	0	0	2.9	0	0	0	0	0	3.4

	FOOTHILL EXPY Southbound				I-280 NB RAMPS Westbound				FOOTHILL EXPY Northbound				Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:15 AM																	
08:15 AM	0	**220**	**58**	**278**	**222**	0	53	275	**114**	222	0	336	0	0	0	0	**889**
08:30 AM	0	202	33	235	187	0	91	**278**	111	245	0	**356**	0	0	0	0	869
08:45 AM	0	212	40	252	175	0	**92**	267	96	194	0	290	0	0	0	0	809
09:00 AM	0	167	43	210	184	0	69	253	105	**248**	0	353	0	0	0	0	816
Total Volume	0	801	174	975	768	0	305	1073	426	909	0	1335	0	0	0	0	3383
% App. Total	0	82.2	17.8		71.6	0	28.4		31.9	68.1	0		0	0	0		
PHF	.000	.910	.750	.877	.865	.000	.829	.965	.934	.916	.000	.938	.000	.000	.000	.000	.951

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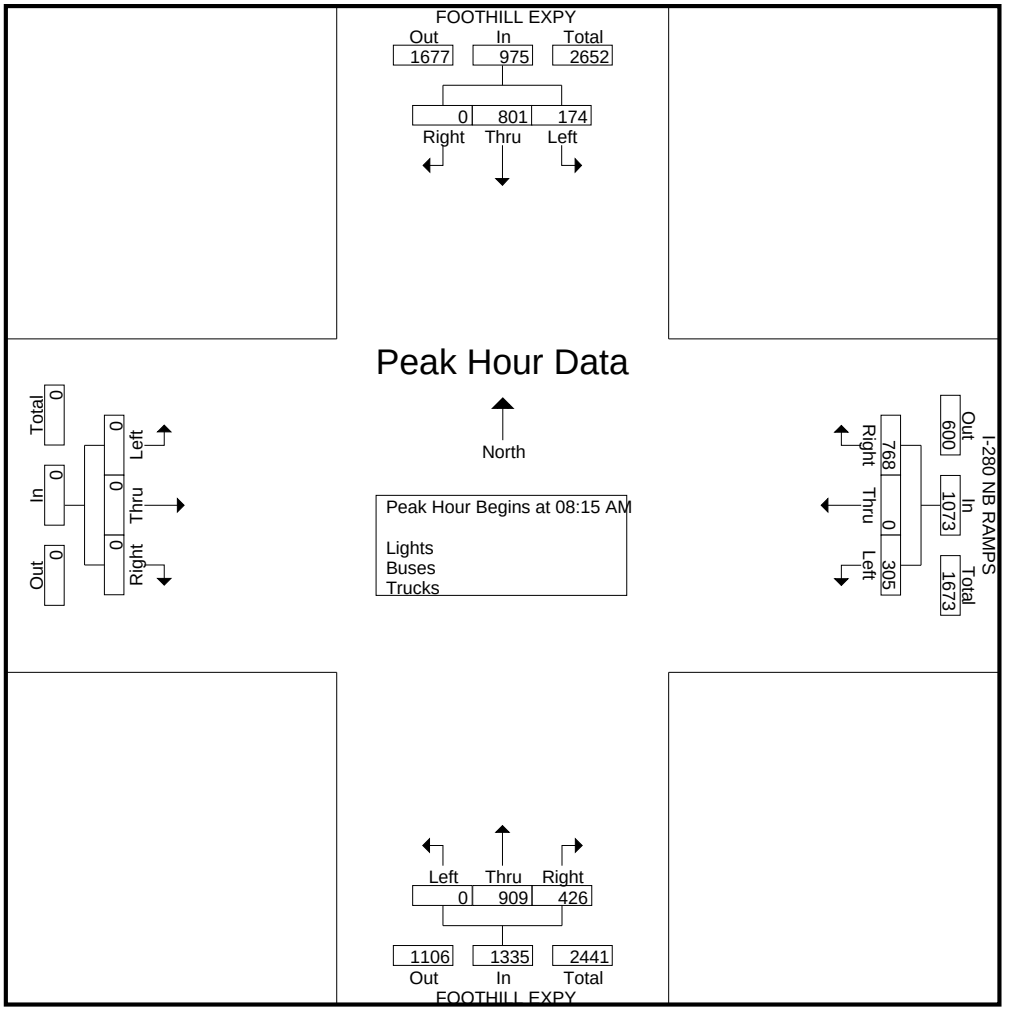

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Groups Printed- Bikes

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Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
07:45 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Total	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	8
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
Total	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	5
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
09:30 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
Grand Total	0	3	0	0	3	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	16
Apprch %	0	100	0	0		0	0	0	0		0	100	0	0		0	0	0	0		
Total %	0	18.8	0	0	18.8	0	0	0	0	0	0	81.2	0	0	81.2	0	0	0	0	0	

	FOOTHILL EXPY Southbound				I-280 NB RAMPS Westbound				FOOTHILL EXPY Northbound				Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	**4**	0	**4**	0	0	0	0	**4**
07:45 AM	0	**2**	0	**2**	0	0	0	0	0	1	0	1	0	0	0	0	3
Total Volume	0	2	0	2	0	0	0	0	0	6	0	6	0	0	0	0	8
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.250	.000	.250	.000	.000	.000	.000	.000	.375	.000	.375	.000	.000	.000	.000	.500

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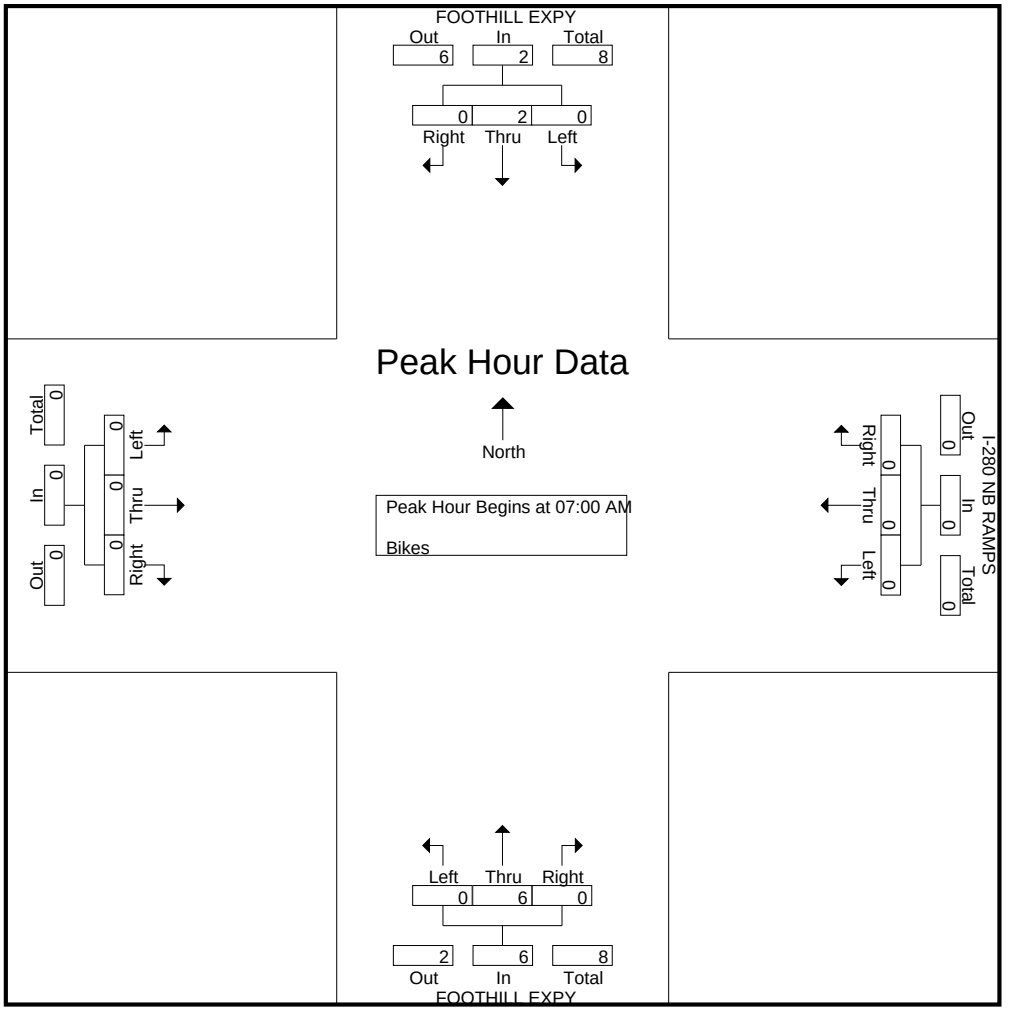

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Groups Printed- Lights - Buses - Trucks

	FOOTHILL EXPY Southbound					I-280 NB RAMPS Westbound					FOOTHILL EXPY Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	368	14	0	382	105	0	95	0	200	15	98	0	0	113	0	0	0	0	0	695
04:15 PM	0	353	18	0	371	110	0	90	2	202	21	95	0	0	116	0	0	0	0	0	689
04:30 PM	0	326	9	0	335	113	0	93	6	212	17	93	0	0	110	0	0	0	0	0	657
04:45 PM	0	337	20	0	357	100	0	82	2	184	20	107	0	0	127	0	0	0	0	0	668
Total	0	1384	61	0	1445	428	0	360	10	798	73	393	0	0	466	0	0	0	0	0	2709
05:00 PM	0	374	23	0	397	122	0	105	0	227	26	120	0	0	146	0	0	0	0	0	770
05:15 PM	0	398	21	0	419	143	0	117	1	261	17	95	0	0	112	0	0	0	0	0	792
05:30 PM	0	405	18	0	423	143	0	104	1	248	18	99	0	0	117	0	0	0	0	0	788
05:45 PM	0	364	15	0	379	153	0	121	1	275	27	91	0	0	118	0	0	0	0	0	772
Total	0	1541	77	0	1618	561	0	447	3	1011	88	405	0	0	493	0	0	0	0	0	3122
06:00 PM	0	375	15	0	390	124	0	103	0	227	17	77	0	0	94	0	0	0	0	0	711
06:15 PM	0	348	24	0	372	123	0	101	0	224	20	85	0	0	105	0	0	0	0	0	701
06:30 PM	0	343	14	0	357	114	0	92	2	208	31	82	0	0	113	0	0	0	0	0	678
06:45 PM	0	252	9	0	261	102	0	101	2	205	10	71	0	0	81	0	0	0	0	0	547
Total	0	1318	62	0	1380	463	0	397	4	864	78	315	0	0	393	0	0	0	0	0	2637
Grand Total	0	4243	200	0	4443	1452	0	1204	17	2673	239	1113	0	0	1352	0	0	0	0	0	8468
Apprch %	0	95.5	4.5	0		54.3	0	45	0.6		17.7	82.3	0	0		0	0	0	0		
Total %	0	50.1	2.4	0	52.5	17.1	0	14.2	0.2	31.6	2.8	13.1	0	0	16	0	0	0	0	0	
Lights	0	4222	195	0	4417	1447	0	1197	17	2661	236	1096	0	0	1332	0	0	0	0	0	8410
% Lights	0	99.5	97.5	0	99.4	99.7	0	99.4	100	99.6	98.7	98.5	0	0	98.5	0	0	0	0	0	99.3
Buses	0	9	1	0	10	3	0	1	0	4	0	5	0	0	5	0	0	0	0	0	19
% Buses	0	0.2	0.5	0	0.2	0.2	0	0.1	0	0.1	0	0.4	0	0	0.4	0	0	0	0	0	0.2
Trucks	0	12	4	0	16	2	0	6	0	8	3	12	0	0	15	0	0	0	0	0	39
% Trucks	0	0.3	2	0	0.4	0.1	0	0.5	0	0.3	1.3	1.1	0	0	1.1	0	0	0	0	0	0.5

	FOOTHILL EXPY Southbound				I-280 NB RAMPS Westbound				FOOTHILL EXPY Northbound				Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	374	**23**	397	122	0	105	227	26	**120**	0	**146**	0	0	0	0	770
05:15 PM	0	398	21	419	143	0	117	260	17	95	0	112	0	0	0	0	**791**
05:30 PM	0	**405**	18	**423**	143	0	104	247	18	99	0	117	0	0	0	0	787
05:45 PM	0	364	15	379	**153**	0	**121**	**274**	**27**	91	0	118	0	0	0	0	771
Total Volume	0	1541	77	1618	561	0	447	1008	88	405	0	493	0	0	0	0	3119
% App. Total	0	95.2	4.8		55.7	0	44.3		17.8	82.2	0		0	0	0		
PHF	.000	.951	.837	.956	.917	.000	.924	.920	.815	.844	.000	.844	.000	.000	.000	.000	.986

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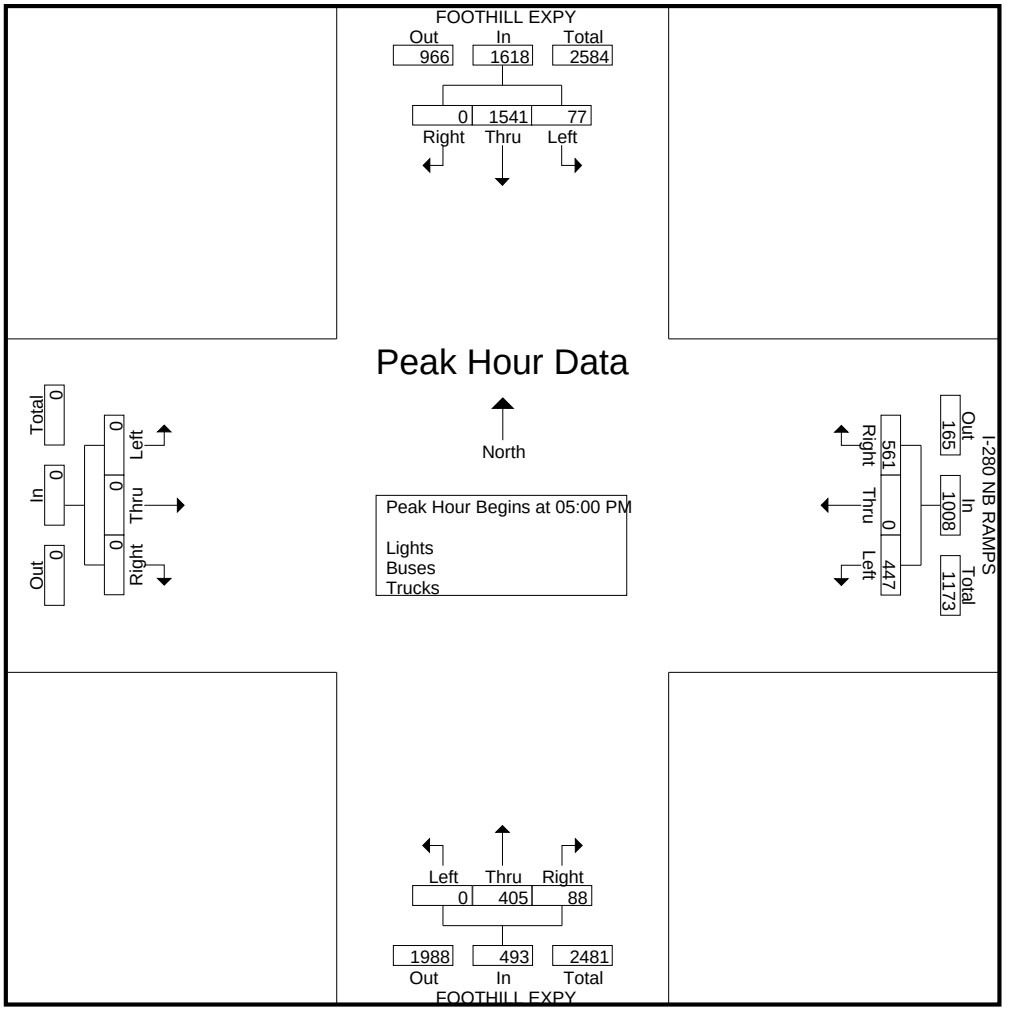

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Groups Printed- Bikes

	FOOTHILL EXPY Southbound					I-280 NB RAMPS Westbound					FOOTHILL EXPY Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	5
Total	0	1	0	0	1	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	10
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
06:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
06:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
Grand Total	0	4	0	0	4	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	18
Apprch %	0	100	0	0		0	0	0	0		0	100	0	0		0	0	0	0		
Total %	0	22.2	0	0	22.2	0	0	0	0	0	0	77.8	0	0	77.8	0	0	0	0	0	

	FOOTHILL EXPY Southbound				I-280 NB RAMPS Westbound				FOOTHILL EXPY Northbound				Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	3
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	**1**	0	**1**	0	0	0	0	0	1	0	1	0	0	0	0	2
04:45 PM	0	0	0	0	0	0	0	0	0	**5**	0	**5**	0	0	0	0	**5**
Total Volume	0	1	0	1	0	0	0	0	0	9	0	9	0	0	0	0	10
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.250	.000	.250	.000	.000	.000	.000	.000	.450	.000	.450	.000	.000	.000	.000	.500

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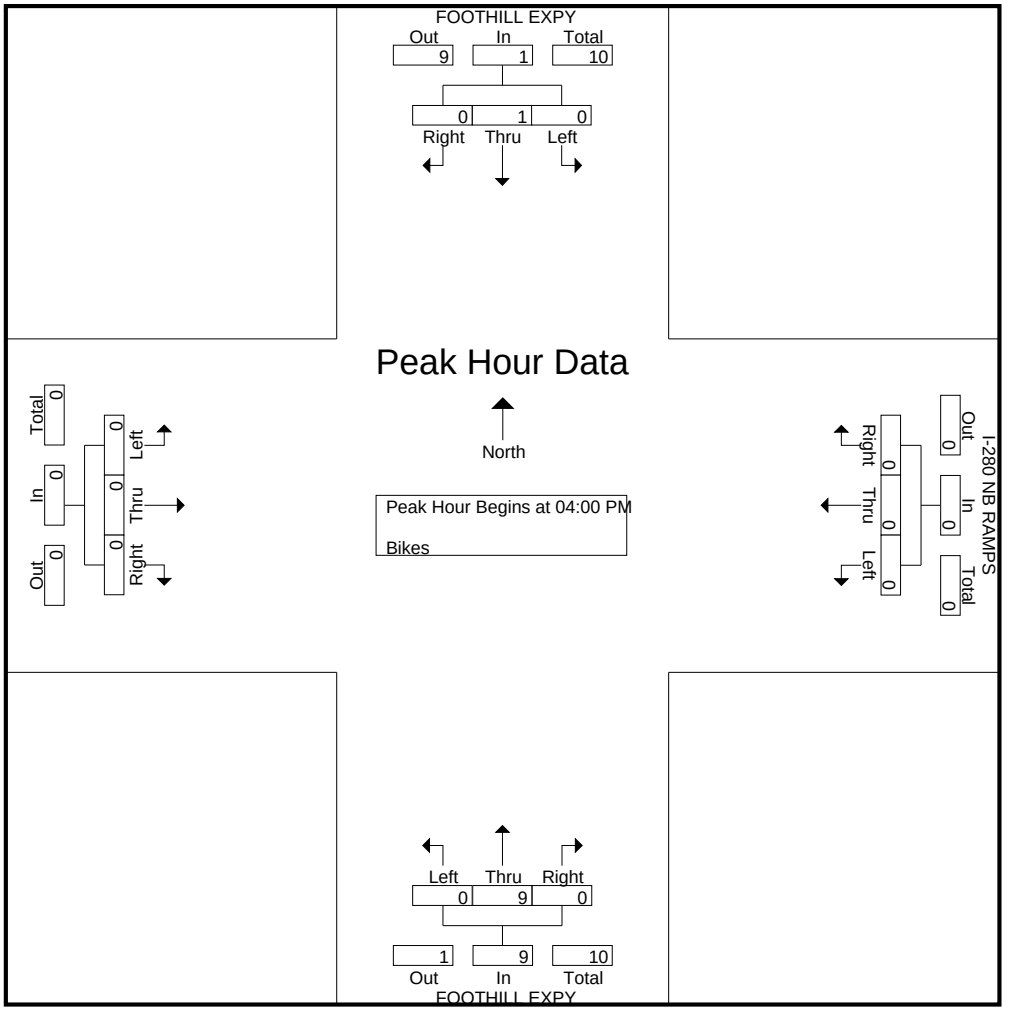

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Groups Printed- Lights - Buses - Trucks

	FOOTHILL EXPY Southbound					I-280 SB ON-RAMP Westbound					FOOTHILL BLVD Northbound					I-280 SB RAMPS Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	51	82	0	0	133	0	0	0	0	0	93	111	0	0	204	5	0	6	0	11	348
07:15 AM	66	61	0	0	127	0	0	0	0	0	113	139	0	0	252	11	0	12	0	23	402
07:30 AM	120	83	0	0	203	0	0	0	0	0	120	223	0	0	343	15	0	13	0	28	574
07:45 AM	127	93	0	0	220	0	0	0	0	0	147	244	0	0	391	23	0	18	0	41	652
Total	364	319	0	0	683	0	0	0	0	0	473	717	0	0	1190	54	0	49	0	103	1976
08:00 AM	149	109	1	0	259	0	0	0	1	1	130	269	0	0	399	18	0	22	0	40	699
08:15 AM	145	117	0	0	262	0	0	0	0	0	135	310	0	0	445	25	0	21	0	46	753
08:30 AM	131	156	0	0	287	0	0	0	0	0	130	292	0	0	422	24	0	38	0	62	771
08:45 AM	133	169	0	0	302	0	0	0	0	0	139	258	0	0	397	36	0	22	0	58	757
Total	558	551	1	0	1110	0	0	0	1	1	534	1129	0	0	1663	103	0	103	0	206	2980
09:00 AM	112	125	0	0	237	0	0	0	0	0	164	337	0	0	501	27	0	14	0	41	779
09:15 AM	80	143	0	0	223	0	0	0	2	2	108	281	0	0	389	24	0	15	0	39	653
09:30 AM	101	118	0	0	219	0	0	0	0	0	114	255	0	0	369	30	0	23	0	53	641
09:45 AM	77	131	0	0	208	0	0	0	0	0	107	231	0	0	338	29	0	17	0	46	592
Total	370	517	0	0	887	0	0	0	2	2	493	1104	0	0	1597	110	0	69	0	179	2665
Grand Total	1292	1387	1	0	2680	0	0	0	3	3	1500	2950	0	0	4450	267	0	221	0	488	7621
Apprch %	48.2	51.8	0	0		0	0	0	100		33.7	66.3	0	0		54.7	0	45.3	0		
Total %	17	18.2	0	0	35.2	0	0	0	0	0	19.7	38.7	0	0	58.4	3.5	0	2.9	0	6.4	
Lights	1273	1227	1	0	2501	0	0	0	3	3	1399	2857	0	0	4256	221	0	212	0	433	7193
% Lights	98.5	88.5	100	0	93.3	0	0	0	100	100	93.3	96.8	0	0	95.6	82.8	0	95.9	0	88.7	94.4
Buses	6	20	0	0	26	0	0	0	0	0	10	15	0	0	25	1	0	0	0	1	52
% Buses	0.5	1.4	0	0	1	0	0	0	0	0	0.7	0.5	0	0	0.6	0.4	0	0	0	0.2	0.7
Trucks	13	140	0	0	153	0	0	0	0	0	91	78	0	0	169	45	0	9	0	54	376
% Trucks	1	10.1	0	0	5.7	0	0	0	0	0	6.1	2.6	0	0	3.8	16.9	0	4.1	0	11.1	4.9

	FOOTHILL EXPY Southbound				I-280 SB ON-RAMP Westbound				FOOTHILL BLVD Northbound				I-280 SB RAMPS Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:15 AM																	
08:15 AM	**145**	117	0	262	0	0	0	0	135	310	0	445	25	0	21	46	753
08:30 AM	131	156	0	287	0	0	0	0	130	292	0	422	24	0	**38**	**62**	771
08:45 AM	133	**169**	0	**302**	0	0	0	0	139	258	0	397	**36**	0	22	58	757
09:00 AM	112	125	0	237	0	0	0	0	**164**	**337**	0	**501**	27	0	14	41	**779**
Total Volume	521	567	0	1088	0	0	0	0	568	1197	0	1765	112	0	95	207	3060
% App. Total	47.9	52.1	0		0	0	0		32.2	67.8	0		54.1	0	45.9		
PHF	.898	.839	.000	.901	.000	.000	.000	.000	.866	.888	.000	.881	.778	.000	.625	.835	.982

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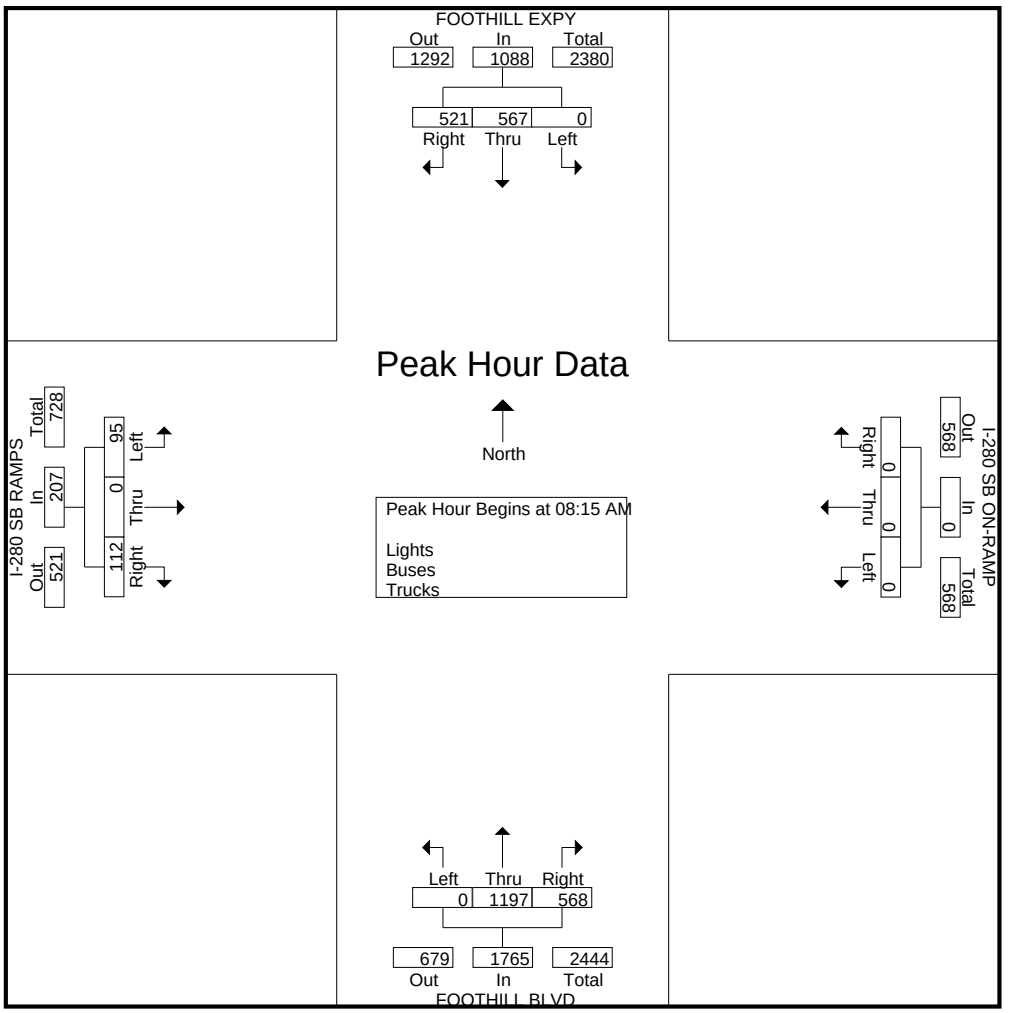

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Groups Printed- Bikes

	FOOTHILL EXPY Southbound					I-280 SB ON-RAMP Westbound					FOOTHILL BLVD Northbound					I-280 SB RAMPS Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
07:45 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Total	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	8
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
08:45 AM	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	6
Total	0	2	0	0	2	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	9
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
09:15 AM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	5
09:30 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	5	0	0	5	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	12
Grand Total	0	9	0	0	9	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	29
Apprch %	0	100	0	0		0	0	0	0		0	100	0	0		0	0	0	0		
Total %	0	31	0	0	31	0	0	0	0	0	0	69	0	0	69	0	0	0	0	0	

	FOOTHILL EXPY Southbound				I-280 SB ON-RAMP Westbound				FOOTHILL BLVD Northbound				I-280 SB RAMPS Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:45 AM																	
08:45 AM	0	2	0	2	0	0	0	0	0	**4**	0	**4**	0	0	0	0	**6**
09:00 AM	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	3
09:15 AM	0	**3**	0	**3**	0	0	0	0	0	2	0	2	0	0	0	0	5
09:30 AM	0	2	0	2	0	0	0	0	0	1	0	1	0	0	0	0	3
Total Volume	0	7	0	7	0	0	0	0	0	10	0	10	0	0	0	0	17
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.583	.000	.583	.000	.000	.000	.000	.000	.625	.000	.625	.000	.000	.000	.000	.708

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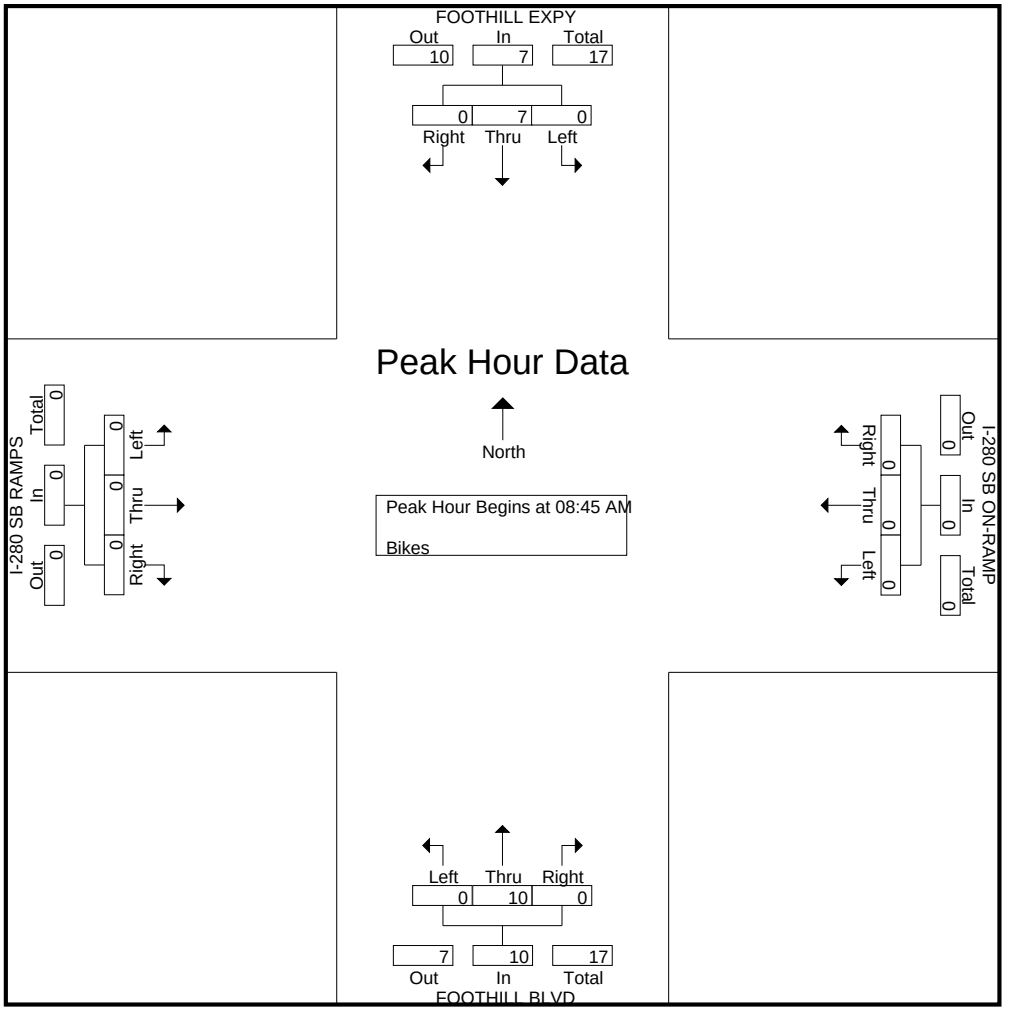

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Groups Printed- Lights - Buses - Trucks

	FOOTHILL EXPY Southbound					I-280 SB ON-RAMP Westbound					FOOTHILL BLVD Northbound					I-280 SB RAMPS Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	226	256	0	0	482	0	0	0	0	0	72	83	0	0	155	52	0	29	0	81	718
04:15 PM	174	291	0	0	465	0	0	0	6	6	60	99	0	0	159	86	0	16	0	102	732
04:30 PM	146	291	0	0	437	0	0	0	2	2	69	88	0	0	157	77	0	27	1	105	701
04:45 PM	162	298	0	0	460	0	0	0	1	1	51	105	0	0	156	108	0	25	0	133	750
Total	708	1136	0	0	1844	0	0	0	9	9	252	375	0	0	627	323	0	97	1	421	2901
05:00 PM	182	301	0	0	483	0	0	0	1	1	62	118	0	0	180	109	0	30	0	139	803
05:15 PM	184	343	0	0	527	0	0	0	1	1	56	87	0	0	143	103	0	23	0	126	797
05:30 PM	176	311	0	0	487	0	0	0	1	1	70	86	0	0	156	97	0	28	0	125	769
05:45 PM	174	356	0	0	530	0	0	0	0	0	67	95	0	0	162	90	0	24	0	114	806
Total	716	1311	0	0	2027	0	0	0	3	3	255	386	0	0	641	399	0	105	0	504	3175
06:00 PM	179	311	0	0	490	0	0	0	0	0	55	82	0	0	137	104	0	13	0	117	744
06:15 PM	174	290	0	0	464	0	0	0	0	0	55	68	0	0	123	83	0	35	0	118	705
06:30 PM	172	270	0	0	442	0	0	0	2	2	34	85	0	0	119	74	0	28	0	102	665
06:45 PM	129	224	0	0	353	0	0	0	2	2	43	62	0	0	105	48	0	19	0	67	527
Total	654	1095	0	0	1749	0	0	0	4	4	187	297	0	0	484	309	0	95	0	404	2641
Grand Total	2078	3542	0	0	5620	0	0	0	16	16	694	1058	0	0	1752	1031	0	297	1	1329	8717
Apprch %	37	63	0	0		0	0	0	100		39.6	60.4	0	0		77.6	0	22.3	0.1		
Total %	23.8	40.6	0	0	64.5	0	0	0	0.2	0.2	8	12.1	0	0	20.1	11.8	0	3.4	0	15.2	
Lights	2062	3527	0	0	5589	0	0	0	16	16	678	1049	0	0	1727	1026	0	292	1	1319	8651
% Lights	99.2	99.6	0	0	99.4	0	0	0	100	100	97.7	99.1	0	0	98.6	99.5	0	98.3	100	99.2	99.2
Buses	4	7	0	0	11	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	17
% Buses	0.2	0.2	0	0	0.2	0	0	0	0	0	0	0.6	0	0	0.3	0	0	0	0	0	0.2
Trucks	12	8	0	0	20	0	0	0	0	0	16	3	0	0	19	5	0	5	0	10	49
% Trucks	0.6	0.2	0	0	0.4	0	0	0	0	0	2.3	0.3	0	0	1.1	0.5	0	1.7	0	0.8	0.6

	FOOTHILL EXPY Southbound				I-280 SB ON-RAMP Westbound				FOOTHILL BLVD Northbound				I-280 SB RAMPS Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	182	301	0	483	0	0	0	0	62	**118**	0	**180**	**109**	0	**30**	**139**	802
05:15 PM	**184**	343	0	527	0	0	0	0	56	87	0	143	103	0	23	126	796
05:30 PM	176	311	0	487	0	0	0	0	**70**	86	0	156	97	0	28	125	768
05:45 PM	174	**356**	0	**530**	0	0	0	0	67	95	0	162	90	0	24	114	**806**
Total Volume	716	1311	0	2027	0	0	0	0	255	386	0	641	399	0	105	504	3172
% App. Total	35.3	64.7	0		0	0	0		39.8	60.2	0		79.2	0	20.8		
PHF	.973	.921	.000	.956	.000	.000	.000	.000	.911	.818	.000	.890	.915	.000	.875	.906	.984

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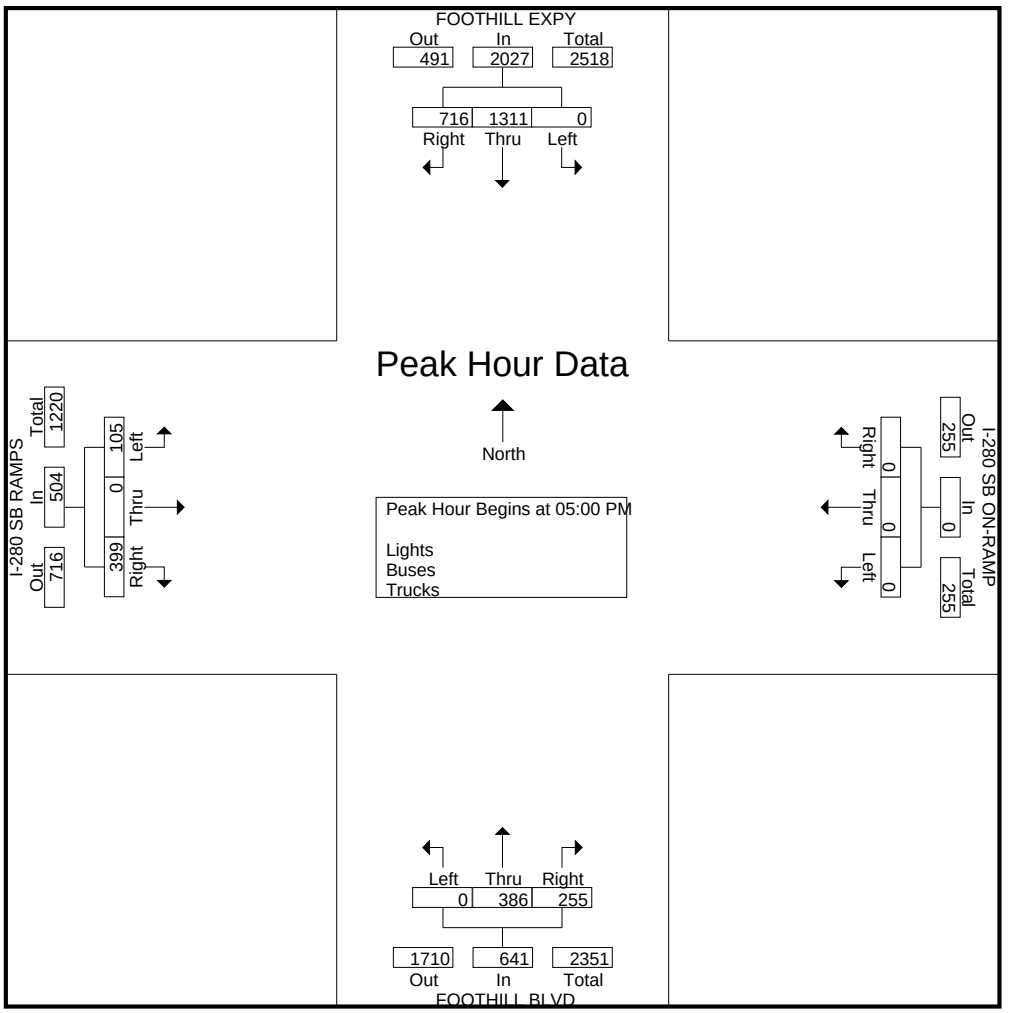

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Groups Printed- Bikes

	FOOTHILL EXPY Southbound					I-280 SB ON-RAMP Westbound					FOOTHILL BLVD Northbound					I-280 SB RAMPS Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	4
04:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:30 PM	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	5
Total	0	6	0	0	6	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	15
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
05:15 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
05:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
05:45 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Total	0	5	0	0	5	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	10
06:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:45 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Grand Total	0	16	0	0	16	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	30
Apprch %	0	100	0	0		0	0	0	0		0	100	0	0		0	0	0	0		
Total %	0	53.3	0	0	53.3	0	0	0	0	0	0	46.7	0	0	46.7	0	0	0	0	0	

	FOOTHILL EXPY Southbound				I-280 SB ON-RAMP Westbound				FOOTHILL BLVD Northbound				I-280 SB RAMPS Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	1	0	1	0	0	0	0	0	3	0	3	0	0	0	0	4
04:15 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:30 PM	0	**4**	0	**4**	0	0	0	0	0	1	0	1	0	0	0	0	**5**
04:45 PM	0	0	0	0	0	0	0	0	0	**5**	0	**5**	0	0	0	0	5
Total Volume	0	6	0	6	0	0	0	0	0	9	0	9	0	0	0	0	15
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.375	.000	.375	.000	.000	.000	.000	.000	.450	.000	.450	.000	.000	.000	.000	.750

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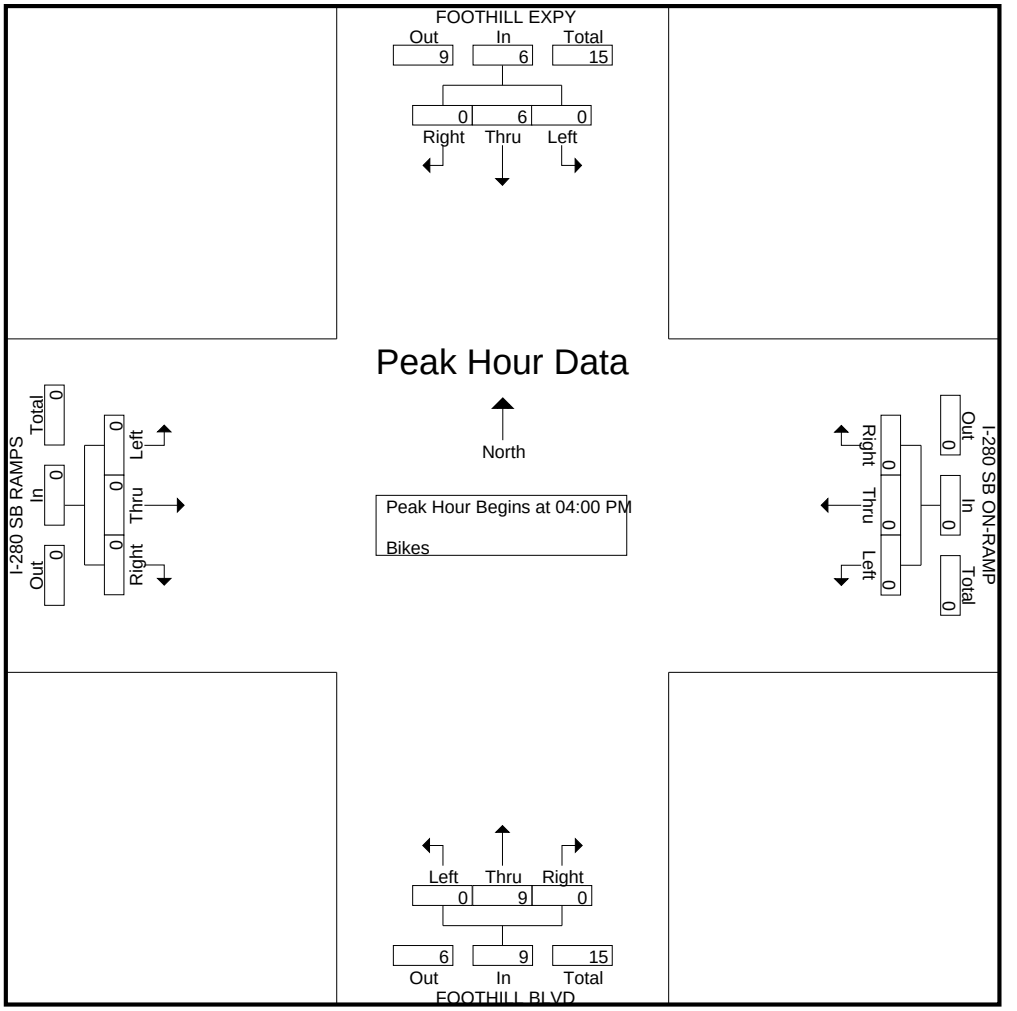

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Groups Printed- Lights - Buses - Trucks

	FOOTHILL BLVD Southbound					STARLING DR Westbound					FOOTHILL BLVD Northbound					CRISTO REY DR Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	32	51	5	0	88	16	0	2	0	18	1	155	7	1	164	3	0	28	0	31	301
07:15 AM	25	41	4	0	70	18	0	0	0	18	1	202	7	0	210	2	0	32	0	34	332
07:30 AM	33	57	7	0	97	18	1	1	1	21	0	282	8	0	290	3	2	49	0	54	462
07:45 AM	42	66	6	0	114	22	0	2	1	25	2	328	10	0	340	7	1	36	0	44	523
Total	132	215	22	0	369	74	1	5	2	82	4	967	32	1	1004	15	3	145	0	163	1618
08:00 AM	43	57	19	0	119	20	0	4	2	26	0	333	12	2	347	5	1	60	0	66	558
08:15 AM	49	86	12	0	147	25	2	5	0	32	1	367	6	1	375	12	0	52	0	64	618
08:30 AM	55	87	24	0	166	24	1	27	0	52	4	326	13	0	343	13	3	51	0	67	628
08:45 AM	57	105	47	0	209	54	0	37	2	93	9	311	28	0	348	12	4	49	0	65	715
Total	204	335	102	0	641	123	3	73	4	203	14	1337	59	3	1413	42	8	212	0	262	2519
09:00 AM	48	102	9	0	159	92	4	60	0	156	6	340	47	0	393	9	1	45	0	55	763
09:15 AM	58	88	14	0	160	23	0	7	4	34	7	296	15	0	318	6	0	42	0	48	560
09:30 AM	45	97	1	0	143	23	0	0	0	23	5	258	20	1	284	4	0	62	0	66	516
09:45 AM	60	86	9	0	155	18	0	6	0	24	3	254	18	0	275	5	1	39	0	45	499
Total	211	373	33	0	617	156	4	73	4	237	21	1148	100	1	1270	24	2	188	0	214	2338
Grand Total	547	923	157	0	1627	353	8	151	10	522	39	3452	191	5	3687	81	13	545	0	639	6475
Apprch %	33.6	56.7	9.6	0		67.6	1.5	28.9	1.9		1.1	93.6	5.2	0.1		12.7	2	85.3	0		
Total %	8.4	14.3	2.4	0	25.1	5.5	0.1	2.3	0.2	8.1	0.6	53.3	2.9	0.1	56.9	1.3	0.2	8.4	0	9.9	
Lights	531	738	149	0	1418	347	8	145	10	510	39	3262	186	5	3492	76	12	537	0	625	6045
% Lights	97.1	80	94.9	0	87.2	98.3	100	96	100	97.7	100	94.5	97.4	100	94.7	93.8	92.3	98.5	0	97.8	93.4
Buses	2	12	5	0	19	4	0	3	0	7	0	19	1	0	20	1	0	1	0	2	48
% Buses	0.4	1.3	3.2	0	1.2	1.1	0	2	0	1.3	0	0.6	0.5	0	0.5	1.2	0	0.2	0	0.3	0.7
Trucks	14	173	3	0	190	2	0	3	0	5	0	171	4	0	175	4	1	7	0	12	382
% Trucks	2.6	18.7	1.9	0	11.7	0.6	0	2	0	1	0	5	2.1	0	4.7	4.9	7.7	1.3	0	1.9	5.9

	FOOTHILL BLVD Southbound				STARLING DR Westbound				FOOTHILL BLVD Northbound				CRISTO REY DR Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:15 AM																	
08:15 AM	49	86	12	147	25	2	5	32	1	**367**	6	374	12	0	**52**	64	617
08:30 AM	55	87	24	166	24	1	27	52	4	326	13	343	**13**	3	51	**67**	628
08:45 AM	**57**	**105**	**47**	**209**	54	0	37	91	**9**	311	28	348	12	**4**	49	65	713
09:00 AM	48	102	9	159	**92**	**4**	**60**	**156**	6	340	**47**	**393**	9	1	45	55	**763**
Total Volume	209	380	92	681	195	7	129	331	20	1344	94	1458	46	8	197	251	2721
% App. Total	30.7	55.8	13.5		58.9	2.1	39		1.4	92.2	6.4		18.3	3.2	78.5		
PHF	.917	.905	.489	.815	.530	.438	.538	.530	.556	.916	.500	.927	.885	.500	.947	.937	.892

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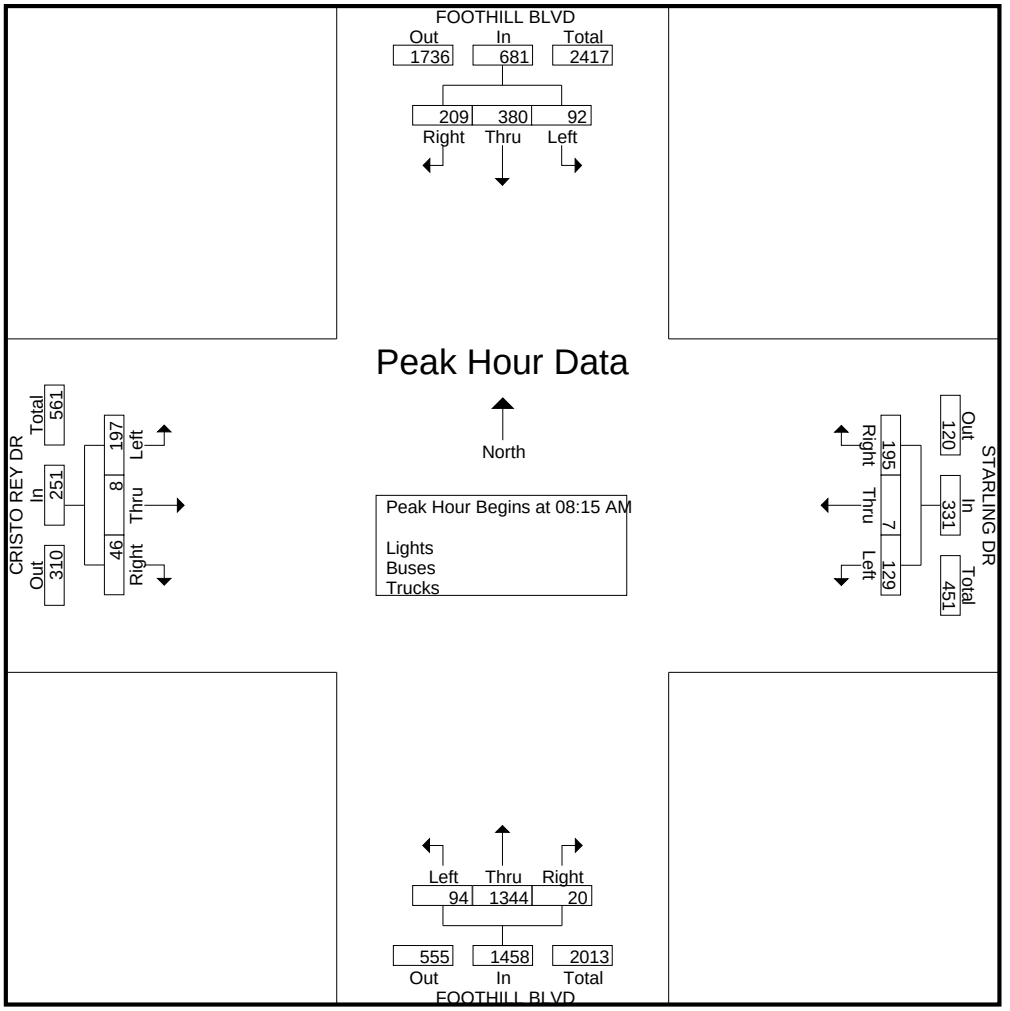

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Groups Printed- Bikes

	FOOTHILL BLVD Southbound					STARLING DR Westbound					FOOTHILL BLVD Northbound					CRISTO REY DR Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	2
07:15 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
07:45 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	0	1	0	0	0	0	0	3	5	0	0	8	0	0	0	0	0	9
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Total	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
09:30 AM	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	8
Grand Total	0	8	0	0	8	0	0	0	0	0	3	10	0	0	13	0	0	0	0	0	21
Apprch %	0	100	0	0		0	0	0	0		23.1	76.9	0	0		0	0	0	0		
Total %	0	38.1	0	0	38.1	0	0	0	0	0	14.3	47.6	0	0	61.9	0	0	0	0	0	

	FOOTHILL BLVD Southbound				STARLING DR Westbound				FOOTHILL BLVD Northbound				CRISTO REY DR Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:45 AM																	
08:45 AM	0	2	0	2	0	0	0	0	0	1	0	1	0	0	0	0	3
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	2	0	2	0	0	0	0	0	**2**	0	**2**	0	0	0	0	**4**
09:30 AM	0	**3**	0	**3**	0	0	0	0	0	1	0	1	0	0	0	0	4
Total Volume	0	7	0	7	0	0	0	0	0	4	0	4	0	0	0	0	11
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.583	.000	.583	.000	.000	.000	.000	.000	.500	.000	.500	.000	.000	.000	.000	.688

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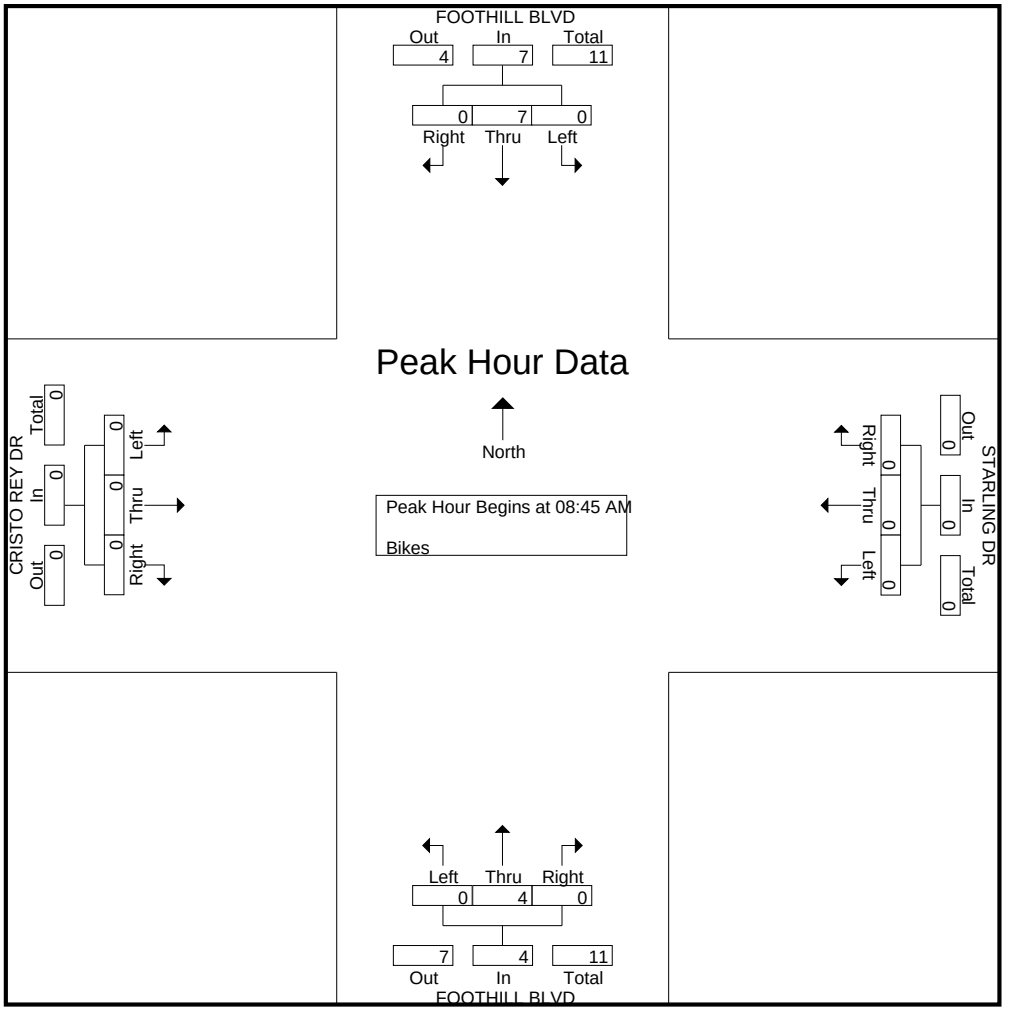

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Groups Printed- Lights - Buses - Trucks

	FOOTHILL BLVD Southbound					STARLING DR Westbound					FOOTHILL BLVD Northbound					CRISTO REY DR Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	56	244	15	0	315	19	0	5	0	24	4	102	8	0	114	11	0	34	0	45	498
04:15 PM	40	311	14	0	365	7	2	5	5	19	1	94	9	5	109	15	1	54	0	70	563
04:30 PM	47	283	21	0	351	14	0	5	2	21	5	79	12	1	97	15	0	59	0	74	543
04:45 PM	54	355	10	0	419	18	0	3	1	22	2	84	9	0	95	16	0	51	0	67	603
Total	197	1193	60	0	1450	58	2	18	8	86	12	359	38	6	415	57	1	198	0	256	2207
05:00 PM	23	355	22	0	400	15	0	6	1	22	2	114	9	2	127	16	1	51	0	68	617
05:15 PM	26	410	24	0	460	5	2	4	1	12	1	100	8	0	109	8	0	37	0	45	626
05:30 PM	27	347	21	0	395	13	3	10	0	26	6	94	17	1	118	19	0	46	0	65	604
05:45 PM	29	403	27	0	459	10	0	9	0	19	5	103	9	1	118	12	1	49	0	62	658
Total	105	1515	94	0	1714	43	5	29	2	79	14	411	43	4	472	55	2	183	0	240	2505
06:00 PM	35	355	23	0	413	12	0	3	0	15	3	89	13	0	105	14	0	31	0	45	578
06:15 PM	24	335	25	0	384	6	0	5	0	11	3	93	4	0	100	6	0	22	0	28	523
06:30 PM	19	309	19	0	347	9	0	6	3	18	6	80	2	0	88	3	0	22	0	25	478
06:45 PM	16	237	16	0	269	6	0	3	0	9	2	87	3	0	92	3	0	10	0	13	383
Total	94	1236	83	0	1413	33	0	17	3	53	14	349	22	0	385	26	0	85	0	111	1962
Grand Total	396	3944	237	0	4577	134	7	64	13	218	40	1119	103	10	1272	138	3	466	0	607	6674
Apprch %	8.7	86.2	5.2	0		61.5	3.2	29.4	6		3.1	88	8.1	0.8		22.7	0.5	76.8	0		
Total %	5.9	59.1	3.6	0	68.6	2	0.1	1	0.2	3.3	0.6	16.8	1.5	0.1	19.1	2.1	0	7	0	9.1	
Lights	396	3924	237	0	4557	134	7	63	13	217	40	1097	103	10	1250	138	3	465	0	606	6630
% Lights	100	99.5	100	0	99.6	100	100	98.4	100	99.5	100	98	100	100	98.3	100	100	99.8	0	99.8	99.3
Buses	0	7	0	0	7	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	16
% Buses	0	0.2	0	0	0.2	0	0	0	0	0	0	0.8	0	0	0.7	0	0	0	0	0	0.2
Trucks	0	13	0	0	13	0	0	1	0	1	0	13	0	0	13	0	0	1	0	1	28
% Trucks	0	0.3	0	0	0.3	0	0	1.6	0	0.5	0	1.2	0	0	1	0	0	0.2	0	0.2	0.4

	FOOTHILL BLVD Southbound				STARLING DR Westbound				FOOTHILL BLVD Northbound				CRISTO REY DR Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	23	355	22	400	**15**	0	6	21	2	**114**	9	**125**	16	**1**	**51**	**68**	614
05:15 PM	26	**410**	24	**460**	5	2	4	11	1	100	8	109	8	0	37	45	625
05:30 PM	27	347	21	395	13	**3**	**10**	**26**	**6**	94	**17**	117	**19**	0	46	65	603
05:45 PM	**29**	403	**27**	459	10	0	9	19	5	103	9	117	12	1	49	62	**657**
Total Volume	105	1515	94	1714	43	5	29	77	14	411	43	468	55	2	183	240	2499
% App. Total	6.1	88.4	5.5		55.8	6.5	37.7		3	87.8	9.2		22.9	0.8	76.2		
PHF	.905	.924	.870	.932	.717	.417	.725	.740	.583	.901	.632	.936	.724	.500	.897	.882	.951

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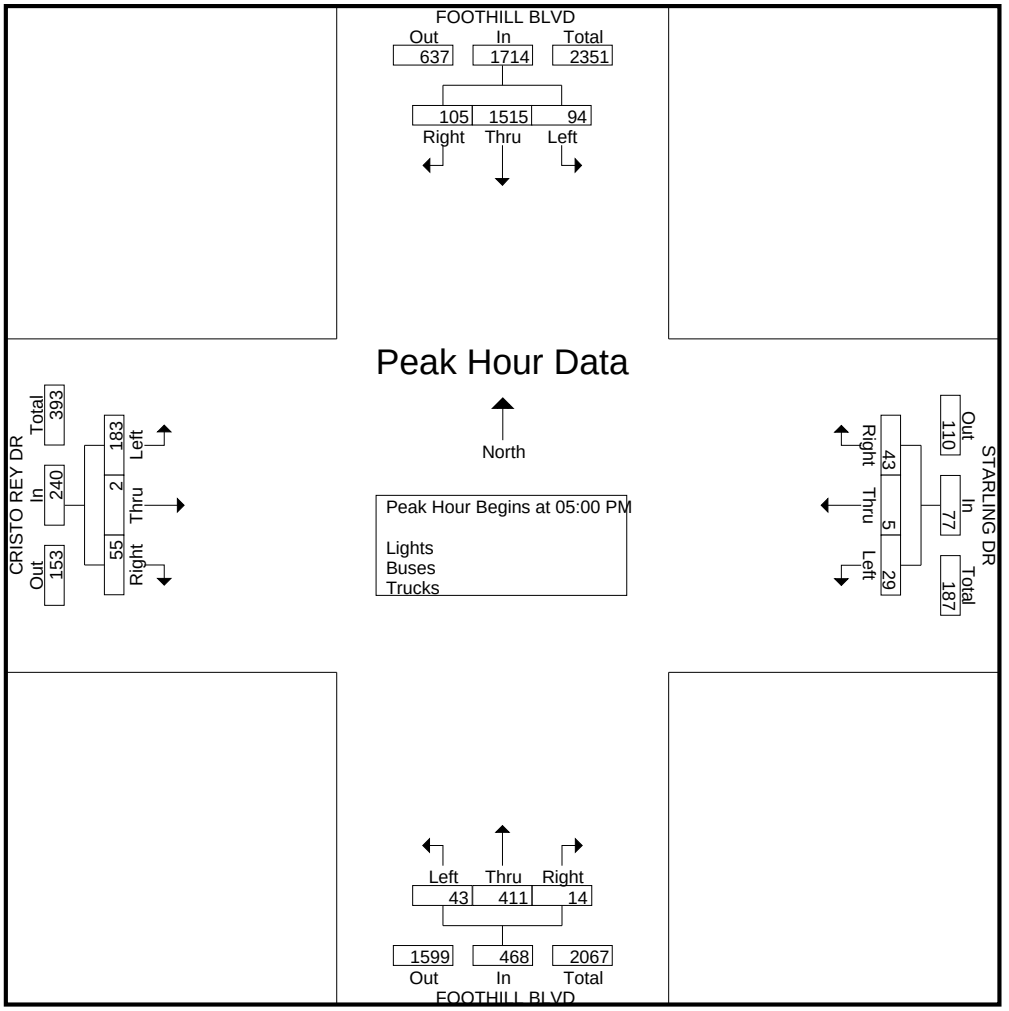

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File Name : 2PM FINAL
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Groups Printed- Bikes

	FOOTHILL BLVD Southbound					STARLING DR Westbound					FOOTHILL BLVD Northbound					CRISTO REY DR Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	1	0	0	1	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	4
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	5	0	0	5	0	0	0	0	0	0	1	0	0	1	3	0	0	0	3	9
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	0	1	0	1	4
Total	0	6	0	0	6	0	1	0	0	1	0	5	1	0	6	3	0	1	0	4	17
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
05:15 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	4
05:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
05:45 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	9
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
06:15 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
06:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:45 PM	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	4	1	0	5	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	6
Grand Total	0	15	1	0	16	0	1	0	0	1	0	9	1	0	10	4	0	1	0	5	32
Apprch %	0	93.8	6.2	0		0	100	0	0		0	90	10	0		80	0	20	0		
Total %	0	46.9	3.1	0	50	0	3.1	0	0	3.1	0	28.1	3.1	0	31.2	12.5	0	3.1	0	15.6	

	FOOTHILL BLVD Southbound				STARLING DR Westbound				FOOTHILL BLVD Northbound				CRISTO REY DR Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	**5**	0	**5**	0	0	0	0	0	1	0	1	**3**	0	0	**3**	**9**
04:45 PM	0	0	0	0	0	0	0	0	0	**2**	**1**	**3**	0	0	**1**	1	4
05:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
05:15 PM	0	2	0	2	0	0	0	0	0	1	0	1	1	0	0	1	4
Total Volume	0	7	0	7	0	0	0	0	0	5	1	6	4	0	1	5	18
% App. Total	0	100	0		0	0	0		0	83.3	16.7		80	0	20		
PHF	.000	.350	.000	.350	.000	.000	.000	.000	.000	.625	.250	.500	.333	.000	.250	.417	.500

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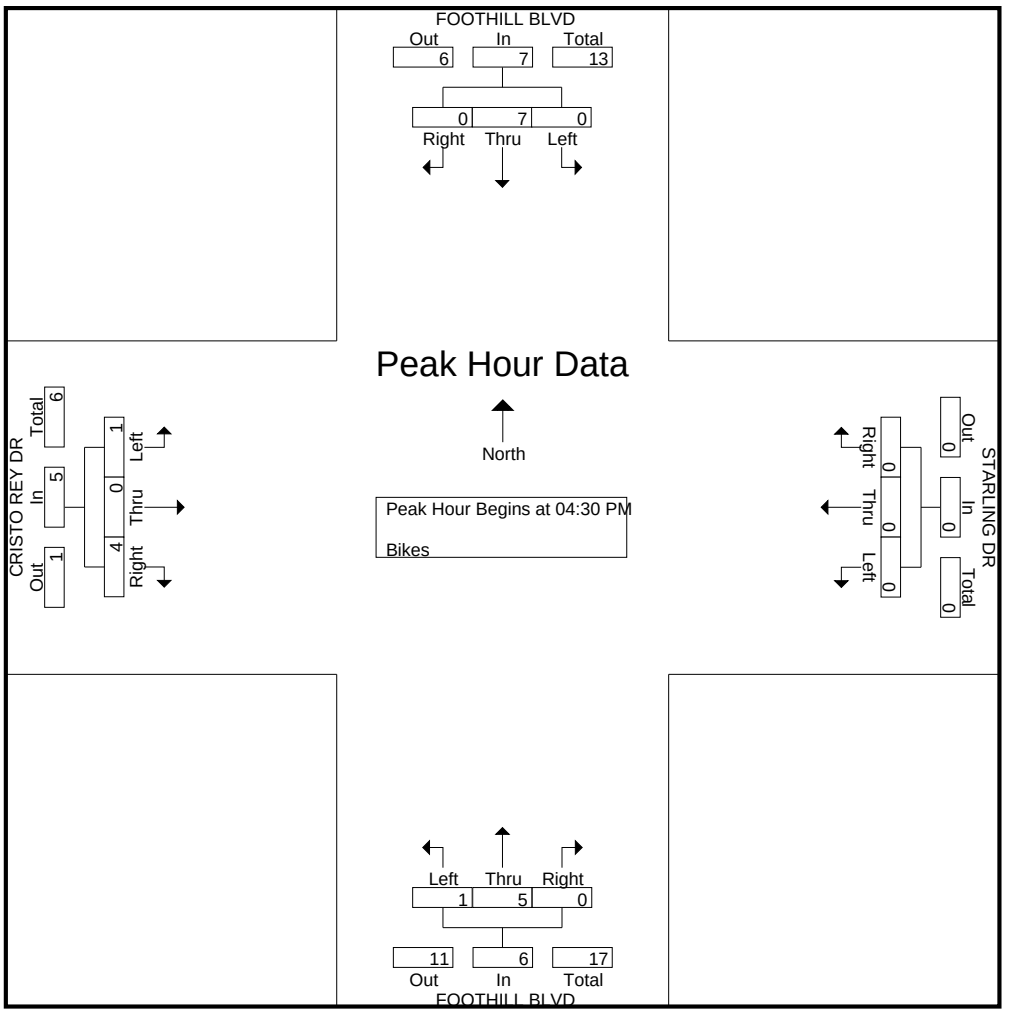

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File Name : 1AM FINAL
Site Code : 00000001
Start Date : 1/23/2019
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Groups Printed- Lights - Buses - Trucks

	N FOOTHILL BLVD Southbound					STEVENS CREEK BLVD Westbound					S FOOTHILL BLVD Northbound					STEVENS CREEK BLVD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	8	26	8	0	42	47	6	10	2	65	12	64	1	1	78	1	4	20	0	25	210
07:15 AM	9	24	15	1	49	70	5	8	0	83	11	77	2	1	91	6	7	35	0	48	271
07:30 AM	6	23	16	0	45	116	10	11	0	137	11	125	4	0	140	2	13	29	0	44	366
07:45 AM	4	34	22	0	60	132	7	6	0	145	15	128	3	2	148	1	9	44	0	54	407
Total	27	107	61	1	196	365	28	35	2	430	49	394	10	4	457	10	33	128	0	171	1254
08:00 AM	11	36	25	0	72	145	2	10	1	158	16	113	2	3	134	3	13	33	1	50	414
08:15 AM	8	43	42	1	94	167	5	9	1	182	27	121	2	0	150	3	25	27	1	56	482
08:30 AM	12	63	79	0	154	144	10	11	0	165	18	138	3	0	159	12	45	59	1	117	595
08:45 AM	24	72	58	1	155	173	15	20	4	212	17	158	7	2	184	3	30	75	1	109	660
Total	55	214	204	2	475	629	32	50	6	717	78	530	14	5	627	21	113	194	4	332	2151
09:00 AM	28	92	58	0	178	170	8	19	5	202	13	145	3	0	161	8	11	38	0	57	598
09:15 AM	18	46	41	2	107	115	18	11	1	145	15	130	6	0	151	5	22	37	0	64	467
09:30 AM	8	36	36	0	80	103	12	17	1	133	20	89	3	0	112	0	12	39	0	51	376
09:45 AM	12	52	27	1	92	125	15	15	2	157	17	90	2	1	110	4	14	25	0	43	402
Total	66	226	162	3	457	513	53	62	9	637	65	454	14	1	534	17	59	139	0	215	1843
Grand Total	148	547	427	6	1128	1507	113	147	17	1784	192	1378	38	10	1618	48	205	461	4	718	5248
Apprch %	13.1	48.5	37.9	0.5		84.5	6.3	8.2	1		11.9	85.2	2.3	0.6		6.7	28.6	64.2	0.6		
Total %	2.8	10.4	8.1	0.1	21.5	28.7	2.2	2.8	0.3	34	3.7	26.3	0.7	0.2	30.8	0.9	3.9	8.8	0.1	13.7	
Lights	98	433	411	6	948	1480	107	143	17	1747	189	1253	21	10	1473	29	201	424	4	658	4826
% Lights	66.2	79.2	96.3	100	84	98.2	94.7	97.3	100	97.9	98.4	90.9	55.3	100	91	60.4	98	92	100	91.6	92
Buses	4	2	7	0	13	14	1	1	0	16	0	2	0	0	2	0	3	1	0	4	35
% Buses	2.7	0.4	1.6	0	1.2	0.9	0.9	0.7	0	0.9	0	0.1	0	0	0.1	0	1.5	0.2	0	0.6	0.7
Trucks	46	112	9	0	167	13	5	3	0	21	3	123	17	0	143	19	1	36	0	56	387
% Trucks	31.1	20.5	2.1	0	14.8	0.9	4.4	2	0	1.2	1.6	8.9	44.7	0	8.8	39.6	0.5	7.8	0	7.8	7.4

	N FOOTHILL BLVD Southbound				STEVENS CREEK BLVD Westbound				S FOOTHILL BLVD Northbound				STEVENS CREEK BLVD Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:15 AM																	
08:15 AM	8	43	42	93	167	5	9	181	**27**	121	2	150	3	25	27	55	479
08:30 AM	12	63	**79**	154	144	10	11	165	18	138	3	159	**12**	**45**	59	**116**	594
08:45 AM	24	72	58	154	**173**	**15**	**20**	**208**	17	**158**	**7**	**182**	3	30	**75**	108	**652**
09:00 AM	**28**	**92**	58	**178**	170	8	19	197	13	145	3	161	8	11	38	57	593
Total Volume	72	270	237	579	654	38	59	751	75	562	15	652	26	111	199	336	2318
% App. Total	12.4	46.6	40.9		87.1	5.1	7.9		11.5	86.2	2.3		7.7	33	59.2		
PHF	.643	.734	.750	.813	.945	.633	.738	.903	.694	.889	.536	.896	.542	.617	.663	.724	.889

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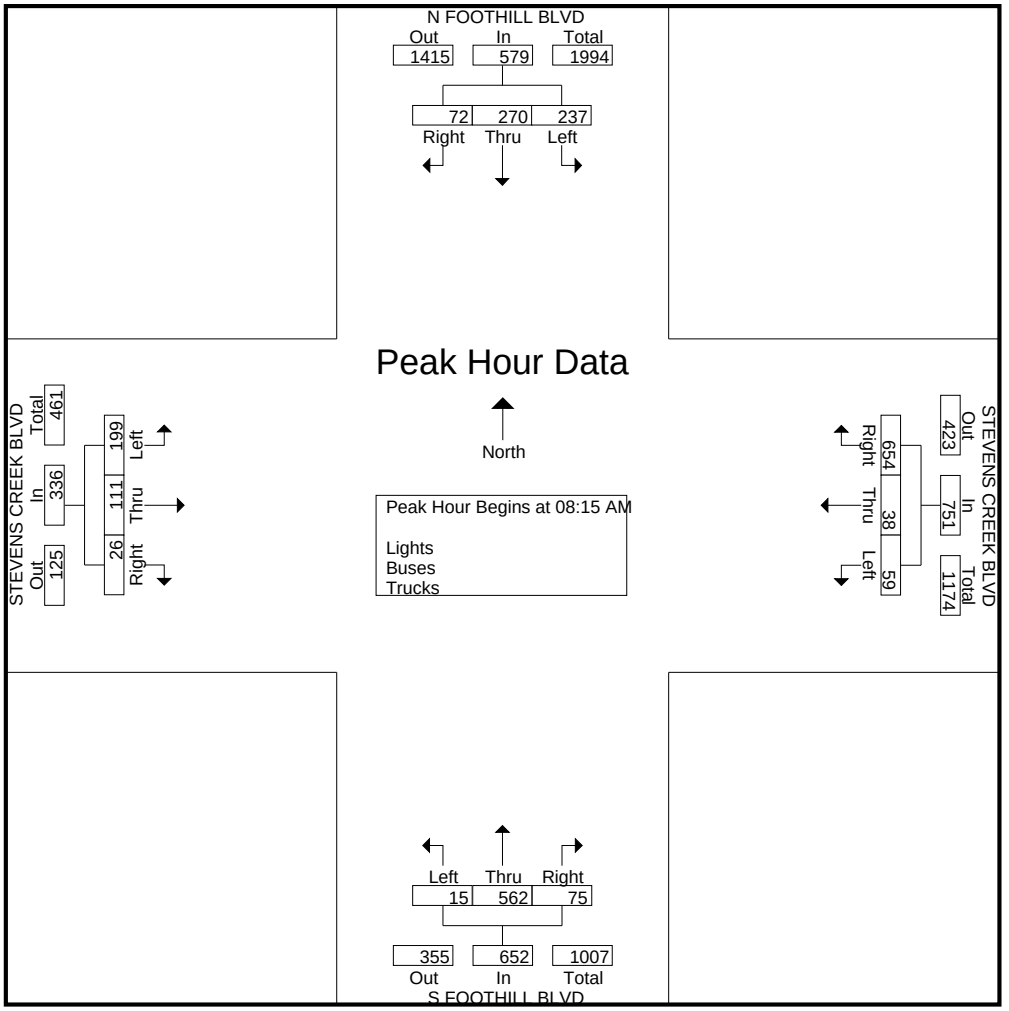

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Groups Printed- Bikes

	N FOOTHILL BLVD Southbound					STEVENS CREEK BLVD Westbound					S FOOTHILL BLVD Northbound					STEVENS CREEK BLVD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	2	0	1	0	3	0	0	0	0	0	0	0	1	0	1	4
07:45 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
Total	1	0	0	0	1	4	0	1	0	5	0	0	0	0	0	0	0	2	0	2	8
08:00 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
08:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	4	1	0	5	7
08:45 AM	0	0	1	0	1	0	0	0	0	0	0	4	0	0	4	0	2	0	0	2	7
Total	0	0	1	0	1	0	0	0	0	0	4	5	0	0	9	0	7	1	0	8	18
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
09:15 AM	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
09:30 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	4
09:45 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	1	0	3	1	0	0	0	1	0	4	0	0	4	0	1	0	0	1	9
Grand Total	1	2	2	0	5	5	0	1	0	6	4	9	0	0	13	0	8	3	0	11	35
Apprch %	20	40	40	0		83.3	0	16.7	0		30.8	69.2	0	0		0	72.7	27.3	0		
Total %	2.9	5.7	5.7	0	14.3	14.3	0	2.9	0	17.1	11.4	25.7	0	0	37.1	0	22.9	8.6	0	31.4	

	N FOOTHILL BLVD Southbound				STEVENS CREEK BLVD Westbound				S FOOTHILL BLVD Northbound				STEVENS CREEK BLVD Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	0	0	0	0	0	0	0	**2**	0	0	2	0	0	0	0	2
08:15 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
08:30 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	**4**	**1**	**5**	**7**
08:45 AM	0	0	**1**	**1**	0	0	0	0	0	**4**	0	**4**	0	2	0	2	7
Total Volume	0	0	1	1	0	0	0	0	4	5	0	9	0	7	1	8	18
% App. Total	0	0	100		0	0	0		44.4	55.6	0		0	87.5	12.5		
PHF	.000	.000	.250	.250	.000	.000	.000	.000	.500	.313	.000	.563	.000	.438	.250	.400	.643

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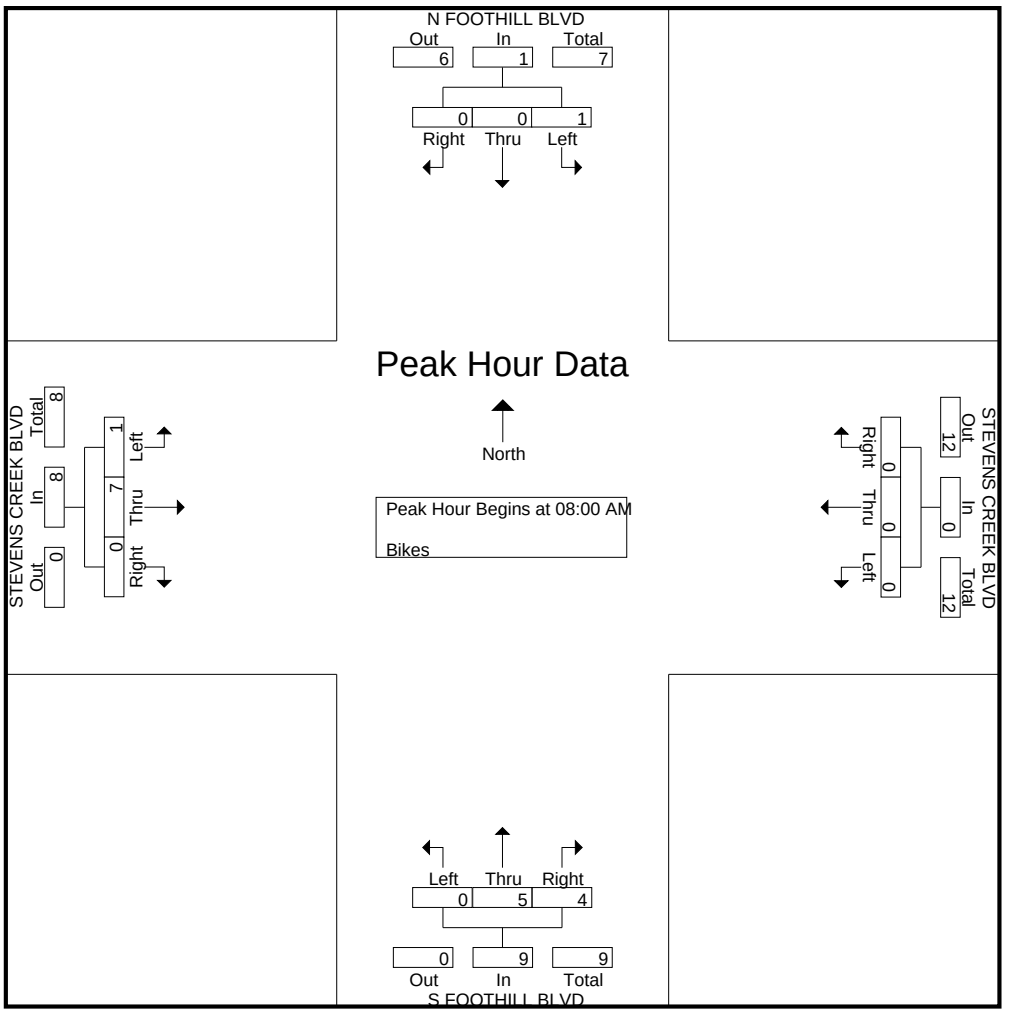

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File Name : 1PM FINAL
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Groups Printed- Lights - Buses - Trucks

	N FOOTHILL BLVD Southbound					STEVENS CREEK BLVD Westbound					S FOOTHILL BLVD Northbound					STEVENS CREEK BLVD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	11	103	132	0	246	42	12	17	7	78	16	39	2	0	57	6	10	16	0	32	413
04:15 PM	17	119	138	0	274	39	11	21	6	77	21	44	1	2	68	1	14	7	0	22	441
04:30 PM	15	155	118	1	289	36	17	25	1	79	24	38	4	0	66	6	30	12	0	48	482
04:45 PM	21	185	147	1	354	39	20	15	0	74	17	28	2	0	47	2	14	9	2	27	502
Total	64	562	535	2	1163	156	60	78	14	308	78	149	9	2	238	15	68	44	2	129	1838
05:00 PM	29	175	126	0	330	53	12	28	0	93	31	44	2	0	77	2	17	15	0	34	534
05:15 PM	24	194	113	0	331	39	21	23	0	83	23	34	2	0	59	6	22	13	0	41	514
05:30 PM	32	210	140	0	382	46	17	22	2	87	25	45	5	0	75	1	18	14	0	33	577
05:45 PM	36	209	141	1	387	54	26	37	1	118	19	41	2	0	62	3	23	17	0	43	610
Total	121	788	520	1	1430	192	76	110	3	381	98	164	11	0	273	12	80	59	0	151	2235
06:00 PM	24	191	132	0	347	55	22	19	1	97	20	23	4	0	47	1	20	20	0	41	532
06:15 PM	24	154	111	0	289	42	28	30	2	102	14	39	1	0	54	4	15	11	0	30	475
06:30 PM	26	123	151	0	300	38	22	21	2	83	20	33	1	2	56	1	15	15	0	31	470
06:45 PM	28	102	90	0	220	31	17	18	0	66	21	31	4	0	56	6	20	9	0	35	377
Total	102	570	484	0	1156	166	89	88	5	348	75	126	10	2	213	12	70	55	0	137	1854
Grand Total	287	1920	1539	3	3749	514	225	276	22	1037	251	439	30	4	724	39	218	158	2	417	5927
Apprch %	7.7	51.2	41.1	0.1		49.6	21.7	26.6	2.1		34.7	60.6	4.1	0.6		9.4	52.3	37.9	0.5		
Total %	4.8	32.4	26	0.1	63.3	8.7	3.8	4.7	0.4	17.5	4.2	7.4	0.5	0.1	12.2	0.7	3.7	2.7	0	7	
Lights	285	1913	1530	3	3731	504	222	275	22	1023	248	435	29	4	716	39	216	148	2	405	5875
% Lights	99.3	99.6	99.4	100	99.5	98.1	98.7	99.6	100	98.6	98.8	99.1	96.7	100	98.9	100	99.1	93.7	100	97.1	99.1
Buses	0	2	6	0	8	6	0	0	0	6	1	0	0	0	1	0	0	0	0	0	15
% Buses	0	0.1	0.4	0	0.2	1.2	0	0	0	0.6	0.4	0	0	0	0.1	0	0	0	0	0	0.3
Trucks	2	5	3	0	10	4	3	1	0	8	2	4	1	0	7	0	2	10	0	12	37
% Trucks	0.7	0.3	0.2	0	0.3	0.8	1.3	0.4	0	0.8	0.8	0.9	3.3	0	1	0	0.9	6.3	0	2.9	0.6

	N FOOTHILL BLVD Southbound				STEVENS CREEK BLVD Westbound				S FOOTHILL BLVD Northbound				STEVENS CREEK BLVD Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	29	175	126	330	53	12	28	93	**31**	44	2	**77**	2	17	15	34	534
05:15 PM	24	194	113	331	39	21	23	83	23	34	2	59	**6**	22	13	41	514
05:30 PM	32	**210**	140	382	46	17	22	85	25	**45**	**5**	75	1	18	14	33	575
05:45 PM	**36**	209	**141**	**386**	**54**	**26**	**37**	**117**	19	41	2	62	3	**23**	**17**	**43**	**608**
Total Volume	121	788	520	1429	192	76	110	378	98	164	11	273	12	80	59	151	2231
% App. Total	8.5	55.1	36.4		50.8	20.1	29.1		35.9	60.1	4		7.9	53	39.1		
PHF	.840	.938	.922	.926	.889	.731	.743	.808	.790	.911	.550	.886	.500	.870	.868	.878	.917

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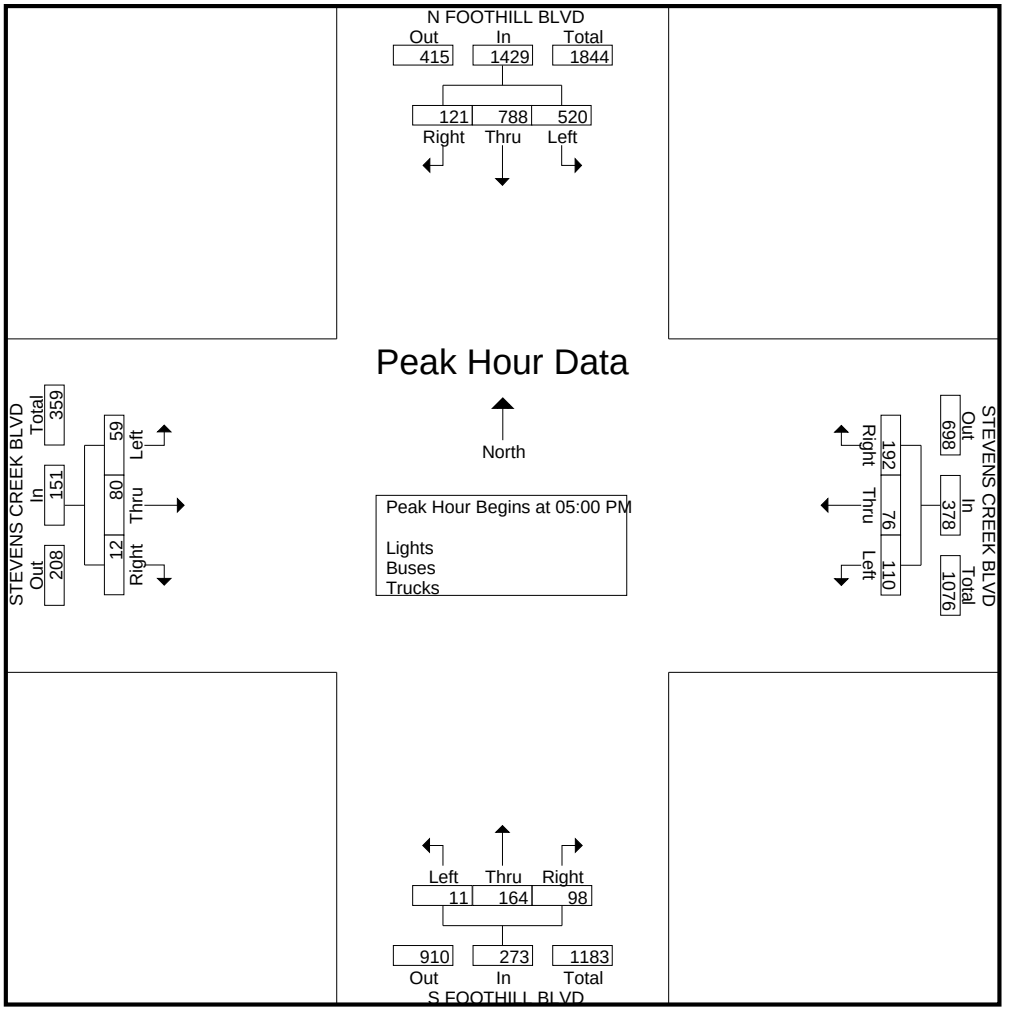

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File Name : 1PM FINAL
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Groups Printed- Bikes

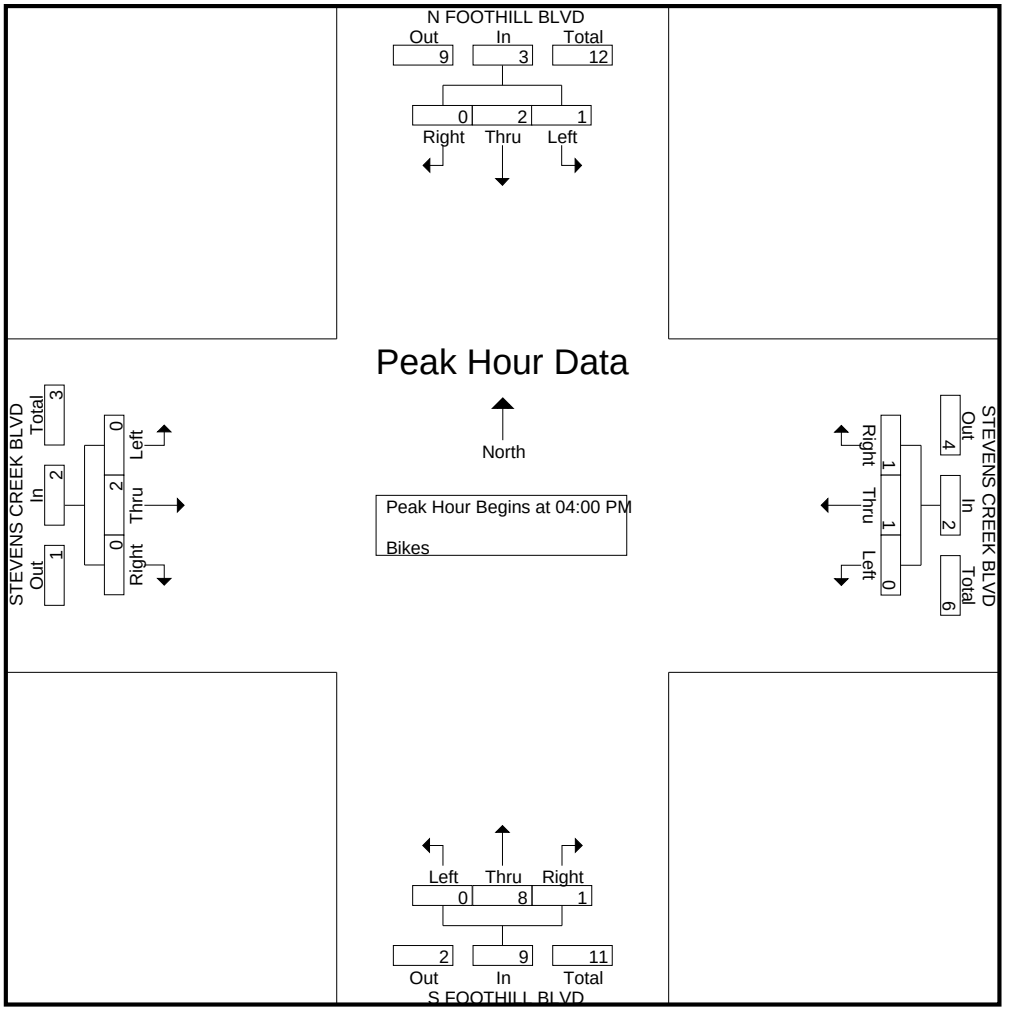
	N FOOTHILL BLVD Southbound					STEVENS CREEK BLVD Westbound					S FOOTHILL BLVD Northbound					STEVENS CREEK BLVD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	3
04:15 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	2
04:30 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	4
04:45 PM	0	0	1	0	1	0	0	0	0	0	1	5	0	0	6	0	0	0	0	0	7
Total	0	2	1	0	3	1	1	0	0	2	1	8	0	0	9	0	2	0	0	2	16
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
05:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	3
05:30 PM	0	0	1	0	1	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	3
05:45 PM	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	0	0	0	0	0	3
Total	0	1	1	0	2	1	1	1	0	3	1	3	0	0	4	0	1	0	0	1	10
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 PM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
06:45 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	1	1	0	0	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	3
Grand Total	1	4	2	0	7	2	2	2	0	6	2	11	0	0	13	0	3	0	0	3	29
Apprch %	14.3	57.1	28.6	0		33.3	33.3	33.3	0		15.4	84.6	0	0		0	100	0	0		
Total %	3.4	13.8	6.9	0	24.1	6.9	6.9	6.9	0	20.7	6.9	37.9	0	0	44.8	0	10.3	0	0	10.3	

	N FOOTHILL BLVD Southbound				STEVENS CREEK BLVD Westbound				S FOOTHILL BLVD Northbound				STEVENS CREEK BLVD Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	**1**	0	**1**	0	2	0	2	0	0	0	0	3
04:15 PM	0	0	0	0	**1**	0	0	1	0	0	0	0	0	**1**	0	**1**	2
04:30 PM	0	**2**	0	**2**	0	0	0	0	0	1	0	1	0	1	0	1	4
04:45 PM	0	0	**1**	1	0	0	0	0	**1**	**5**	0	**6**	0	0	0	0	**7**
Total Volume	0	2	1	3	1	1	0	2	1	8	0	9	0	2	0	2	16
% App. Total	0	66.7	33.3		50	50	0		11.1	88.9	0		0	100	0		
PHF	.000	.250	.250	.375	.250	.250	.000	.500	.250	.400	.000	.375	.000	.500	.000	.500	.571

Traffic Data Service

San Jose, CA
(408) 622-4787
tdsbay@cs.com

File Name : 1PM FINAL
Site Code : 00000001
Start Date : 1/23/2019
Page No : 2



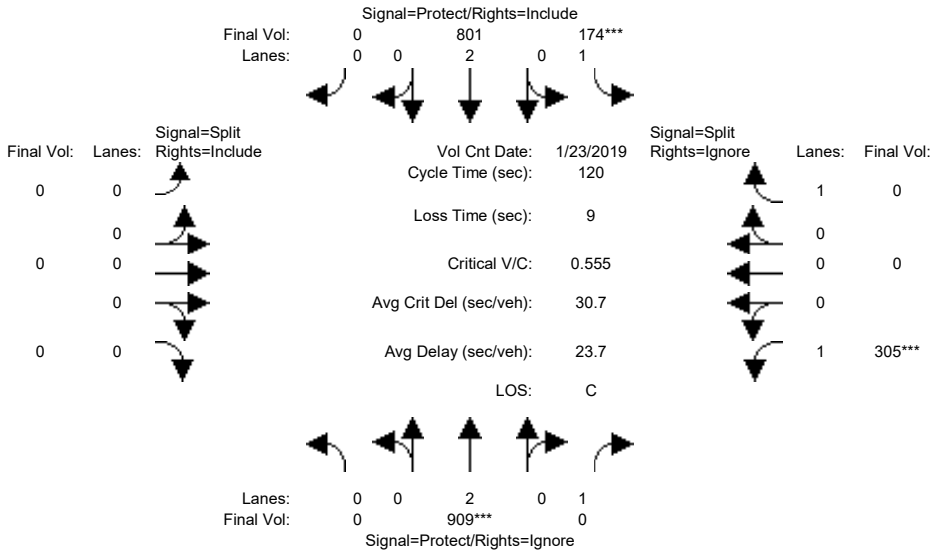
Appendix C:
Intersection Level of Service Calculations



Project Rainbow
SJ18-1829
Existing

Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing AM

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 08:15:00 AM												
Base Vol:	0	909	426	174	801	0	0	0	0	305	0	768
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	909	426	174	801	0	0	0	0	305	0	768
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	909	426	174	801	0	0	0	0	305	0	768
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	909	0	174	801	0	0	0	0	305	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	909	0	174	801	0	0	0	0	305	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	909	0	174	801	0	0	0	0	305	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.24	0.00	0.10	0.21	0.00	0.00	0.00	0.00	0.17	0.00	0.00
Crit Moves:		****		****						****		
Green Time:	0.0	51.8	0.0	21.5	73.3	0.0	0.0	0.0	0.0	37.7	0.0	0.0
Volume/Cap:	0.00	0.55	0.00	0.55	0.35	0.00	0.00	0.00	0.00	0.55	0.00	0.00
Delay/Veh:	0.0	25.9	0.0	47.0	11.6	0.0	0.0	0.0	0.0	35.4	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	25.9	0.0	47.0	11.6	0.0	0.0	0.0	0.0	35.4	0.0	0.0
LOS by Move:	A	C	A	D	B+	A	A	A	A	D+	A	A
HCM2kAvgQ:	0	13	0	7	7	0	0	0	0	10	0	0

Note: Queue reported is the number of cars per lane.

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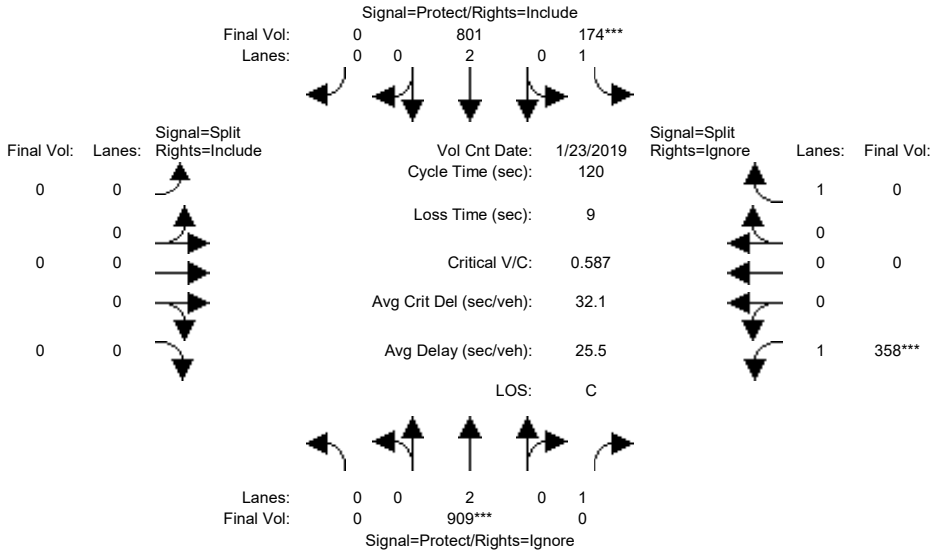
Project Rainbow
SJ18-1829
Existing

Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing AM PP

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 08:15:00 AM												
Base Vol:	0	909	426	174	801	0	0	0	0	305	0	768
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	909	426	174	801	0	0	0	0	305	0	768
Added Vol:	0	0	23	0	0	0	0	0	0	53	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	909	449	174	801	0	0	0	0	358	0	768
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	909	0	174	801	0	0	0	0	358	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	909	0	174	801	0	0	0	0	358	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	909	0	174	801	0	0	0	0	358	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.24	0.00	0.10	0.21	0.00	0.00	0.00	0.00	0.20	0.00	0.00
Crit Moves:		****		****						****		
Green Time:	0.0	48.9	0.0	20.3	69.2	0.0	0.0	0.0	0.0	41.8	0.0	0.0
Volume/Cap:	0.00	0.59	0.00	0.59	0.37	0.00	0.00	0.00	0.00	0.59	0.00	0.00
Delay/Veh:	0.0	28.3	0.0	49.0	13.7	0.0	0.0	0.0	0.0	33.5	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	28.3	0.0	49.0	13.7	0.0	0.0	0.0	0.0	33.5	0.0	0.0
LOS by Move:	A	C	A	D	B	A	A	A	A	C-	A	A
HCM2kAvgQ:	0	13	0	7	8	0	0	0	0	12	0	0

Note: Queue reported is the number of cars per lane.

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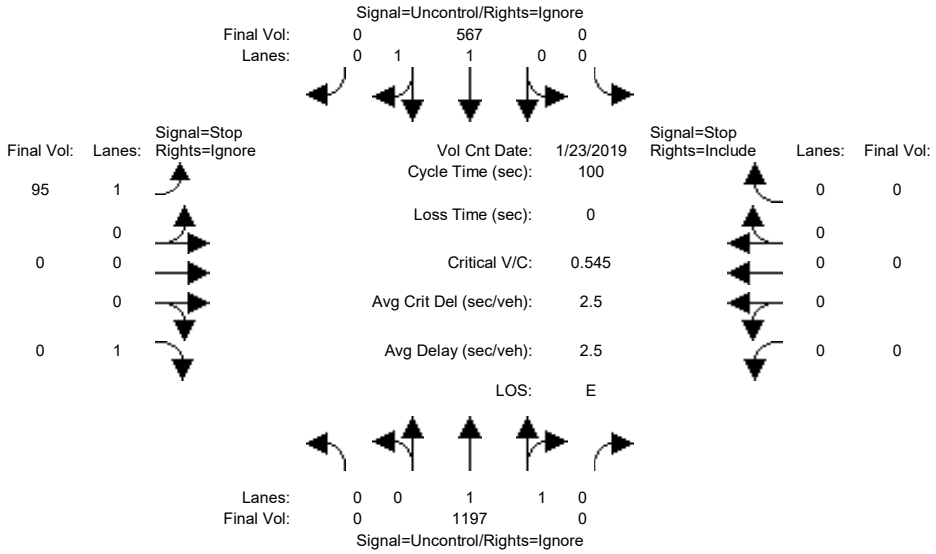
Project Rainbow
SJ18-1829
Existing

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Existing AM

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Volume Module: >> Count Date: 23 Jan 2019 << 08:15:00 AM												
Base Vol:	0	1197	568	0	567	521	95	0	112	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	1197	568	0	567	521	95	0	112	0	0	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1197	568	0	567	521	95	0	112	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	0	1197	0	0	567	0	95	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	1197	0	0	567	0	95	0	0	0	0	0
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.0	xxxx	7.1	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.6	xxxx	3.4	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	1166	xxxx	284	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	174	xxxx	687	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	174	xxxx	687	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	0.55	xxxx	0.00	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	2.8	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	48.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	E	*	*	*	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			48.0			xxxxxx		
ApproachLOS:	*			*			E			*		

Note: Queue reported is the number of cars per lane.

Peak Hour Delay Signal Warrant Report

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant NOT Met

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1197	568	0	567	521	95	0	112	0	0	0
ApproachDel:	xxxxxx			xxxxxx			48.0			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=2.8]
FAIL - Vehicle-hours less than 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=207]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3060]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1197	568	0	567	521	95	0	112	0	0	0

Major Street Volume: 2853
Minor Approach Volume: 207
Minor Approach Volume Threshold: -77 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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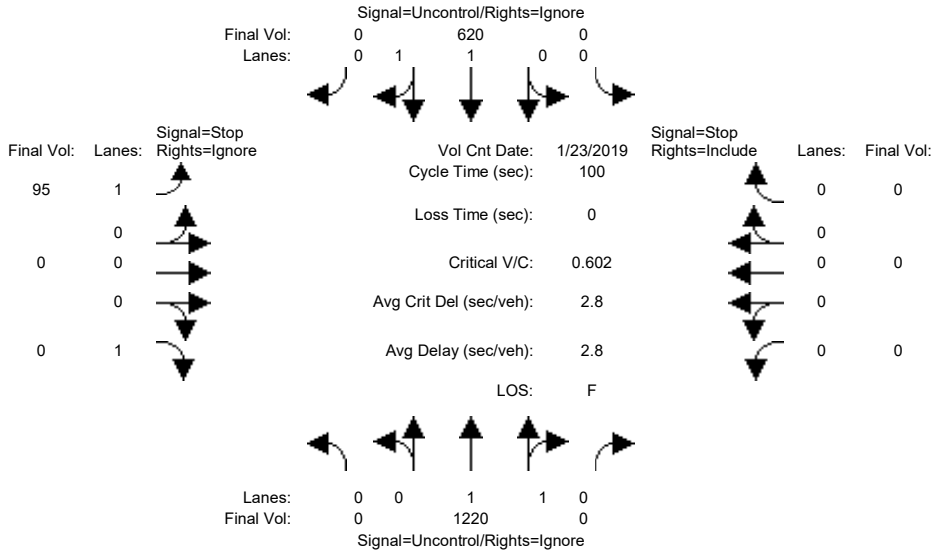
Project Rainbow
SJ18-1829
Existing

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Existing AM PP

Intersection #2: I-280 SB Ramps / Foothill Expy




```
Street Name:          Foothill Expy                    I-280 SB Ramps
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module: >> Count Date: 23 Jan 2019 << 08:15:00 AM
Base Vol:       0 1197   568     0  567   521    95    0   112     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0 1197   568     0  567   521    95    0   112     0    0     0
Added Vol:      0   23    43     0   53     0     0    0    29     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0 1220   611     0  620   521    95    0   141     0    0     0
User Adj:    1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Volume:     0 1220     0     0  620     0    95    0     0     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0 1220     0     0  620     0    95    0     0     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.0 xxxx   7.1 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   3.6 xxxx   3.4 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  1230 xxxx   310  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx   158 xxxx   660  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   158 xxxx   660  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.60 xxxx  0.00  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   3.2 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx  57.5 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     F    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             57.5           xxxxxx
ApproachLOS:         *                *                F                *
Note: Queue reported is the number of cars per lane.
                  Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #2 I-280 SB Ramps / Foothill Expy
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1220	611	0	620	521	95	0	141	0	0	0
ApproachDel:	xxxxxx			xxxxxx			57.5			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=3.8]
FAIL - Vehicle-hours less than 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=236]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3208]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1220	611	0	620	521	95	0	141	0	0	0

Major Street Volume: 2972
Minor Approach Volume: 236
Minor Approach Volume Threshold: -94 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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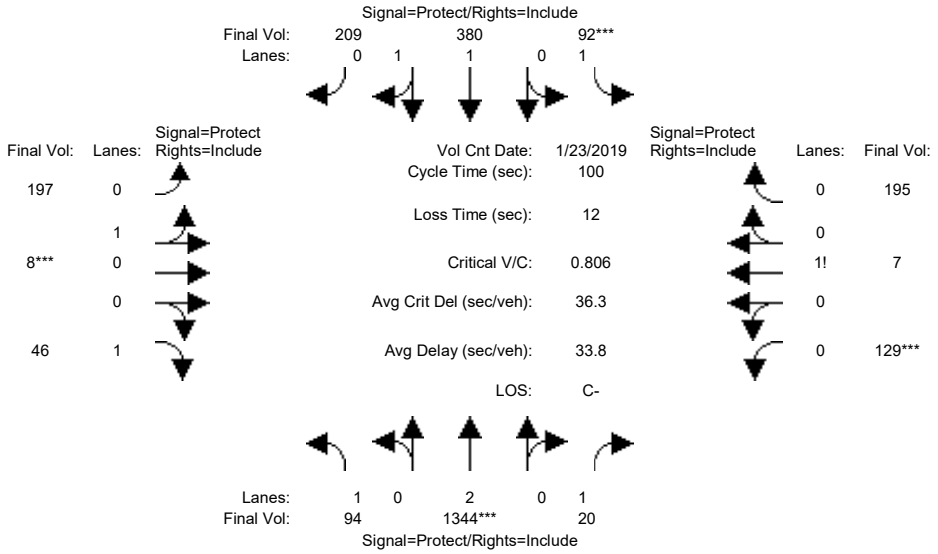
Project Rainbow
SJ18-1829
Existing

Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing AM

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 08:15:00 AM												
Base Vol:	94	1344	20	92	380	209	197	8	46	129	7	195
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	94	1344	20	92	380	209	197	8	46	129	7	195
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	94	1344	20	92	380	209	197	8	46	129	7	195
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	94	1344	20	92	380	209	197	8	46	129	7	195
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	94	1344	20	92	380	209	197	8	46	129	7	195
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	94	1344	20	92	380	209	197	8	46	129	7	195
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.99	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.27	0.73	0.96	0.04	1.00	0.39	0.02	0.59
Final Sat.:	1750	3800	1750	1750	2386	1312	1730	70	1750	682	37	1031
Capacity Analysis Module:												
Vol/Sat:	0.05	0.35	0.01	0.05	0.16	0.16	0.11	0.11	0.03	0.19	0.19	0.19
Crit Moves:		****		****				****		****		
Green Time:	15.5	43.6	43.6	7.0	35.2	35.2	14.0	14.0	14.0	23.3	23.3	23.3
Volume/Cap:	0.35	0.81	0.03	0.75	0.45	0.45	0.81	0.81	0.19	0.81	0.81	0.81
Delay/Veh:	38.5	27.7	16.1	68.2	25.2	25.2	59.3	59.3	38.3	47.8	47.8	47.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	38.5	27.7	16.1	68.2	25.2	25.2	59.3	59.3	38.3	47.8	47.8	47.8
LOS by Move:	D+	C	B	E	C	C	E+	E+	D+	D	D	D
HCM2kAvgQ:	3	18	0	5	7	7	9	9	1	13	13	13

Note: Queue reported is the number of cars per lane.

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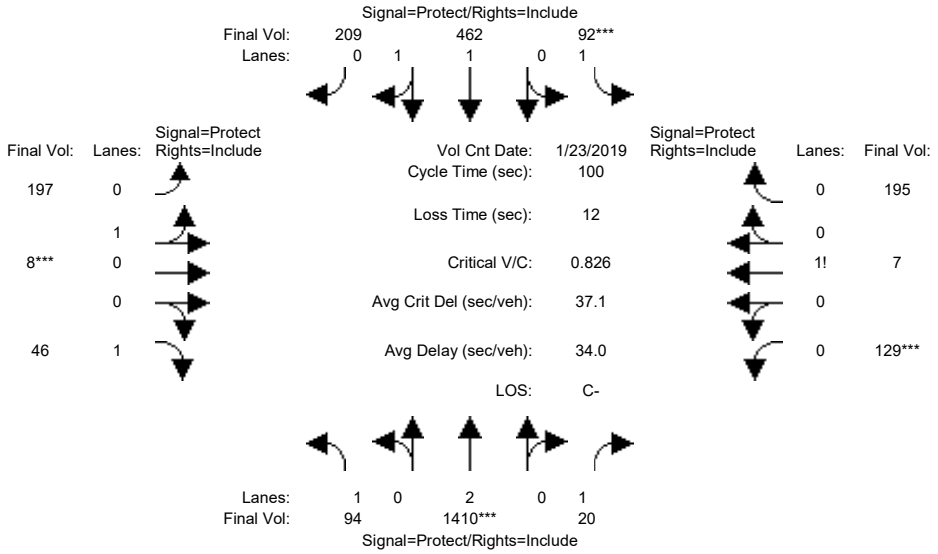
Project Rainbow
SJ18-1829
Existing

Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing AM PP

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 08:15:00 AM												
Base Vol:	94	1344	20	92	380	209	197	8	46	129	7	195
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	94	1344	20	92	380	209	197	8	46	129	7	195
Added Vol:	0	66	0	0	82	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	94	1410	20	92	462	209	197	8	46	129	7	195
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	94	1410	20	92	462	209	197	8	46	129	7	195
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	94	1410	20	92	462	209	197	8	46	129	7	195
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	94	1410	20	92	462	209	197	8	46	129	7	195
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.99	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.36	0.64	0.96	0.04	1.00	0.39	0.02	0.59
Final Sat.:	1750	3800	1750	1750	2547	1152	1730	70	1750	682	37	1031
Capacity Analysis Module:												
Vol/Sat:	0.05	0.37	0.01	0.05	0.18	0.18	0.11	0.11	0.03	0.19	0.19	0.19
Crit Moves:		****		****				****		****		
Green Time:	14.4	44.6	44.6	7.0	37.2	37.2	13.7	13.7	13.7	22.7	22.7	22.7
Volume/Cap:	0.37	0.83	0.03	0.75	0.49	0.49	0.83	0.83	0.19	0.83	0.83	0.83
Delay/Veh:	39.7	28.1	15.5	68.2	24.3	24.3	62.8	62.8	38.6	50.7	50.7	50.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	39.7	28.1	15.5	68.2	24.3	24.3	62.8	62.8	38.6	50.7	50.7	50.7
LOS by Move:	D	C	B	E	C	C	E	E	D+	D	D	D
HCM2kAvgQ:	3	19	0	5	8	8	9	9	1	13	13	13

Note: Queue reported is the number of cars per lane.

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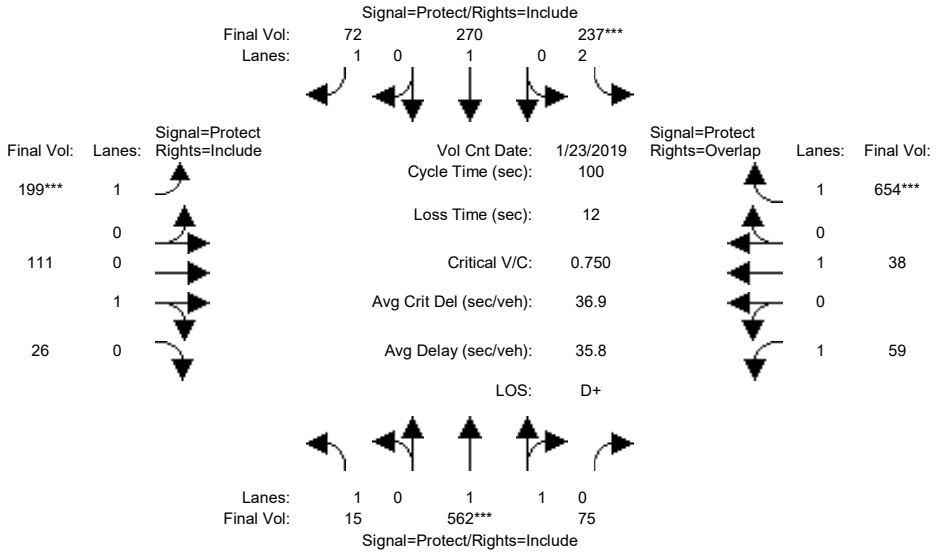
Project Rainbow
SJ18-1829
Existing

Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing AM

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 08:15:00 AM												
Base Vol:	15	562	75	237	270	72	199	111	26	59	38	654
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	15	562	75	237	270	72	199	111	26	59	38	654
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	562	75	237	270	72	199	111	26	59	38	654
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	15	562	75	237	270	72	199	111	26	59	38	654
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	15	562	75	237	270	72	199	111	26	59	38	654
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	15	562	75	237	270	72	199	111	26	59	38	654
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.98	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.76	0.24	2.00	1.00	1.00	1.00	0.81	0.19	1.00	1.00	1.00
Final Sat.:	1750	3264	436	3150	1900	1750	1750	1458	342	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.17	0.17	0.08	0.14	0.04	0.11	0.08	0.08	0.03	0.02	0.37
Crit Moves:		****		****			****					****
Green Time:	10.9	23.0	23.0	10.0	22.1	22.1	15.2	32.3	32.3	22.6	39.8	49.9
Volume/Cap:	0.08	0.75	0.75	0.75	0.64	0.19	0.75	0.24	0.24	0.15	0.05	0.75
Delay/Veh:	40.2	39.6	39.6	53.3	38.7	31.9	51.8	25.0	25.0	31.1	18.5	23.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	40.2	39.6	39.6	53.3	38.7	31.9	51.8	25.0	25.0	31.1	18.5	23.7
LOS by Move:	D	D	D	D-	D+	C	D-	C	C	C	B-	C
HCM2kAvgQ:	0	10	10	5	7	2	8	3	3	2	1	19

Note: Queue reported is the number of cars per lane.

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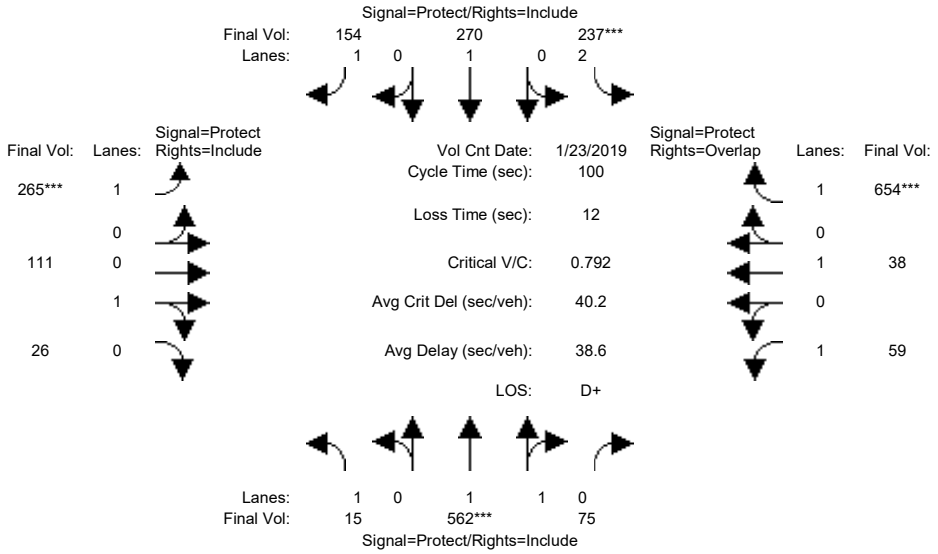
Project Rainbow
SJ18-1829
Existing

Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing AM PP

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 08:15:00 AM												
Base Vol:	15	562	75	237	270	72	199	111	26	59	38	654
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	15	562	75	237	270	72	199	111	26	59	38	654
Added Vol:	0	0	0	0	0	82	66	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	562	75	237	270	154	265	111	26	59	38	654
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	15	562	75	237	270	154	265	111	26	59	38	654
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	15	562	75	237	270	154	265	111	26	59	38	654
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	15	562	75	237	270	154	265	111	26	59	38	654
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.98	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.76	0.24	2.00	1.00	1.00	1.00	0.81	0.19	1.00	1.00	1.00
Final Sat.:	1750	3264	436	3150	1900	1750	1750	1458	342	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.17	0.17	0.08	0.14	0.09	0.15	0.08	0.08	0.03	0.02	0.37
Crit Moves:		****		****			****					****
Green Time:	10.3	21.7	21.7	9.5	20.9	20.9	19.1	33.4	33.4	23.4	37.7	47.2
Volume/Cap:	0.08	0.79	0.79	0.79	0.68	0.42	0.79	0.23	0.23	0.14	0.05	0.79
Delay/Veh:	40.8	42.4	42.4	57.7	41.2	35.1	50.7	24.2	24.2	30.5	19.9	27.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	40.8	42.4	42.4	57.7	41.2	35.1	50.7	24.2	24.2	30.5	19.9	27.6
LOS by Move:	D	D	D	E+	D	D+	D	C	C	C	B-	C
HCM2kAvgQ:	0	10	10	5	8	4	11	3	3	2	1	20

Note: Queue reported is the number of cars per lane.

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Project Rainbow
SJ18-1829
Existing

Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

	???				Existing AM				Existing AM PP						???			
Intersection	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	?	xx.x	x.xxx	xx.x	C	23.7	0.555	30.7	C	25.5	0.587	+ 0.033	32.1	+ 1.4	?	xx.x	x.xxx	xx.x
#2	?	xx.x	x.xxx	xx.x	E	2.5	0.545	2.5	F	2.8	0.602	+ 0.057	2.8	+ 0.4	?	xx.x	x.xxx	xx.x
#3	?	xx.x	x.xxx	xx.x	C-	33.8	0.806	36.3	C-	34.0	0.826	+ 0.020	37.1	+ 0.8	?	xx.x	x.xxx	xx.x
#4	?	xx.x	x.xxx	xx.x	D+	35.8	0.750	36.9	D+	38.6	0.792	+ 0.043	40.2	+ 3.4	?	xx.x	x.xxx	xx.x

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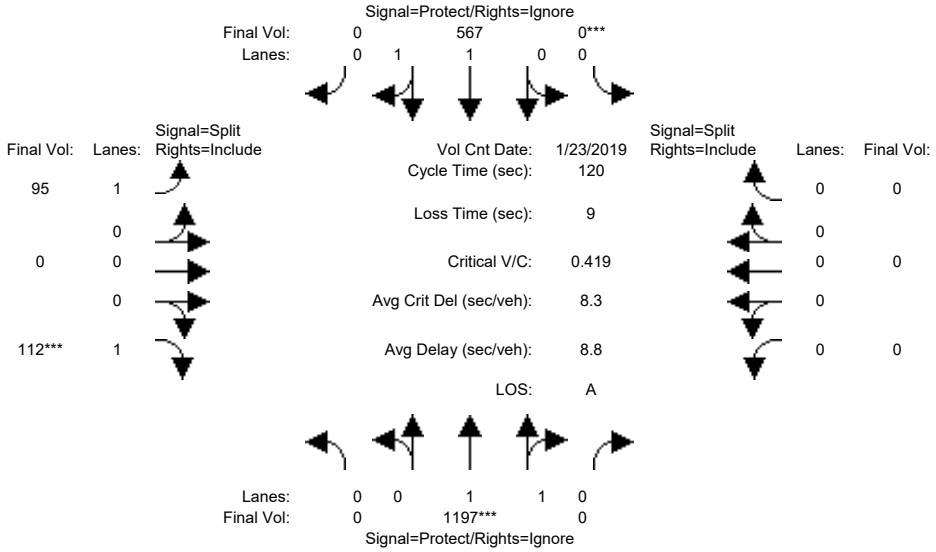
Project Rainbow
SJ18-1829
Existing

Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing AM + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 08:15:00 AM												
Base Vol:	0	1197	568	0	567	521	95	0	112	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	1197	568	0	567	521	95	0	112	0	0	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1197	568	0	567	521	95	0	112	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	1197	0	0	567	0	95	0	112	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	1197	0	0	567	0	95	0	112	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	0	1197	0	0	567	0	95	0	112	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1750	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.32	0.00	0.00	0.15	0.00	0.05	0.00	0.06	0.00	0.00	0.00
Crit Moves:		****		****					****			
Green Time:	0.0	92.7	0.0	0.0	92.7	0.0	18.3	0.0	18.3	0.0	0.0	0.0
Volume/Cap:	0.00	0.42	0.00	0.00	0.20	0.00	0.36	0.00	0.42	0.00	0.00	0.00
Delay/Veh:	0.0	4.7	0.0	0.0	3.7	0.0	46.4	0.0	47.1	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	4.7	0.0	0.0	3.7	0.0	46.4	0.0	47.1	0.0	0.0	0.0
LOS by Move:	A	A	A	A	A	A	D	A	D	A	A	A
HCM2kAvgQ:	0	7	0	0	3	0	4	0	4	0	0	0

Note: Queue reported is the number of cars per lane.

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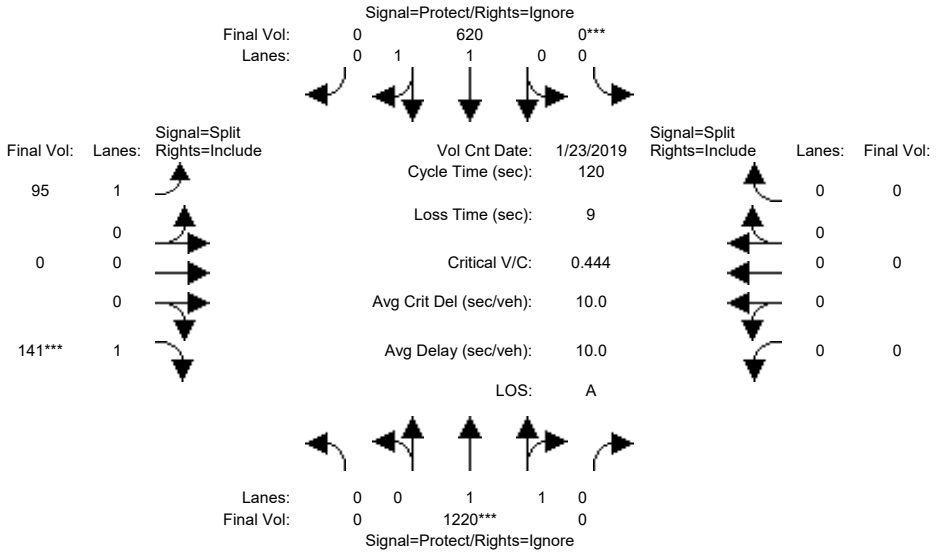
Project Rainbow
SJ18-1829
Existing

Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing AM PP + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 08:15:00 AM												
Base Vol:	0	1197	568	0	567	521	95	0	112	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	1197	568	0	567	521	95	0	112	0	0	0
Added Vol:	0	23	43	0	53	0	0	0	29	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1220	611	0	620	521	95	0	141	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	1220	0	0	620	0	95	0	141	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	1220	0	0	620	0	95	0	141	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	0	1220	0	0	620	0	95	0	141	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1750	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.33	0.00	0.00	0.17	0.00	0.05	0.00	0.08	0.00	0.00	0.00
Crit Moves:		****		****					****			
Green Time:	0.0	89.2	0.0	0.0	89.2	0.0	21.8	0.0	21.8	0.0	0.0	0.0
Volume/Cap:	0.00	0.44	0.00	0.00	0.23	0.00	0.30	0.00	0.44	0.00	0.00	0.00
Delay/Veh:	0.0	6.0	0.0	0.0	4.8	0.0	43.0	0.0	44.7	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	6.0	0.0	0.0	4.8	0.0	43.0	0.0	44.7	0.0	0.0	0.0
LOS by Move:	A	A	A	A	A	A	D	A	D	A	A	A
HCM2kAvgQ:	0	8	0	0	4	0	3	0	5	0	0	0

Note: Queue reported is the number of cars per lane.

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Project Rainbow
SJ18-1829
Existing

Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

Intersection	???				Existing AM + Mit				Existing AM PP + Mit						???			
	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#2 [ ]	?	xx.x	x.xxx	xx.x	A	8.8	0.419	8.3	A	10.0	0.444	+ 0.025	10.0	+ 1.7	?	xx.x	x.xxx	xx.x

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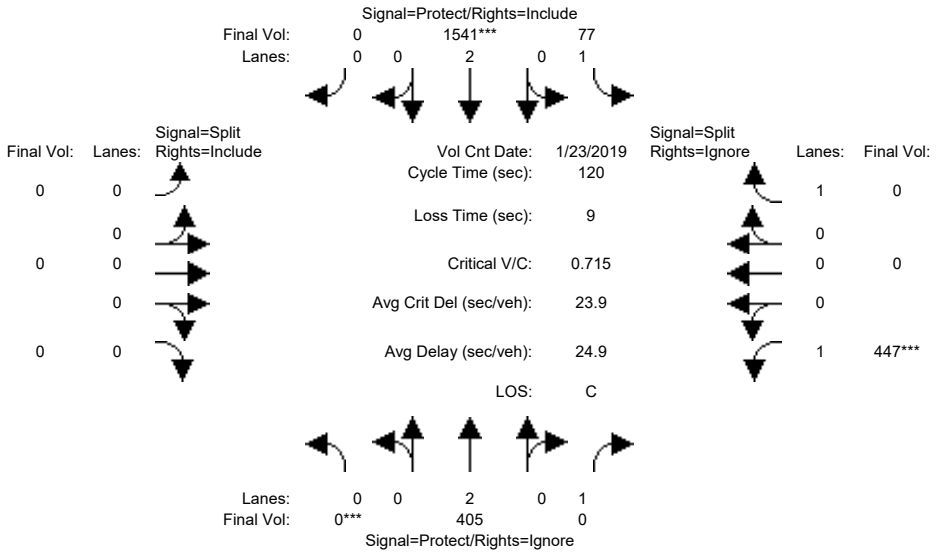
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing PM

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	405	88	77	1541	0	0	0	0	447	0	561
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	405	88	77	1541	0	0	0	0	447	0	561
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	405	88	77	1541	0	0	0	0	447	0	561
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	405	0	77	1541	0	0	0	0	447	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	405	0	77	1541	0	0	0	0	447	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	405	0	77	1541	0	0	0	0	447	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.11	0.00	0.04	0.41	0.00	0.00	0.00	0.00	0.26	0.00	0.00
Crit Moves:	****				****					****		
Green Time:	0.0	44.0	0.0	24.1	68.1	0.0	0.0	0.0	0.0	42.9	0.0	0.0
Volume/Cap:	0.00	0.29	0.00	0.22	0.71	0.00	0.00	0.00	0.00	0.71	0.00	0.00
Uniform Del:	0.0	26.9	0.0	40.1	18.9	0.0	0.0	0.0	0.0	33.3	0.0	0.0
IncremntDel:	0.0	0.1	0.0	0.3	1.2	0.0	0.0	0.0	0.0	3.9	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Delay/Veh:	0.0	27.0	0.0	40.4	20.0	0.0	0.0	0.0	0.0	37.2	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	27.0	0.0	40.4	20.0	0.0	0.0	0.0	0.0	37.2	0.0	0.0
LOS by Move:	A	C	A	D	C+	A	A	A	A	D+	A	A
HCM2kAvgQ:	0	5	0	3	21	0	0	0	0	16	0	0

Note: Queue reported is the number of cars per lane.

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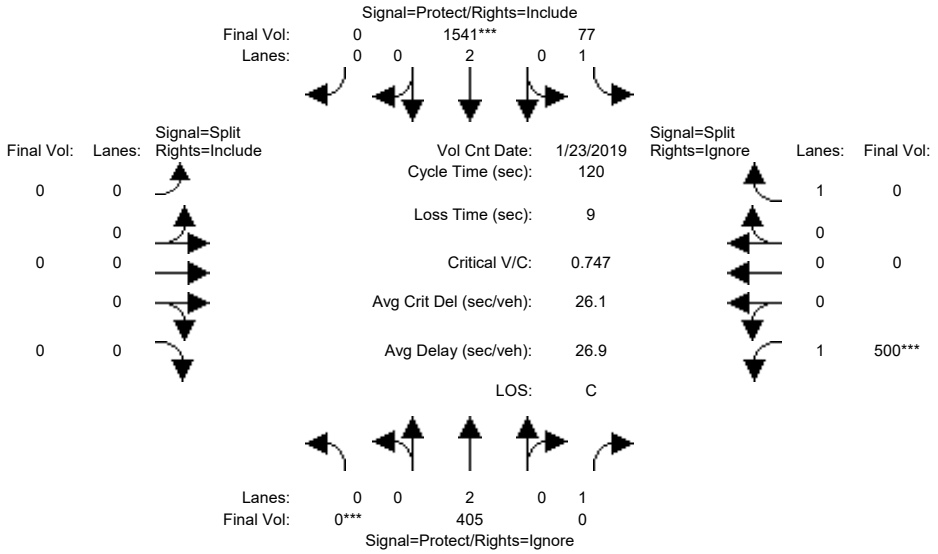
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing PM PP

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	405	88	77	1541	0	0	0	0	447	0	561
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	405	88	77	1541	0	0	0	0	447	0	561
Added Vol:	0	0	23	0	0	0	0	0	0	53	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	405	111	77	1541	0	0	0	0	500	0	561
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	405	0	77	1541	0	0	0	0	500	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	405	0	77	1541	0	0	0	0	500	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	405	0	77	1541	0	0	0	0	500	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.11	0.00	0.04	0.41	0.00	0.00	0.00	0.00	0.29	0.00	0.00
Crit Moves:	****				****					****		
Green Time:	0.0	42.1	0.0	23.0	65.1	0.0	0.0	0.0	0.0	45.9	0.0	0.0
Volume/Cap:	0.00	0.30	0.00	0.23	0.75	0.00	0.00	0.00	0.00	0.75	0.00	0.00
Delay/Veh:	0.0	28.4	0.0	41.3	22.7	0.0	0.0	0.0	0.0	36.7	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	28.4	0.0	41.3	22.7	0.0	0.0	0.0	0.0	36.7	0.0	0.0
LOS by Move:	A	C	A	D	C+	A	A	A	A	D+	A	A
HCM2kAvgQ:	0	5	0	3	22	0	0	0	0	18	0	0

Note: Queue reported is the number of cars per lane.

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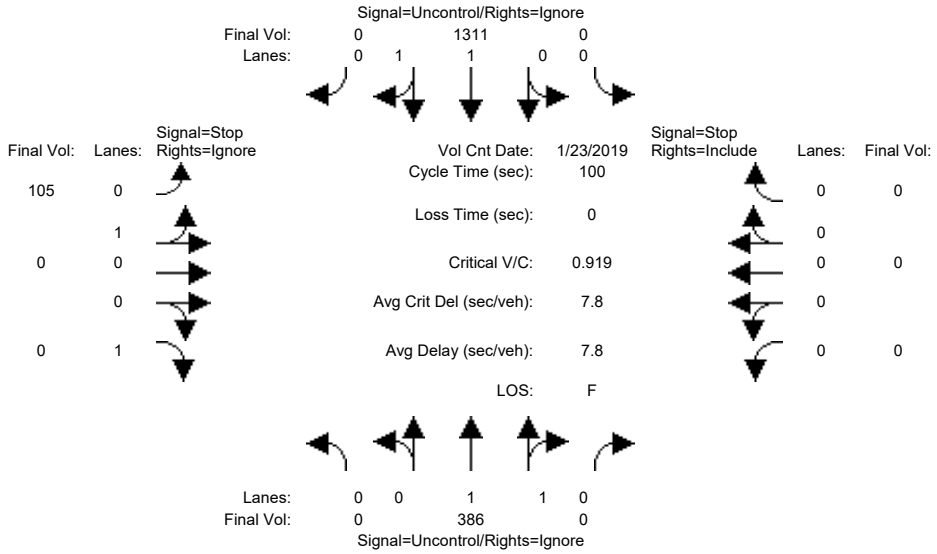
Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Existing PM

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	386	255	0	1311	716	105	0	399	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	386	255	0	1311	716	105	0	399	0	0	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	386	255	0	1311	716	105	0	399	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	0	386	0	0	1311	0	105	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	386	0	0	1311	0	105	0	0	0	0	0
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.8	6.5	6.9	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	1504	1697	656	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	114	93	413	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	114	93	413	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	0.92	0.00	0.00	xxxx	xxxx	xxxx

Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	114	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	5.7	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	133.8	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	F	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			133.8			xxxxxx		
ApproachLOS:	*			*			F			*		

Note: Queue reported is the number of cars per lane.

Peak Hour Delay Signal Warrant Report

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1	0	0 1	0 0	0	0 0
Initial Vol:	0 386	255		0 1311	716		105	0	399	0	0	0
ApproachDel:	xxxxxx			xxxxxx			133.8			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=18.7]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=504]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3172]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1	0	0 1	0 0	0	0 0
Initial Vol:	0 386	255		0 1311	716		105	0	399	0	0	0

Major Street Volume: 2668
Minor Approach Volume: 504
Minor Approach Volume Threshold: -48 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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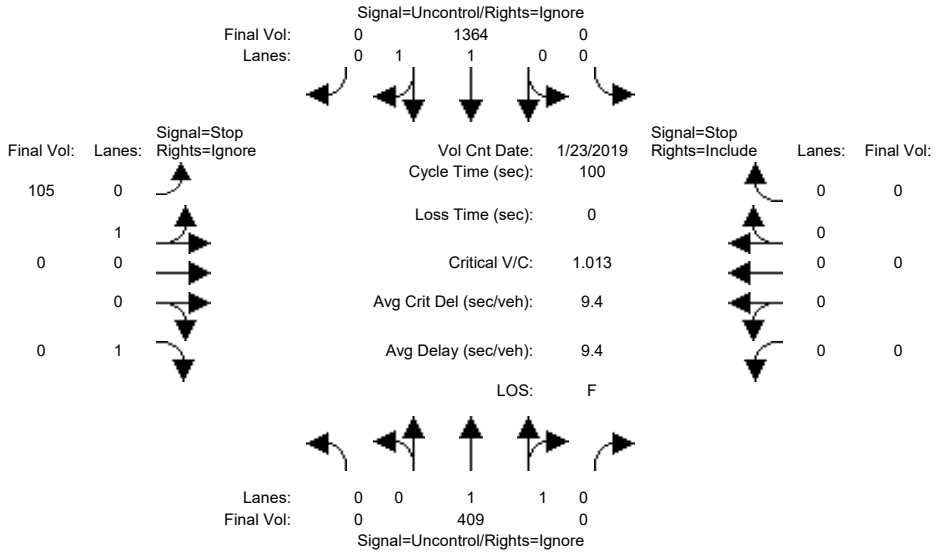
Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Existing PM PP

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	386	255	0	1311	716	105	0	399	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	386	255	0	1311	716	105	0	399	0	0	0
Added Vol:	0	23	43	0	53	0	0	0	29	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	409	298	0	1364	716	105	0	428	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	0	409	0	0	1364	0	105	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	409	0	0	1364	0	105	0	0	0	0	0
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.8	6.5	6.9	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	1569	1773	682	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	104	84	397	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	104	84	397	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	1.01	0.00	0.00	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	104	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	168.7	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	F	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			168.7			xxxxxx		
ApproachLOS:	*			*			F			*		

Note: Queue reported is the number of cars per lane.

Peak Hour Delay Signal Warrant Report

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1	0	0 1	0 0	0	0 0
Initial Vol:	0 409	298		0 1364	716		105	0	428	0	0	0
ApproachDel:	xxxxxx			xxxxxx			168.7			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=25.0]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=533]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3320]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1	0	0 1	0 0	0	0 0
Initial Vol:	0 409	298		0 1364	716		105	0	428	0	0	0

Major Street Volume: 2787
Minor Approach Volume: 533
Minor Approach Volume Threshold: -67 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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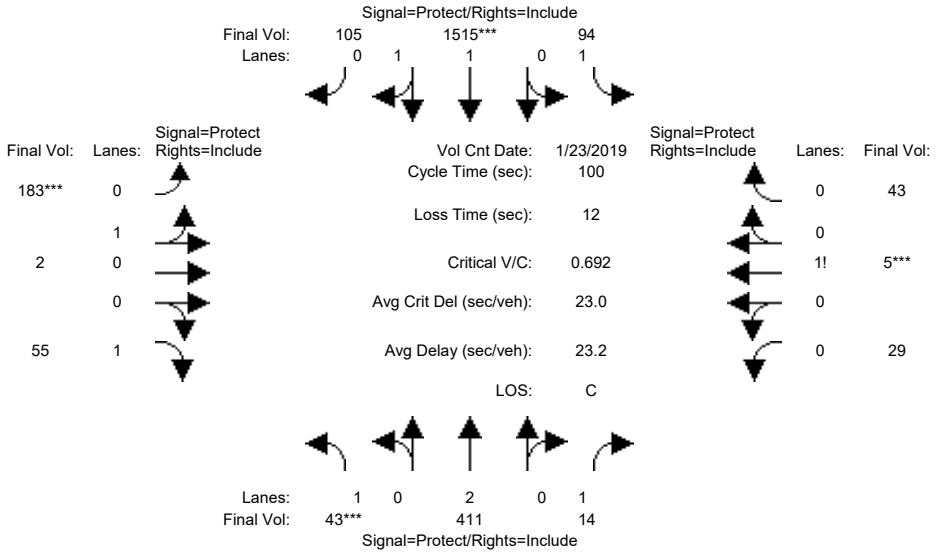
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing PM

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	43	411	14	94	1515	105	183	2	55	29	5	43
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	43	411	14	94	1515	105	183	2	55	29	5	43
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	43	411	14	94	1515	105	183	2	55	29	5	43
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	43	411	14	94	1515	105	183	2	55	29	5	43
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	43	411	14	94	1515	105	183	2	55	29	5	43
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	43	411	14	94	1515	105	183	2	55	29	5	43
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.87	0.13	0.99	0.01	1.00	0.38	0.06	0.56
Final Sat.:	1750	3800	1750	1750	3460	240	1781	19	1750	659	114	977
Capacity Analysis Module:												
Vol/Sat:	0.02	0.11	0.01	0.05	0.44	0.44	0.10	0.10	0.03	0.04	0.04	0.04
Crit Moves:	****				****		****				****	
Green Time:	7.0	39.2	39.2	25.3	57.5	57.5	13.5	14.0	14.0	9.5	10.0	10.0
Volume/Cap:	0.35	0.28	0.02	0.21	0.76	0.76	0.76	0.74	0.22	0.46	0.44	0.44
Uniform Del:	44.3	20.8	18.7	29.4	16.1	16.1	41.7	41.2	38.2	42.8	42.4	42.4
IncremntDel:	1.7	0.1	0.0	0.2	1.7	1.7	13.2	10.7	0.5	2.0	1.8	1.8
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	46.1	20.9	18.7	29.7	17.7	17.7	54.9	52.0	38.7	44.8	44.1	44.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	46.1	20.9	18.7	29.7	17.7	17.7	54.9	52.0	38.7	44.8	44.1	44.1
LOS by Move:	D	C+	B-	C	B	B	D-	D-	D+	D	D	D
HCM2kAvgQ:	1	4	0	3	20	20	8	7	2	3	3	3

Note: Queue reported is the number of cars per lane.

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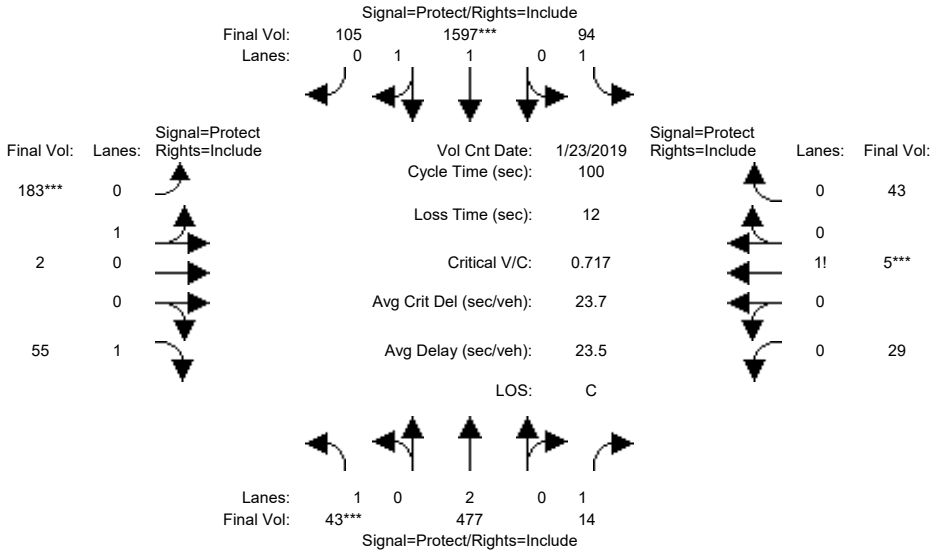
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing PM PP

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	43	411	14	94	1515	105	183	2	55	29	5	43
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	43	411	14	94	1515	105	183	2	55	29	5	43
Added Vol:	0	66	0	0	82	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	43	477	14	94	1597	105	183	2	55	29	5	43
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	43	477	14	94	1597	105	183	2	55	29	5	43
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	43	477	14	94	1597	105	183	2	55	29	5	43
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	43	477	14	94	1597	105	183	2	55	29	5	43
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.87	0.13	0.99	0.01	1.00	0.38	0.06	0.56
Final Sat.:	1750	3800	1750	1750	3472	228	1781	19	1750	659	114	977
Capacity Analysis Module:												
Vol/Sat:	0.02	0.13	0.01	0.05	0.46	0.46	0.10	0.10	0.03	0.04	0.04	0.04
Crit Moves:	****				****		****				****	
Green Time:	7.0	41.8	41.8	23.3	58.0	58.0	13.0	13.7	13.7	9.3	10.0	10.0
Volume/Cap:	0.35	0.30	0.02	0.23	0.79	0.79	0.79	0.75	0.23	0.47	0.44	0.44
Delay/Veh:	46.1	19.5	17.1	31.4	18.4	18.4	59.0	53.8	39.0	45.2	44.1	44.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	46.1	19.5	17.1	31.4	18.4	18.4	59.0	53.8	39.0	45.2	44.1	44.1
LOS by Move:	D	B-	B	C	B-	B-	E+	D-	D+	D	D	D
HCM2kAvgQ:	1	5	0	3	22	22	8	8	2	3	3	3

Note: Queue reported is the number of cars per lane.

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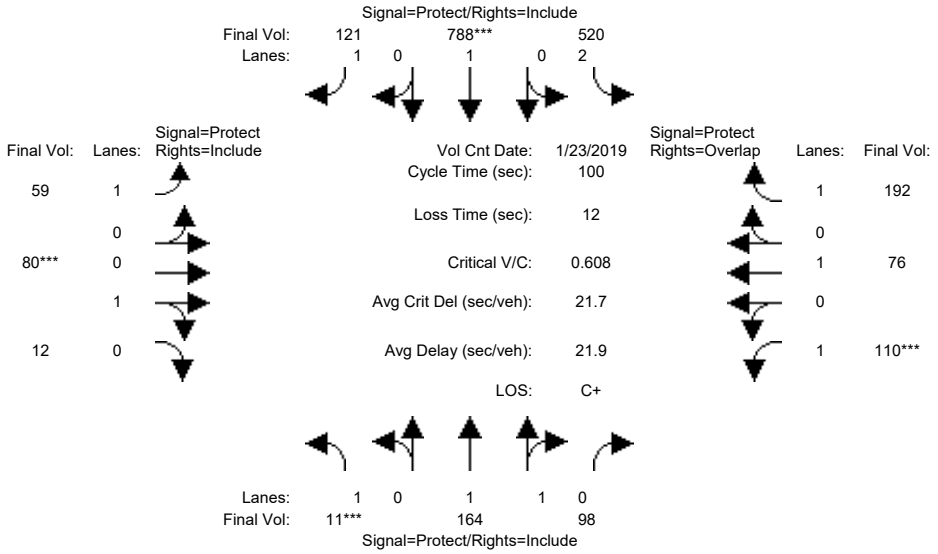
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing PM

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	11	164	98	520	788	121	59	80	12	110	76	192
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	11	164	98	520	788	121	59	80	12	110	76	192
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	164	98	520	788	121	59	80	12	110	76	192
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	11	164	98	520	788	121	59	80	12	110	76	192
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	11	164	98	520	788	121	59	80	12	110	76	192
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	11	164	98	520	788	121	59	80	12	110	76	192
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.99	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.23	0.77	2.00	1.00	1.00	1.00	0.87	0.13	1.00	1.00	1.00
Final Sat.:	1750	2315	1383	3150	1900	1750	1750	1565	235	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.07	0.07	0.17	0.41	0.07	0.03	0.05	0.05	0.06	0.04	0.11
Crit Moves:	****				****			****		****		
Green Time:	7.0	25.9	25.9	42.8	61.7	61.7	8.0	10.0	10.0	9.3	11.4	54.1
Volume/Cap:	0.09	0.27	0.27	0.39	0.67	0.11	0.42	0.51	0.51	0.67	0.35	0.20
Uniform Del:	43.5	29.5	29.5	19.6	12.6	7.9	43.8	42.7	42.7	43.8	40.9	11.8
IncremntDel:	0.3	0.2	0.2	0.2	1.6	0.0	2.1	2.5	2.5	10.5	1.0	0.1
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	43.8	29.7	29.7	19.8	14.1	7.9	45.9	45.1	45.1	54.3	41.9	11.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.8	29.7	29.7	19.8	14.1	7.9	45.9	45.1	45.1	54.3	41.9	11.9
LOS by Move:	D	C	C	B-	B	A	D	D	D	D-	D	B+
HCM2kAvgQ:	0	3	3	6	15	2	2	4	4	5	2	3

Note: Queue reported is the number of cars per lane.

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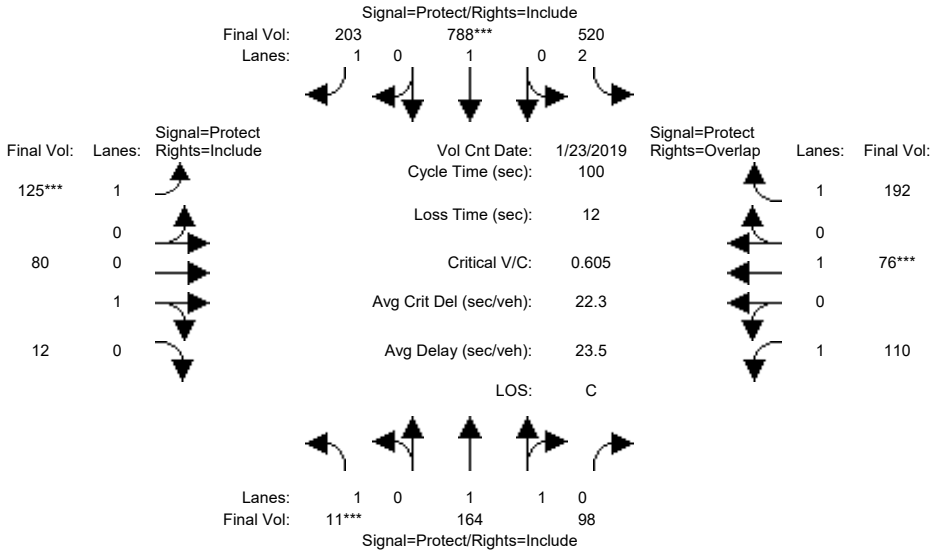
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing PM PP

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	11	164	98	520	788	121	59	80	12	110	76	192
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	11	164	98	520	788	121	59	80	12	110	76	192
Added Vol:	0	0	0	0	0	82	66	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	164	98	520	788	203	125	80	12	110	76	192
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	11	164	98	520	788	203	125	80	12	110	76	192
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	11	164	98	520	788	203	125	80	12	110	76	192
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	11	164	98	520	788	203	125	80	12	110	76	192
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.99	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.23	0.77	2.00	1.00	1.00	1.00	0.87	0.13	1.00	1.00	1.00
Final Sat.:	1750	2315	1383	3150	1900	1750	1750	1565	235	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.07	0.07	0.17	0.41	0.12	0.07	0.05	0.05	0.06	0.04	0.11
Crit Moves:	****				****		****				****	
Green Time:	7.0	25.5	25.5	42.1	60.6	60.6	10.4	12.0	12.0	8.4	10.0	52.1
Volume/Cap:	0.09	0.28	0.28	0.39	0.68	0.19	0.68	0.43	0.43	0.75	0.40	0.21
Delay/Veh:	43.8	30.0	30.0	20.3	15.0	8.9	53.5	42.1	42.1	63.5	43.6	13.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.8	30.0	30.0	20.3	15.0	8.9	53.5	42.1	42.1	63.5	43.6	13.0
LOS by Move:	D	C	C	C+	B	A	D-	D	D	E	D	B
HCM2kAvgQ:	0	3	3	6	16	3	5	3	3	5	3	3

Note: Queue reported is the number of cars per lane.

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Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

	???				Existing PM				Existing PM PP						???			
Intersection	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	?	xx.x	x.xxx	xx.x	C	24.9	0.715	23.9	C	26.9	0.747	+ 0.033	26.1	+ 2.2	?	xx.x	x.xxx	xx.x
#2	?	xx.x	x.xxx	xx.x	F	7.8	0.919	7.8	F	9.4	1.013	+ 0.095	9.4	+ 1.6	?	xx.x	x.xxx	xx.x
#3	?	xx.x	x.xxx	xx.x	C	23.2	0.692	23.0	C	23.5	0.717	+ 0.025	23.7	+ 0.7	?	xx.x	x.xxx	xx.x
#4	?	xx.x	x.xxx	xx.x	C+	21.9	0.608	21.7	C	23.5	0.605	- 0.003	22.3	+ 0.6	?	xx.x	x.xxx	xx.x

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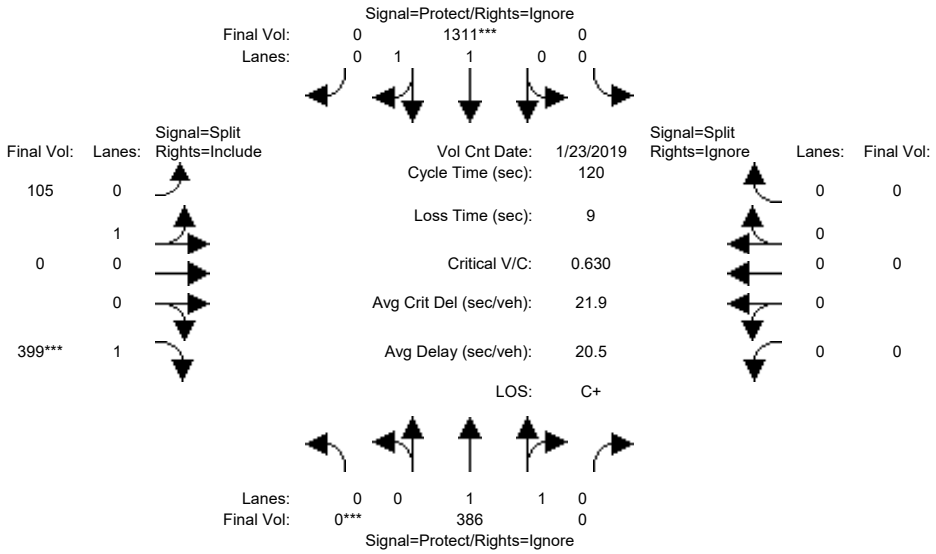
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing PM + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	10	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	386	255	0	1311	716	105	0	399	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	386	255	0	1311	716	105	0	399	0	0	0
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	386	255	0	1311	716	105	0	399	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	386	0	0	1311	0	105	0	399	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	386	0	0	1311	0	105	0	399	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	386	0	0	1311	0	105	0	399	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.95	0.95	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1800	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.10	0.00	0.00	0.35	0.00	0.06	0.00	0.23	0.00	0.00	0.00
Crit Moves:	****				****				****			
Green Time:	0.0	67.5	0.0	0.0	67.5	0.0	43.5	0.0	43.5	0.0	0.0	0.0
Volume/Cap:	0.00	0.19	0.00	0.00	0.63	0.00	0.16	0.00	0.63	0.00	0.00	0.00
Uniform Del:	0.0	12.8	0.0	0.0	17.8	0.0	25.9	0.0	31.6	0.0	0.0	0.0
IncremntDel:	0.0	0.0	0.0	0.0	0.6	0.0	0.1	0.0	2.0	0.0	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Delay/Veh:	0.0	12.8	0.0	0.0	18.4	0.0	26.0	0.0	33.7	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	12.8	0.0	0.0	18.4	0.0	26.0	0.0	33.7	0.0	0.0	0.0
LOS by Move:	A	B	A	A	B-	A	C	A	C-	A	A	A
HCM2kAvgQ:	0	3	0	0	17	0	3	0	14	0	0	0

Note: Queue reported is the number of cars per lane.

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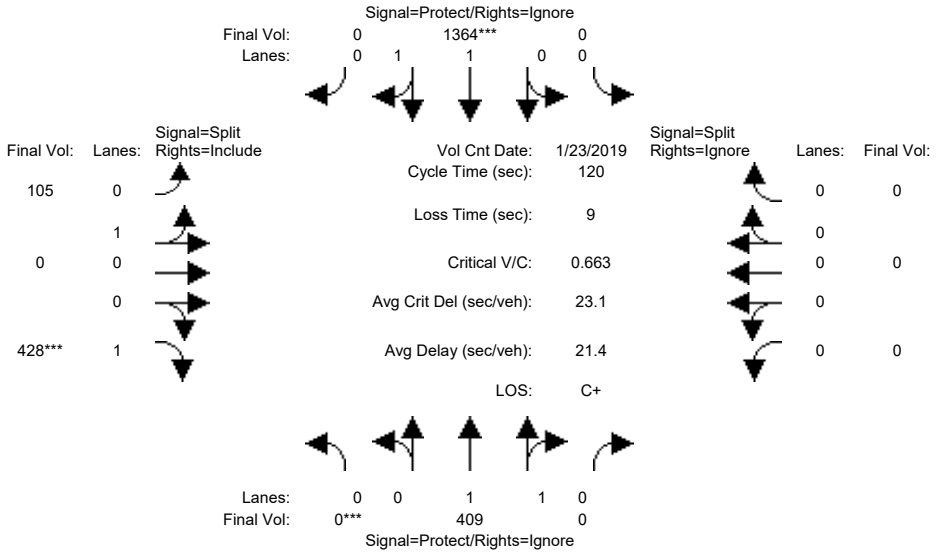
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Existing PM PP + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	10	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	386	255	0	1311	716	105	0	399	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	386	255	0	1311	716	105	0	399	0	0	0
Added Vol:	0	23	43	0	53	0	0	0	29	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	409	298	0	1364	716	105	0	428	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	409	0	0	1364	0	105	0	428	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	409	0	0	1364	0	105	0	428	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	409	0	0	1364	0	105	0	428	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.95	0.95	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1800	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.11	0.00	0.00	0.37	0.00	0.06	0.00	0.24	0.00	0.00	0.00
Crit Moves:	****				****				****			
Green Time:	0.0	66.7	0.0	0.0	66.7	0.0	44.3	0.0	44.3	0.0	0.0	0.0
Volume/Cap:	0.00	0.20	0.00	0.00	0.66	0.00	0.16	0.00	0.66	0.00	0.00	0.00
Delay/Veh:	0.0	13.3	0.0	0.0	19.6	0.0	25.5	0.0	34.2	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	13.3	0.0	0.0	19.6	0.0	25.5	0.0	34.2	0.0	0.0	0.0
LOS by Move:	A	B	A	A	B-	A	C	A	C-	A	A	A
HCM2kAvgQ:	0	4	0	0	18	0	3	0	15	0	0	0

Note: Queue reported is the number of cars per lane.

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Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

Intersection	??? LOS	??? Avg Del (sec)	??? Crit V/C	??? Avg Crit Del (sec)	Existing PM + Mit LOS	Existing PM + Mit Avg Del (sec)	Existing PM + Mit Crit V/C	Existing PM + Mit Avg Crit Del (sec)	Existing PM PP + Mit LOS	Existing PM PP + Mit Avg Del (sec)	Existing PM PP + Mit Crit V/C	Existing PM PP + Mit Crit V/C Change	Existing PM PP + Mit Avg Crit Del (sec)	Existing PM PP + Mit Avg Crit Del Change	??? LOS	??? Avg Del (sec)	??? Crit V/C	??? Avg Crit Del (sec)
#2 [ ]	?	xx.x	x.xxx	xx.x	C+	20.5	0.630	21.9	C+	21.4	0.663	+ 0.033	23.1	+ 1.1	?	xx.x	x.xxx	xx.x

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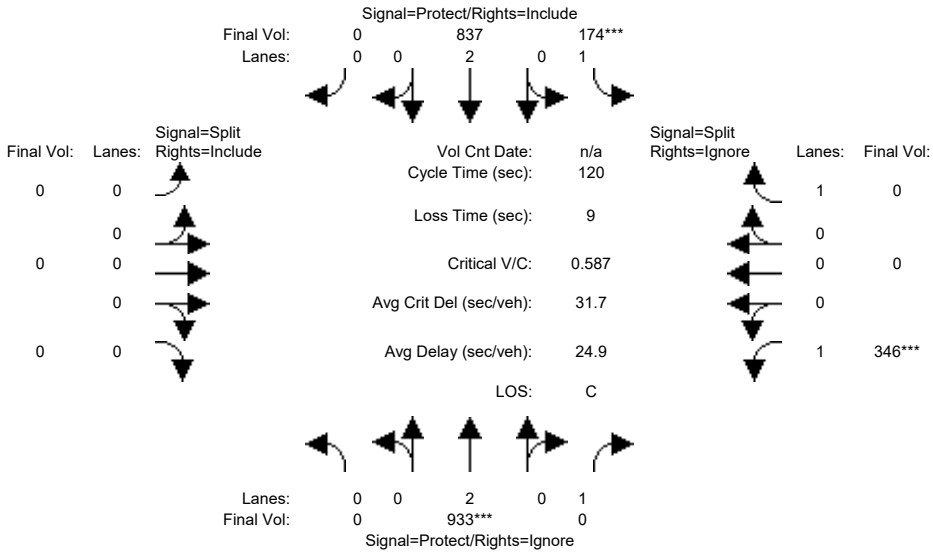
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background AM

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	0	909	431	174	801	0	0	0	0	310	0	768
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	909	431	174	801	0	0	0	0	310	0	768
Added Vol:	0	24	24	0	36	0	0	0	0	36	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	933	455	174	837	0	0	0	0	346	0	768
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	933	0	174	837	0	0	0	0	346	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	933	0	174	837	0	0	0	0	346	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	933	0	174	837	0	0	0	0	346	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.25	0.00	0.10	0.22	0.00	0.00	0.00	0.00	0.20	0.00	0.00
Crit Moves:		****		****						****		
Green Time:	0.0	50.2	0.0	20.3	70.6	0.0	0.0	0.0	0.0	40.4	0.0	0.0
Volume/Cap:	0.00	0.59	0.00	0.59	0.37	0.00	0.00	0.00	0.00	0.59	0.00	0.00
Uniform Del:	0.0	26.9	0.0	46.0	13.1	0.0	0.0	0.0	0.0	32.9	0.0	0.0
IncremntDel:	0.0	0.6	0.0	3.0	0.1	0.0	0.0	0.0	0.0	1.5	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Delay/Veh:	0.0	27.5	0.0	49.0	13.2	0.0	0.0	0.0	0.0	34.4	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	27.5	0.0	49.0	13.2	0.0	0.0	0.0	0.0	34.4	0.0	0.0
LOS by Move:	A	C	A	D	B	A	A	A	A	C-	A	A
HCM2kAvgQ:	0	13	0	7	8	0	0	0	0	12	0	0

Note: Queue reported is the number of cars per lane.

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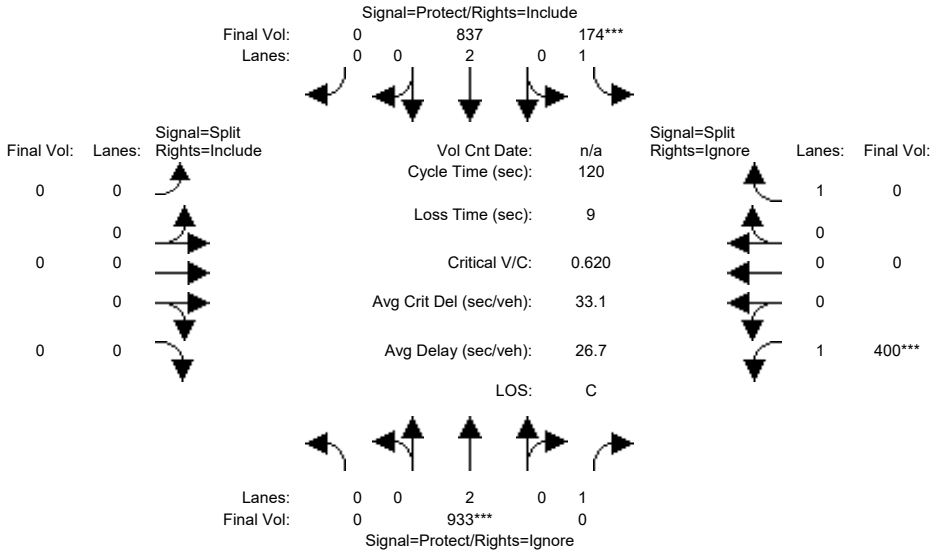
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background AM PP

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	0	909	431	174	801	0	0	0	0	310	0	768
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	909	431	174	801	0	0	0	0	310	0	768
Added Vol:	0	24	47	0	36	0	0	0	0	90	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	933	478	174	837	0	0	0	0	400	0	768
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	933	0	174	837	0	0	0	0	400	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	933	0	174	837	0	0	0	0	400	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	933	0	174	837	0	0	0	0	400	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.25	0.00	0.10	0.22	0.00	0.00	0.00	0.00	0.23	0.00	0.00
Crit Moves:		****		****						****		
Green Time:	0.0	47.5	0.0	19.2	66.8	0.0	0.0	0.0	0.0	44.2	0.0	0.0
Volume/Cap:	0.00	0.62	0.00	0.62	0.40	0.00	0.00	0.00	0.00	0.62	0.00	0.00
Uniform Del:	0.0	29.0	0.0	47.0	15.1	0.0	0.0	0.0	0.0	31.0	0.0	0.0
IncremntDel:	0.0	0.8	0.0	4.2	0.1	0.0	0.0	0.0	0.0	1.9	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Delay/Veh:	0.0	29.8	0.0	51.2	15.3	0.0	0.0	0.0	0.0	32.9	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	29.8	0.0	51.2	15.3	0.0	0.0	0.0	0.0	32.9	0.0	0.0
LOS by Move:	A	C	A	D-	B	A	A	A	A	C-	A	A
HCM2kAvgQ:	0	14	0	7	9	0	0	0	0	13	0	0

Note: Queue reported is the number of cars per lane.

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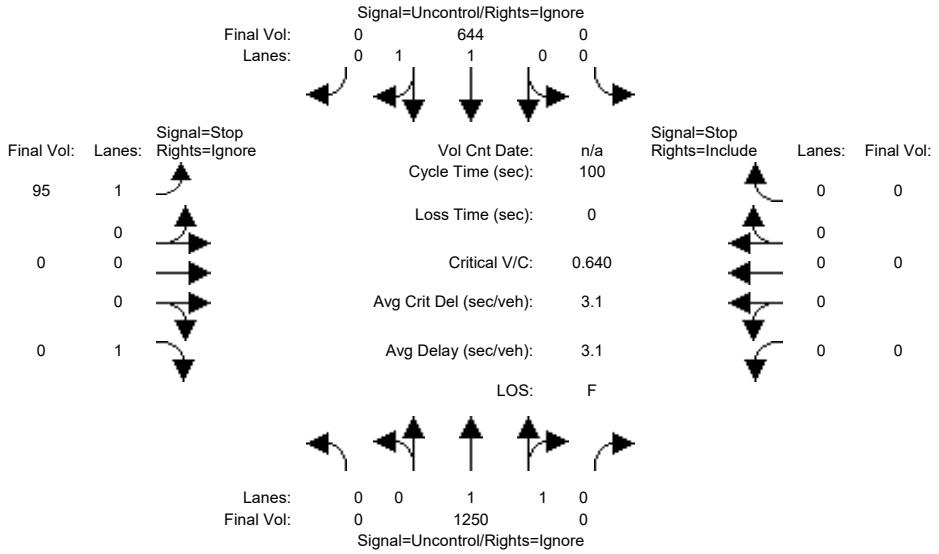
Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Background AM

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Volume Module:												
Base Vol:	0	1202	573	0	572	521	95	0	122	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	1202	573	0	572	521	95	0	122	0	0	0
Added Vol:	0	48	24	0	72	0	0	0	36	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1250	597	0	644	521	95	0	158	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	0	1250	0	0	644	0	95	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	1250	0	0	644	0	95	0	0	0	0	0
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.0	xxxx	7.1	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.6	xxxx	3.4	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	1269	xxxx	322	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	148	xxxx	648	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	148	xxxx	648	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	0.64	xxxx	0.00	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	3.5	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	64.6	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	F	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			64.6			xxxxxx		
ApproachLOS:	*			*			F			*		

Note: Queue reported is the number of cars per lane.

Peak Hour Delay Signal Warrant Report

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant NOT Met

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1250	597	0	644	521	95	0	158	0	0	0
ApproachDel:	xxxxxx			xxxxxx			64.6			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=4.5]
FAIL - Vehicle-hours less than 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=253]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3265]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1250	597	0	644	521	95	0	158	0	0	0

Major Street Volume: 3012
Minor Approach Volume: 253
Minor Approach Volume Threshold: -100 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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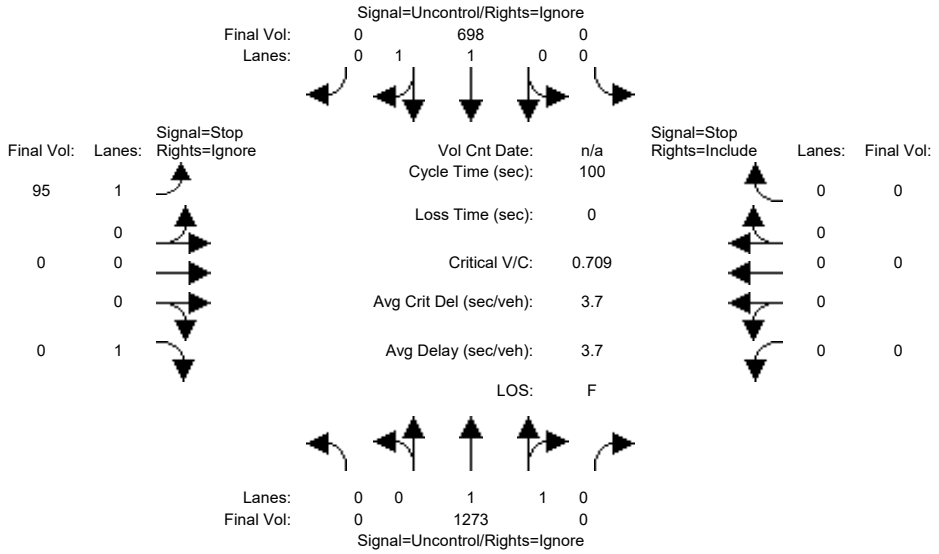
Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Background AM PP

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Volume Module:												
Base Vol:	0	1202	573	0	572	521	95	0	122	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	1202	573	0	572	521	95	0	122	0	0	0
Added Vol:	0	71	67	0	126	0	0	0	65	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1273	640	0	698	521	95	0	187	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	0	1273	0	0	698	0	95	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	1273	0	0	698	0	95	0	0	0	0	0
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.0	xxxx	7.1	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.6	xxxx	3.4	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	1335	xxxx	349	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	134	xxxx	622	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	134	xxxx	622	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	0.71	xxxx	0.00	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	4.0	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	79.7	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	F	*	*	*	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			79.7			xxxxxx		
ApproachLOS:	*			*			F			*		

Note: Queue reported is the number of cars per lane.

Peak Hour Delay Signal Warrant Report

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1273	640	0	698	521	95	0	187	0	0	0
ApproachDel:	xxxxxx			xxxxxx			79.7			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=6.2]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=282]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3414]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1273	640	0	698	521	95	0	187	0	0	0

Major Street Volume: 3132
Minor Approach Volume: 282
Minor Approach Volume Threshold: -117 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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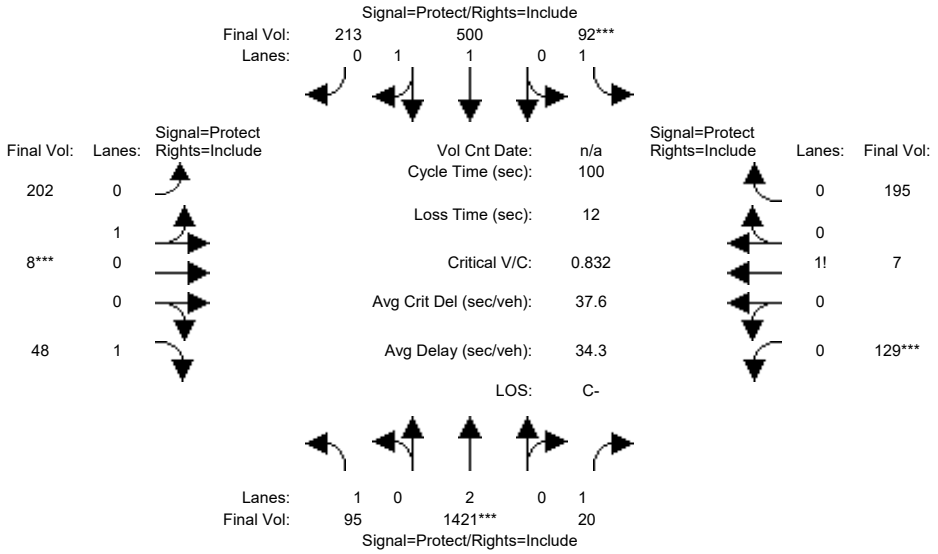
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background AM

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	94	1354	20	92	395	209	197	8	46	129	7	195
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	94	1354	20	92	395	209	197	8	46	129	7	195
Added Vol:	1	67	0	0	105	4	5	0	2	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	95	1421	20	92	500	213	202	8	48	129	7	195
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	95	1421	20	92	500	213	202	8	48	129	7	195
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	95	1421	20	92	500	213	202	8	48	129	7	195
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	95	1421	20	92	500	213	202	8	48	129	7	195
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.39	0.61	0.96	0.04	1.00	0.39	0.02	0.59
Final Sat.:	1750	3800	1750	1750	2594	1105	1731	69	1750	682	37	1031
Capacity Analysis Module:												
Vol/Sat:	0.05	0.37	0.01	0.05	0.19	0.19	0.12	0.12	0.03	0.19	0.19	0.19
Crit Moves:		****		****				****		****		
Green Time:	13.7	44.6	44.6	7.0	37.8	37.8	13.9	13.9	13.9	22.5	22.5	22.5
Volume/Cap:	0.40	0.84	0.03	0.75	0.51	0.51	0.84	0.84	0.20	0.84	0.84	0.84
Uniform Del:	39.3	24.5	15.5	45.6	23.9	23.9	42.0	42.0	38.1	37.0	37.0	37.0
IncremntDel:	1.1	3.9	0.0	22.6	0.3	0.3	21.5	21.5	0.4	14.7	14.7	14.7
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	40.4	28.5	15.6	68.2	24.3	24.3	63.5	63.5	38.5	51.7	51.7	51.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	40.4	28.5	15.6	68.2	24.3	24.3	63.5	63.5	38.5	51.7	51.7	51.7
LOS by Move:	D	C	B	E	C	C	E	E	D+	D-	D-	D-
HCM2kAvgQ:	3	19	0	5	9	9	9	9	2	13	13	13

Note: Queue reported is the number of cars per lane.

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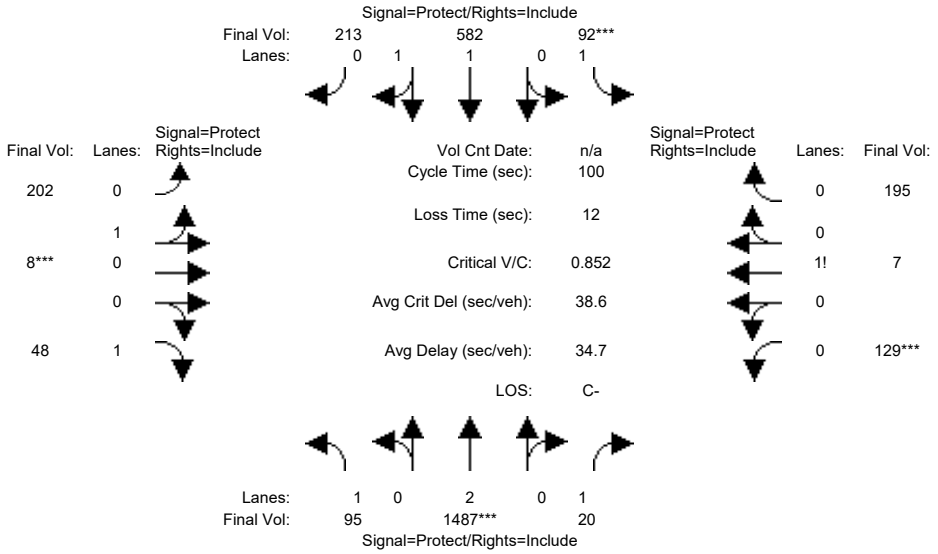
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background AM PP

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	94	1354	20	92	395	209	197	8	46	129	7	195
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	94	1354	20	92	395	209	197	8	46	129	7	195
Added Vol:	1	133	0	0	187	4	5	0	2	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	95	1487	20	92	582	213	202	8	48	129	7	195
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	95	1487	20	92	582	213	202	8	48	129	7	195
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	95	1487	20	92	582	213	202	8	48	129	7	195
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	95	1487	20	92	582	213	202	8	48	129	7	195
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.45	0.55	0.96	0.04	1.00	0.39	0.02	0.59
Final Sat.:	1750	3800	1750	1750	2708	991	1731	69	1750	682	37	1031
Capacity Analysis Module:												
Vol/Sat:	0.05	0.39	0.01	0.05	0.21	0.21	0.12	0.12	0.03	0.19	0.19	0.19
Crit Moves:		****		****				****		****		
Green Time:	12.9	45.5	45.5	7.0	39.6	39.6	13.6	13.6	13.6	22.0	22.0	22.0
Volume/Cap:	0.42	0.86	0.03	0.75	0.54	0.54	0.86	0.86	0.20	0.86	0.86	0.86
Uniform Del:	40.1	24.4	15.0	45.6	23.3	23.3	42.3	42.3	38.4	37.5	37.5	37.5
IncremntDel:	1.3	4.7	0.0	22.6	0.4	0.4	25.2	25.2	0.4	17.5	17.5	17.5
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	41.4	29.1	15.1	68.2	23.7	23.7	67.5	67.5	38.8	55.1	55.1	55.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	41.4	29.1	15.1	68.2	23.7	23.7	67.5	67.5	38.8	55.1	55.1	55.1
LOS by Move:	D	C	B	E	C	C	E	E	D+	E+	E+	E+
HCM2kAvgQ:	3	20	0	5	10	10	10	10	2	14	14	14

Note: Queue reported is the number of cars per lane.

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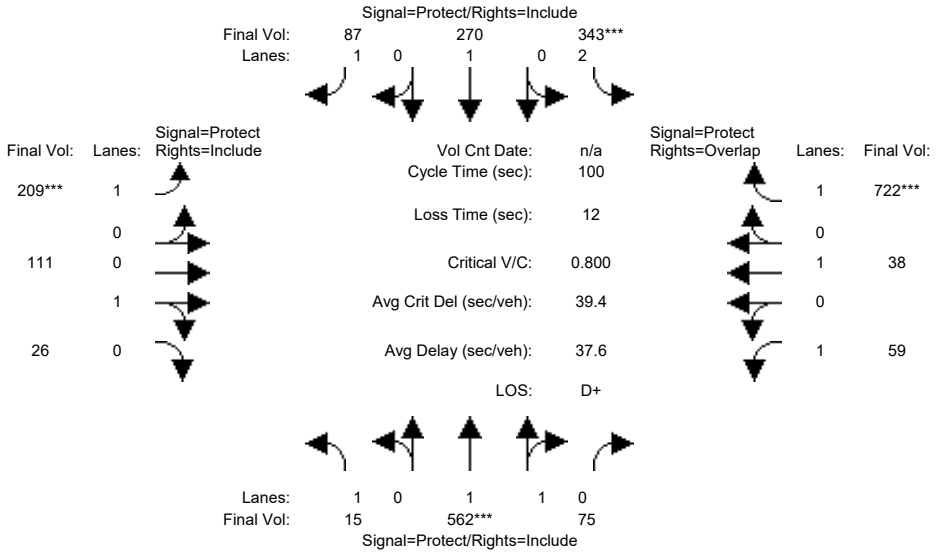
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background AM

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	15	562	75	237	270	87	209	111	26	59	38	654
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	15	562	75	237	270	87	209	111	26	59	38	654
Added Vol:	0	0	0	106	0	0	0	0	0	0	0	68
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	562	75	343	270	87	209	111	26	59	38	722
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	15	562	75	343	270	87	209	111	26	59	38	722
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	15	562	75	343	270	87	209	111	26	59	38	722
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	15	562	75	343	270	87	209	111	26	59	38	722
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.98	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.76	0.24	2.00	1.00	1.00	1.00	0.81	0.19	1.00	1.00	1.00
Final Sat.:	1750	3264	436	3150	1900	1750	1750	1458	342	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.17	0.17	0.11	0.14	0.05	0.12	0.08	0.08	0.03	0.02	0.41
Crit Moves:		****		****			****					****
Green Time:	11.6	21.5	21.5	13.6	23.5	23.5	14.9	31.1	31.1	21.8	38.0	51.6
Volume/Cap:	0.07	0.80	0.80	0.80	0.60	0.21	0.80	0.24	0.24	0.15	0.05	0.80
Uniform Del:	39.4	37.2	37.2	41.9	34.1	30.8	41.1	25.7	25.7	31.7	19.6	20.0
IncremntDel:	0.2	5.8	5.8	10.3	2.3	0.3	15.9	0.2	0.2	0.2	0.0	5.1
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	39.6	43.0	43.0	52.1	36.4	31.0	57.0	25.9	25.9	31.9	19.7	25.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	39.6	43.0	43.0	52.1	36.4	31.0	57.0	25.9	25.9	31.9	19.7	25.1
LOS by Move:	D	D	D	D-	D+	C	E+	C	C	C	B-	C
HCM2kAvgQ:	0	10	10	7	7	2	9	3	3	2	1	21

Note: Queue reported is the number of cars per lane.

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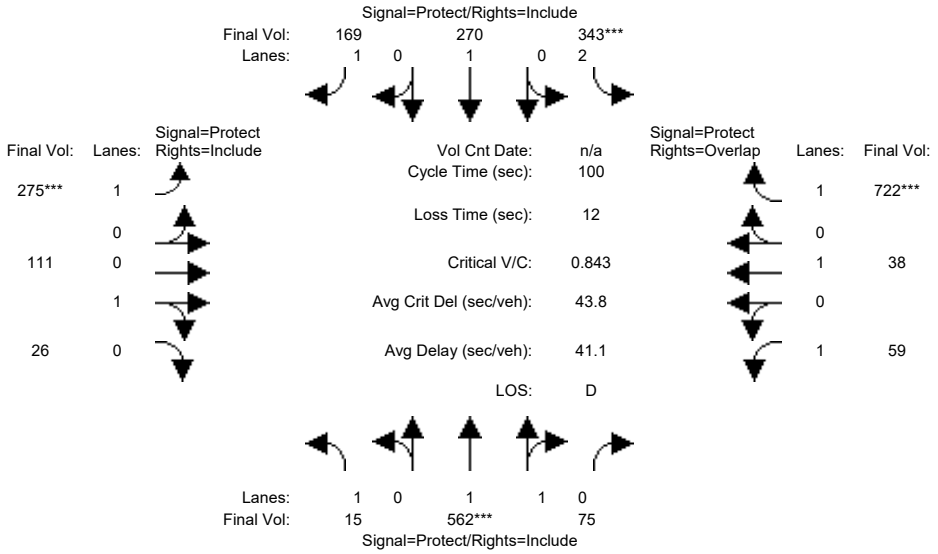
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background AM PP

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	15	562	75	237	270	87	209	111	26	59	38	654
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	15	562	75	237	270	87	209	111	26	59	38	654
Added Vol:	0	0	0	106	0	82	66	0	0	0	0	68
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	562	75	343	270	169	275	111	26	59	38	722
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	15	562	75	343	270	169	275	111	26	59	38	722
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	15	562	75	343	270	169	275	111	26	59	38	722
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	15	562	75	343	270	169	275	111	26	59	38	722
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.98	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.76	0.24	2.00	1.00	1.00	1.00	0.81	0.19	1.00	1.00	1.00
Final Sat.:	1750	3264	436	3150	1900	1750	1750	1458	342	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.17	0.17	0.11	0.14	0.10	0.16	0.08	0.08	0.03	0.02	0.41
Crit Moves:		****		****			****					****
Green Time:	11.0	20.4	20.4	12.9	22.3	22.3	18.6	32.2	32.2	22.5	36.0	48.9
Volume/Cap:	0.08	0.84	0.84	0.84	0.64	0.43	0.84	0.24	0.24	0.15	0.06	0.84
Uniform Del:	39.9	38.2	38.2	42.6	35.2	33.4	39.3	24.9	24.9	31.1	20.9	22.2
IncremntDel:	0.2	8.5	8.5	14.7	3.2	0.8	17.7	0.2	0.2	0.2	0.0	7.6
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	40.1	46.8	46.8	57.3	38.3	34.2	57.0	25.1	25.1	31.3	20.9	29.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	40.1	46.8	46.8	57.3	38.3	34.2	57.0	25.1	25.1	31.3	20.9	29.8
LOS by Move:	D	D	D	E+	D+	C-	E+	C	C	C	C+	C
HCM2kAvgQ:	0	11	11	7	7	5	12	3	3	2	1	23

Note: Queue reported is the number of cars per lane.

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Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

	???				Background AM				Background AM PP						???			
Intersection	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	?	xx.x	x.xxx	xx.x	C	24.9	0.587	31.7	C	26.7	0.620	+ 0.033	33.1	+ 1.4	?	xx.x	x.xxx	xx.x
#2	?	xx.x	x.xxx	xx.x	F	3.1	0.640	3.1	F	3.7	0.709	+ 0.069	3.7	+ 0.6	?	xx.x	x.xxx	xx.x
#3	?	xx.x	x.xxx	xx.x	C-	34.3	0.832	37.6	C-	34.7	0.852	+ 0.020	38.6	+ 1.1	?	xx.x	x.xxx	xx.x
#4	?	xx.x	x.xxx	xx.x	D+	37.6	0.800	39.4	D	41.1	0.843	+ 0.043	43.8	+ 4.4	?	xx.x	x.xxx	xx.x

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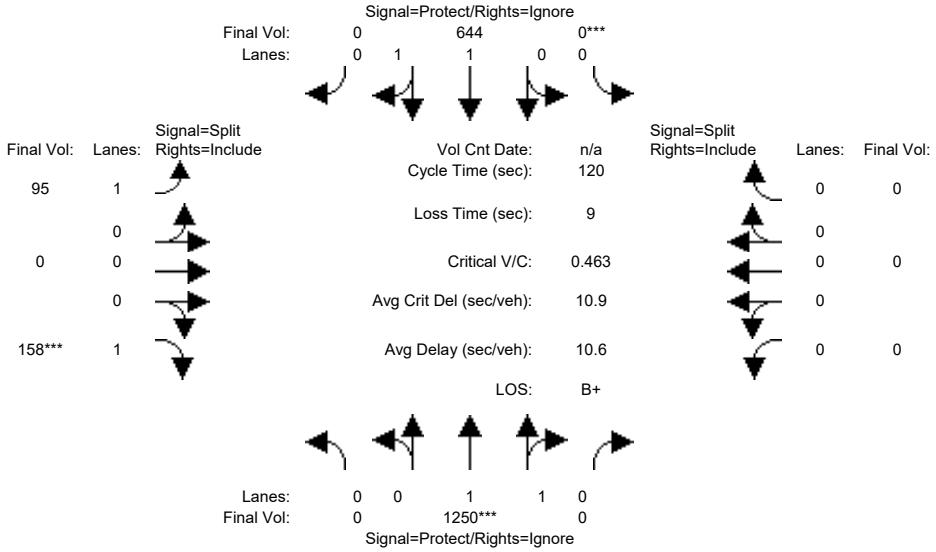
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background AM + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	0	1202	573	0	572	521	95	0	122	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	1202	573	0	572	521	95	0	122	0	0	0
Added Vol:	0	48	24	0	72	0	0	0	36	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1250	597	0	644	521	95	0	158	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	1250	0	0	644	0	95	0	158	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	1250	0	0	644	0	95	0	158	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	0	1250	0	0	644	0	95	0	158	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1750	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.34	0.00	0.00	0.17	0.00	0.05	0.00	0.09	0.00	0.00	0.00
Crit Moves:		****		****					****			
Green Time:	0.0	87.6	0.0	0.0	87.6	0.0	23.4	0.0	23.4	0.0	0.0	0.0
Volume/Cap:	0.00	0.46	0.00	0.00	0.24	0.00	0.28	0.00	0.46	0.00	0.00	0.00
Uniform Del:	0.0	6.6	0.0	0.0	5.3	0.0	41.1	0.0	42.7	0.0	0.0	0.0
IncremntDel:	0.0	0.1	0.0	0.0	0.0	0.0	0.4	0.0	1.0	0.0	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Delay/Veh:	0.0	6.7	0.0	0.0	5.3	0.0	41.6	0.0	43.7	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	6.7	0.0	0.0	5.3	0.0	41.6	0.0	43.7	0.0	0.0	0.0
LOS by Move:	A	A	A	A	A	A	D	A	D	A	A	A
HCM2kAvgQ:	0	9	0	0	4	0	3	0	6	0	0	0

Note: Queue reported is the number of cars per lane.

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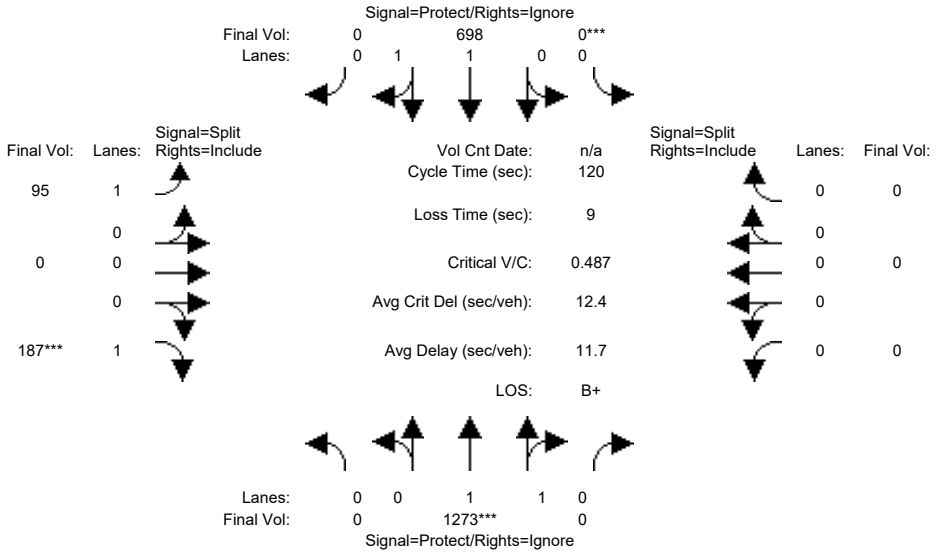
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background AM PP + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	0	1202	573	0	572	521	95	0	122	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	1202	573	0	572	521	95	0	122	0	0	0
Added Vol:	0	71	67	0	126	0	0	0	65	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1273	640	0	698	521	95	0	187	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	1273	0	0	698	0	95	0	187	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	1273	0	0	698	0	95	0	187	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	0	1273	0	0	698	0	95	0	187	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1750	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.34	0.00	0.00	0.19	0.00	0.05	0.00	0.11	0.00	0.00	0.00
Crit Moves:		****		****					****			
Green Time:	0.0	84.7	0.0	0.0	84.7	0.0	26.3	0.0	26.3	0.0	0.0	0.0
Volume/Cap:	0.00	0.49	0.00	0.00	0.27	0.00	0.25	0.00	0.49	0.00	0.00	0.00
Uniform Del:	0.0	7.9	0.0	0.0	6.4	0.0	38.7	0.0	41.0	0.0	0.0	0.0
IncremntDel:	0.0	0.1	0.0	0.0	0.1	0.0	0.3	0.0	1.0	0.0	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Delay/Veh:	0.0	8.1	0.0	0.0	6.5	0.0	39.0	0.0	41.9	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	8.1	0.0	0.0	6.5	0.0	39.0	0.0	41.9	0.0	0.0	0.0
LOS by Move:	A	A	A	A	A	A	D	A	D	A	A	A
HCM2kAvgQ:	0	10	0	0	5	0	3	0	7	0	0	0

Note: Queue reported is the number of cars per lane.

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Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

Intersection	???				Background AM + Mit				Background AM PP + Mit						???			
	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#2 [ ]	?	xx.x	x.xxx	xx.x	B+	10.6	0.463	10.9	B+	11.7	0.487	+ 0.025	12.4	+ 1.5	?	xx.x	x.xxx	xx.x

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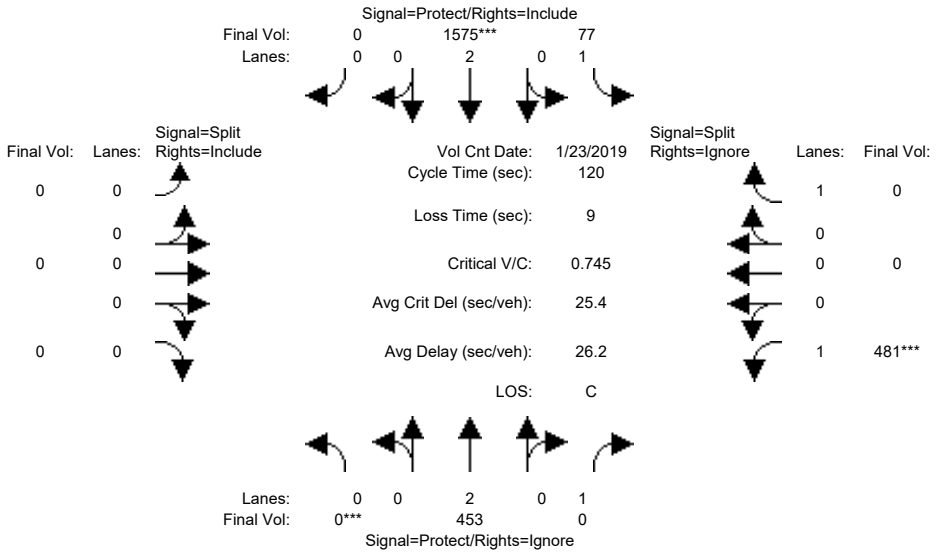
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background PM

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	405	88	77	1541	0	0	0	0	447	0	561
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	405	88	77	1541	0	0	0	0	447	0	561
Added Vol:	0	48	48	0	34	0	0	0	0	34	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	453	136	77	1575	0	0	0	0	481	0	561
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	453	0	77	1575	0	0	0	0	481	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	453	0	77	1575	0	0	0	0	481	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	453	0	77	1575	0	0	0	0	481	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.12	0.00	0.04	0.41	0.00	0.00	0.00	0.00	0.27	0.00	0.00
Crit Moves:	****				****					****		
Green Time:	0.0	44.8	0.0	21.9	66.7	0.0	0.0	0.0	0.0	44.3	0.0	0.0
Volume/Cap:	0.00	0.32	0.00	0.24	0.75	0.00	0.00	0.00	0.00	0.75	0.00	0.00
Uniform Del:	0.0	26.7	0.0	41.9	20.2	0.0	0.0	0.0	0.0	33.0	0.0	0.0
IncremntDel:	0.0	0.1	0.0	0.4	1.5	0.0	0.0	0.0	0.0	4.7	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Delay/Veh:	0.0	26.9	0.0	42.3	21.7	0.0	0.0	0.0	0.0	37.7	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	26.9	0.0	42.3	21.7	0.0	0.0	0.0	0.0	37.7	0.0	0.0
LOS by Move:	A	C	A	D	C+	A	A	A	A	D+	A	A
HCM2kAvgQ:	0	6	0	3	23	0	0	0	0	18	0	0

Note: Queue reported is the number of cars per lane.

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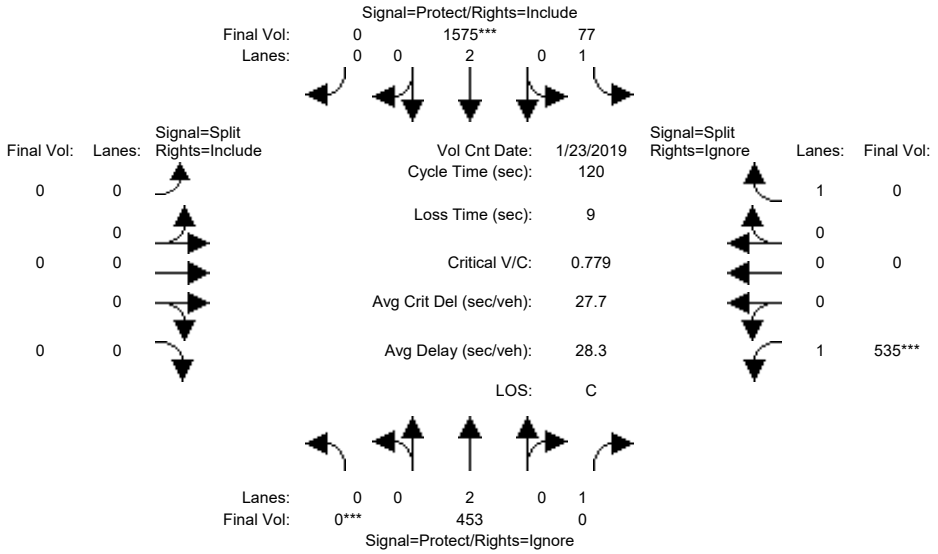
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background PM PP

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	405	88	77	1541	0	0	0	0	447	0	561
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	405	88	77	1541	0	0	0	0	447	0	561
Added Vol:	0	48	71	0	34	0	0	0	0	88	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	453	159	77	1575	0	0	0	0	535	0	561
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	453	0	77	1575	0	0	0	0	535	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	453	0	77	1575	0	0	0	0	535	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	453	0	77	1575	0	0	0	0	535	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.12	0.00	0.04	0.41	0.00	0.00	0.00	0.00	0.31	0.00	0.00
Crit Moves:	****				****					****		
Green Time:	0.0	42.9	0.0	21.0	63.9	0.0	0.0	0.0	0.0	47.1	0.0	0.0
Volume/Cap:	0.00	0.33	0.00	0.25	0.78	0.00	0.00	0.00	0.00	0.78	0.00	0.00
Uniform Del:	0.0	28.1	0.0	42.7	22.4	0.0	0.0	0.0	0.0	31.9	0.0	0.0
IncremntDel:	0.0	0.1	0.0	0.4	2.0	0.0	0.0	0.0	0.0	5.7	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Delay/Veh:	0.0	28.3	0.0	43.2	24.4	0.0	0.0	0.0	0.0	37.5	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	28.3	0.0	43.2	24.4	0.0	0.0	0.0	0.0	37.5	0.0	0.0
LOS by Move:	A	C	A	D	C	A	A	A	A	D+	A	A
HCM2kAvgQ:	0	6	0	3	24	0	0	0	0	20	0	0

Note: Queue reported is the number of cars per lane.

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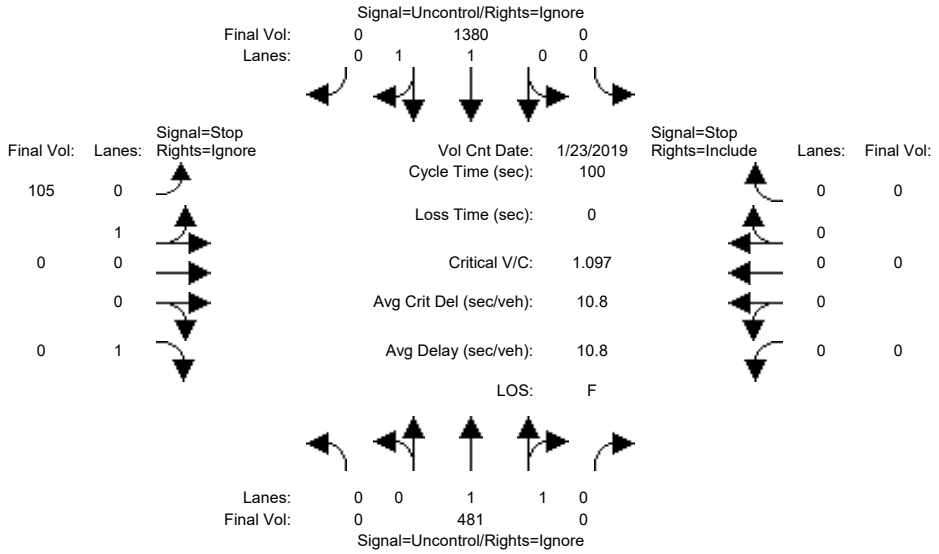
Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Background PM

Intersection #2: I-280 SB Ramps / Foothill Expy




```
Street Name:          Foothill Expy                    I-280 SB Ramps
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM
Base Vol:       0  386   255     0 1311   716   105    0   399     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  386   255     0 1311   716   105    0   399     0    0     0
Added Vol:      0   95    48     0   69     0     0    0    34     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  481   303     0 1380   716   105    0   433     0    0     0
User Adj:    1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Volume:     0  481     0     0 1380     0   105    0     0     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0  481     0     0 1380     0   105    0     0     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  1621 1861   690  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx    96   74   392  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx    96   74   392  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  1.10 0.00  0.00  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx    96 xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   6.9 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx 202.4 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     F    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx            202.4           xxxxxx
ApproachLOS:         *                *               F                *
Note: Queue reported is the number of cars per lane.
                  Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #2 I-280 SB Ramps / Foothill Expy
********************************************************************************
Future Volume Alternative: Peak Hour Warrant Met
```

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1 0	0	1	0 0	0	0
Initial Vol:	0 481	303		0 1380	716		105	0	433	0	0	0
ApproachDel:	xxxxxx			xxxxxx			202.4			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=30.3]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=538]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3418]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

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Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1 0	0	1	0 0	0	0
Initial Vol:	0 481	303		0 1380	716		105	0	433	0	0	0

Major Street Volume: 2880
Minor Approach Volume: 538
Minor Approach Volume Threshold: -81 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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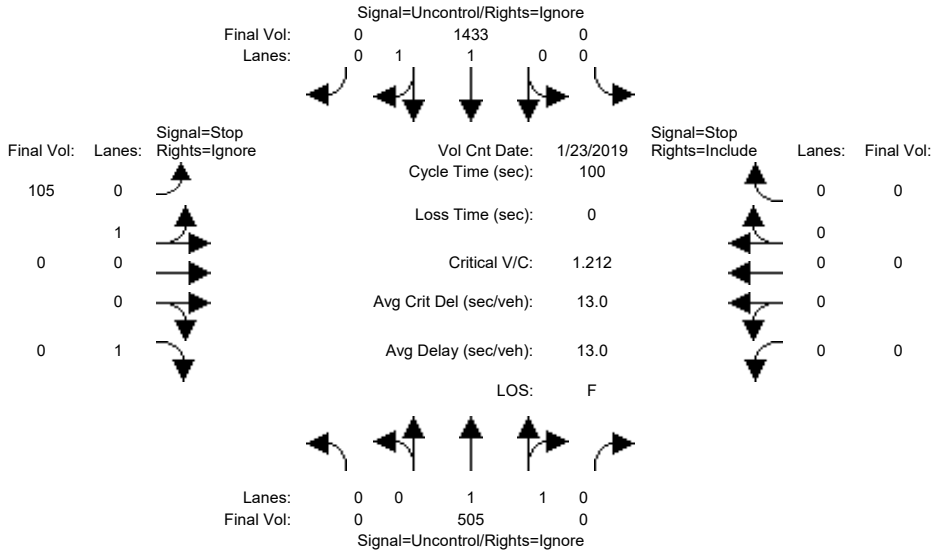
Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Background PM PP

Intersection #2: I-280 SB Ramps / Foothill Expy




```
Street Name:          Foothill Expy                    I-280 SB Ramps
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM
Base Vol:       0  386   255     0 1311   716   105    0   399     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  386   255     0 1311   716   105    0   399     0    0     0
Added Vol:      0  119    91     0  122     0     0    0    63     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  505   346     0 1433   716   105    0   462     0    0     0
User Adj:    1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Volume:     0  505     0     0 1433     0   105    0     0     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0  505     0     0 1433     0   105    0     0     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  1686 1938   717  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx    87   66   377  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx    87   66   377  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  1.21 0.00  0.00  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx    87 xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   7.5 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx 252.0 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     F    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             252.0           xxxxxx
ApproachLOS:         *                *                F                *
Note: Queue reported is the number of cars per lane.
                  Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #2 I-280 SB Ramps / Foothill Expy
********************************************************************************
Future Volume Alternative: Peak Hour Warrant Met
```

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1 0	0	1	0 0	0	0
Initial Vol:	0 505	346		0 1433	716		105	0	462	0	0	0
ApproachDel:	xxxxxx			xxxxxx			252.0			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=39.7]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=567]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3567]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1 0	0	1	0 0	0	0
Initial Vol:	0 505	346		0 1433	716		105	0	462	0	0	0

Major Street Volume: 3000
Minor Approach Volume: 567
Minor Approach Volume Threshold: -98 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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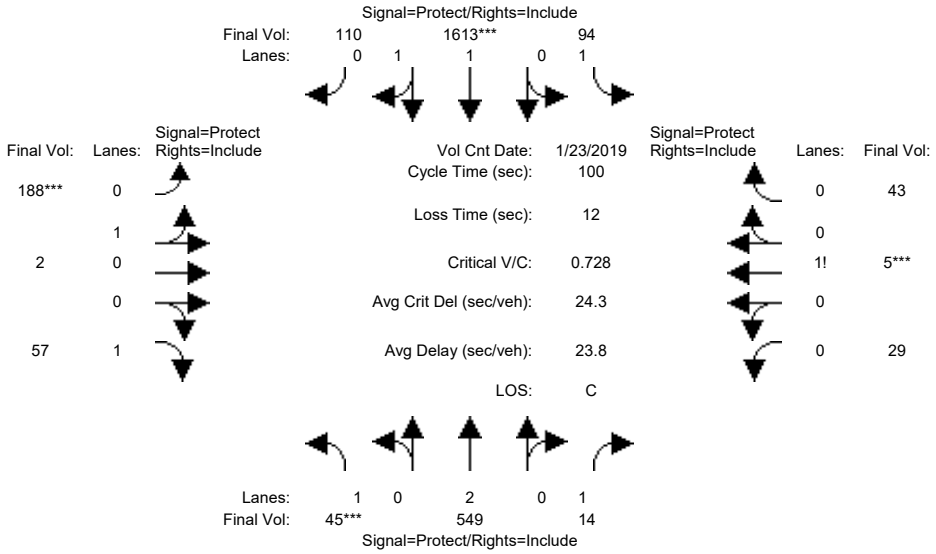
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background PM

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	43	411	14	94	1515	105	183	2	55	29	5	43
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	43	411	14	94	1515	105	183	2	55	29	5	43
Added Vol:	2	138	0	0	98	5	5	0	2	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	45	549	14	94	1613	110	188	2	57	29	5	43
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	45	549	14	94	1613	110	188	2	57	29	5	43
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	45	549	14	94	1613	110	188	2	57	29	5	43
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	45	549	14	94	1613	110	188	2	57	29	5	43
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.87	0.13	0.99	0.01	1.00	0.38	0.06	0.56
Final Sat.:	1750	3800	1750	1750	3464	236	1781	19	1750	659	114	977
Capacity Analysis Module:												
Vol/Sat:	0.03	0.14	0.01	0.05	0.47	0.47	0.11	0.11	0.03	0.04	0.04	0.04
Crit Moves:	****				****		****				****	
Green Time:	7.0	43.7	43.7	21.2	57.9	57.9	13.1	13.9	13.9	9.2	10.0	10.0
Volume/Cap:	0.37	0.33	0.02	0.25	0.80	0.80	0.80	0.76	0.23	0.48	0.44	0.44
Uniform Del:	44.4	18.5	16.0	32.8	16.6	16.6	42.2	41.4	38.3	43.1	42.4	42.4
IncremntDel:	1.9	0.1	0.0	0.4	2.3	2.3	17.9	12.7	0.5	2.2	1.8	1.8
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	46.3	18.6	16.0	33.2	18.9	18.9	60.1	54.1	38.8	45.3	44.1	44.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	46.3	18.6	16.0	33.2	18.9	18.9	60.1	54.1	38.8	45.3	44.1	44.1
LOS by Move:	D	B-	B	C-	B-	B-	E	D-	D+	D	D	D
HCM2kAvgQ:	1	5	0	3	23	23	8	8	2	3	3	3

Note: Queue reported is the number of cars per lane.

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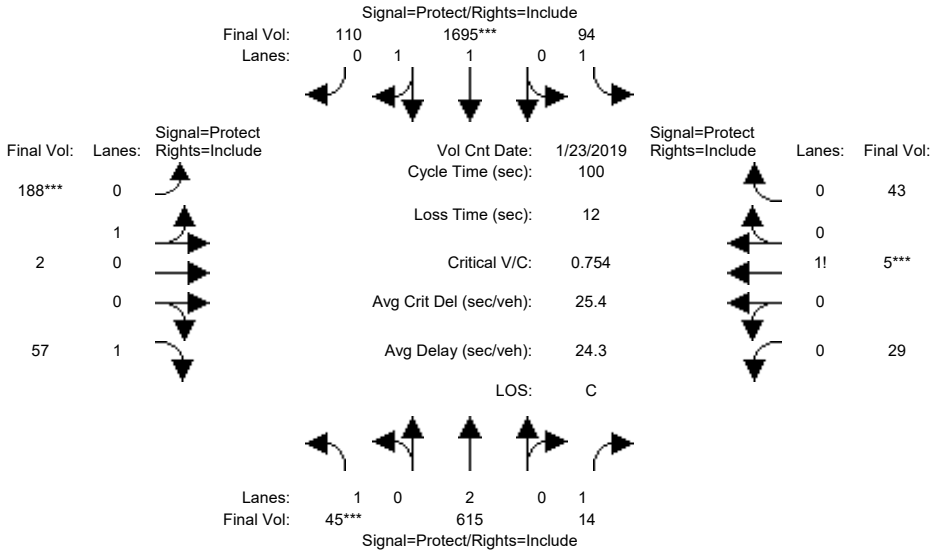
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background PM PP

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	43	411	14	94	1515	105	183	2	55	29	5	43
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	43	411	14	94	1515	105	183	2	55	29	5	43
Added Vol:	2	204	0	0	180	5	5	0	2	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	45	615	14	94	1695	110	188	2	57	29	5	43
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	45	615	14	94	1695	110	188	2	57	29	5	43
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	45	615	14	94	1695	110	188	2	57	29	5	43
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	45	615	14	94	1695	110	188	2	57	29	5	43
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.87	0.13	0.99	0.01	1.00	0.38	0.06	0.56
Final Sat.:	1750	3800	1750	1750	3474	225	1781	19	1750	659	114	977
Capacity Analysis Module:												
Vol/Sat:	0.03	0.16	0.01	0.05	0.49	0.49	0.11	0.11	0.03	0.04	0.04	0.04
Crit Moves:	****				****		****				****	
Green Time:	7.0	45.6	45.6	19.7	58.4	58.4	12.6	13.6	13.6	9.0	10.0	10.0
Volume/Cap:	0.37	0.35	0.02	0.27	0.84	0.84	0.84	0.78	0.24	0.49	0.44	0.44
Uniform Del:	44.4	17.6	14.9	34.0	16.9	16.9	42.7	41.7	38.6	43.3	42.4	42.4
IncremntDel:	1.9	0.1	0.0	0.4	3.0	3.0	22.7	14.4	0.5	2.4	1.8	1.8
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	46.3	17.8	14.9	34.5	19.9	19.9	65.4	56.1	39.1	45.7	44.1	44.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	46.3	17.8	14.9	34.5	19.9	19.9	65.4	56.1	39.1	45.7	44.1	44.1
LOS by Move:	D	B	B	C-	B-	B-	E	E+	D	D	D	D
HCM2kAvgQ:	1	6	0	3	25	25	9	8	2	3	3	3

Note: Queue reported is the number of cars per lane.

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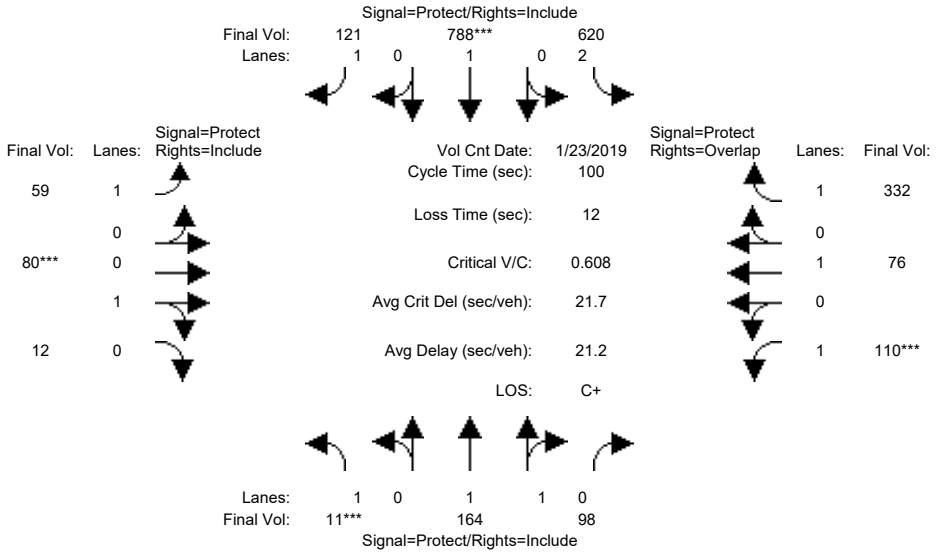
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background PM

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	11	164	98	520	788	121	59	80	12	110	76	192
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	11	164	98	520	788	121	59	80	12	110	76	192
Added Vol:	0	0	0	100	0	0	0	0	0	0	0	140
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	164	98	620	788	121	59	80	12	110	76	332
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	11	164	98	620	788	121	59	80	12	110	76	332
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	11	164	98	620	788	121	59	80	12	110	76	332
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	11	164	98	620	788	121	59	80	12	110	76	332
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.99	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.23	0.77	2.00	1.00	1.00	1.00	0.87	0.13	1.00	1.00	1.00
Final Sat.:	1750	2315	1383	3150	1900	1750	1750	1565	235	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.07	0.07	0.20	0.41	0.07	0.03	0.05	0.05	0.06	0.04	0.19
Crit Moves:	****				****			****		****		
Green Time:	7.0	23.1	23.1	45.5	61.7	61.7	8.0	10.0	10.0	9.3	11.4	56.9
Volume/Cap:	0.09	0.31	0.31	0.43	0.67	0.11	0.42	0.51	0.51	0.67	0.35	0.33
Uniform Del:	43.5	31.8	31.8	18.5	12.6	7.9	43.8	42.7	42.7	43.8	40.9	11.5
IncremntDel:	0.3	0.2	0.2	0.2	1.6	0.0	2.1	2.5	2.5	10.5	1.0	0.2
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	43.8	32.0	32.0	18.7	14.1	7.9	45.9	45.1	45.1	54.3	41.9	11.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.8	32.0	32.0	18.7	14.1	7.9	45.9	45.1	45.1	54.3	41.9	11.7
LOS by Move:	D	C-	C-	B-	B	A	D	D	D	D-	D	B+
HCM2kAvgQ:	0	3	3	7	15	2	2	4	4	5	2	6

Note: Queue reported is the number of cars per lane.

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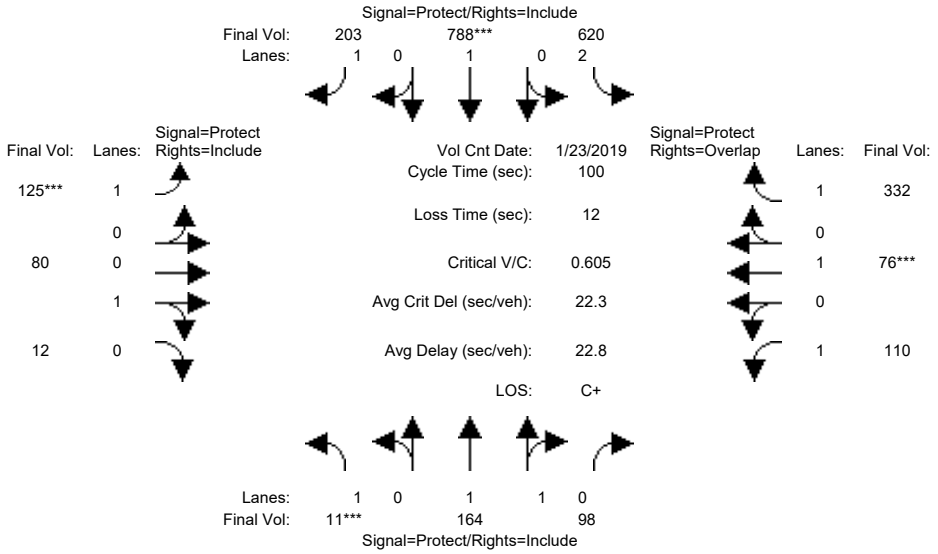
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background PM PP

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	11	164	98	520	788	121	59	80	12	110	76	192
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	11	164	98	520	788	121	59	80	12	110	76	192
Added Vol:	0	0	0	100	0	82	66	0	0	0	0	140
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	164	98	620	788	203	125	80	12	110	76	332
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	11	164	98	620	788	203	125	80	12	110	76	332
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	11	164	98	620	788	203	125	80	12	110	76	332
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	11	164	98	620	788	203	125	80	12	110	76	332
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.99	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.23	0.77	2.00	1.00	1.00	1.00	0.87	0.13	1.00	1.00	1.00
Final Sat.:	1750	2315	1383	3150	1900	1750	1750	1565	235	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.07	0.07	0.20	0.41	0.12	0.07	0.05	0.05	0.06	0.04	0.19
Crit Moves:	****				****		****				****	
Green Time:	7.0	22.8	22.8	44.8	60.6	60.6	10.4	12.0	12.0	8.4	10.0	54.8
Volume/Cap:	0.09	0.31	0.31	0.44	0.68	0.19	0.68	0.43	0.43	0.75	0.40	0.35
Uniform Del:	43.5	32.1	32.1	19.0	13.3	8.8	43.2	40.8	40.8	44.8	42.2	12.6
IncremntDel:	0.3	0.2	0.2	0.2	1.7	0.1	10.3	1.3	1.3	18.8	1.4	0.2
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	43.8	32.3	32.3	19.2	15.0	8.9	53.5	42.1	42.1	63.5	43.6	12.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.8	32.3	32.3	19.2	15.0	8.9	53.5	42.1	42.1	63.5	43.6	12.8
LOS by Move:	D	C-	C-	B-	B	A	D-	D	D	E	D	B
HCM2kAvgQ:	0	3	3	7	15	3	5	3	3	5	3	6

Note: Queue reported is the number of cars per lane.

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Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

	???				Background PM				Background PM PP						???			
Intersection	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	?	xx.x	x.xxx	xx.x	C	26.2	0.745	25.4	C	28.3	0.779	+ 0.033	27.7	+ 2.3	?	xx.x	x.xxx	xx.x
#2	?	xx.x	x.xxx	xx.x	F	10.8	1.097	10.8	F	13.0	1.212	+ 0.115	13.0	+ 2.1	?	xx.x	x.xxx	xx.x
#3	?	xx.x	x.xxx	xx.x	C	23.8	0.728	24.3	C	24.3	0.754	+ 0.025	25.4	+ 1.1	?	xx.x	x.xxx	xx.x
#4	?	xx.x	x.xxx	xx.x	C+	21.2	0.608	21.7	C+	22.8	0.605	- 0.003	22.3	+ 0.6	?	xx.x	x.xxx	xx.x

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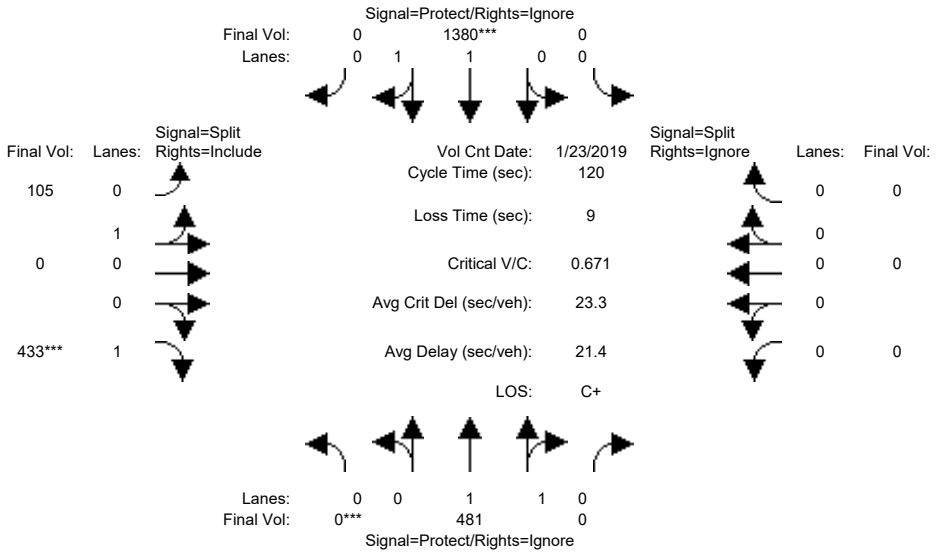
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background PM + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	10	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	386	255	0	1311	716	105	0	399	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	386	255	0	1311	716	105	0	399	0	0	0
Added Vol:	0	95	48	0	69	0	0	0	34	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	481	303	0	1380	716	105	0	433	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	481	0	0	1380	0	105	0	433	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	481	0	0	1380	0	105	0	433	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	481	0	0	1380	0	105	0	433	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.95	0.95	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1800	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.13	0.00	0.00	0.37	0.00	0.06	0.00	0.25	0.00	0.00	0.00
Crit Moves:	****				****				****			
Green Time:	0.0	66.7	0.0	0.0	66.7	0.0	44.3	0.0	44.3	0.0	0.0	0.0
Volume/Cap:	0.00	0.23	0.00	0.00	0.67	0.00	0.16	0.00	0.67	0.00	0.00	0.00
Uniform Del:	0.0	13.6	0.0	0.0	18.9	0.0	25.4	0.0	31.8	0.0	0.0	0.0
IncremntDel:	0.0	0.1	0.0	0.0	0.9	0.0	0.1	0.0	2.7	0.0	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Delay/Veh:	0.0	13.6	0.0	0.0	19.7	0.0	25.5	0.0	34.5	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	13.6	0.0	0.0	19.7	0.0	25.5	0.0	34.5	0.0	0.0	0.0
LOS by Move:	A	B	A	A	B-	A	C	A	C-	A	A	A
HCM2kAvgQ:	0	4	0	0	19	0	3	0	15	0	0	0

Note: Queue reported is the number of cars per lane.

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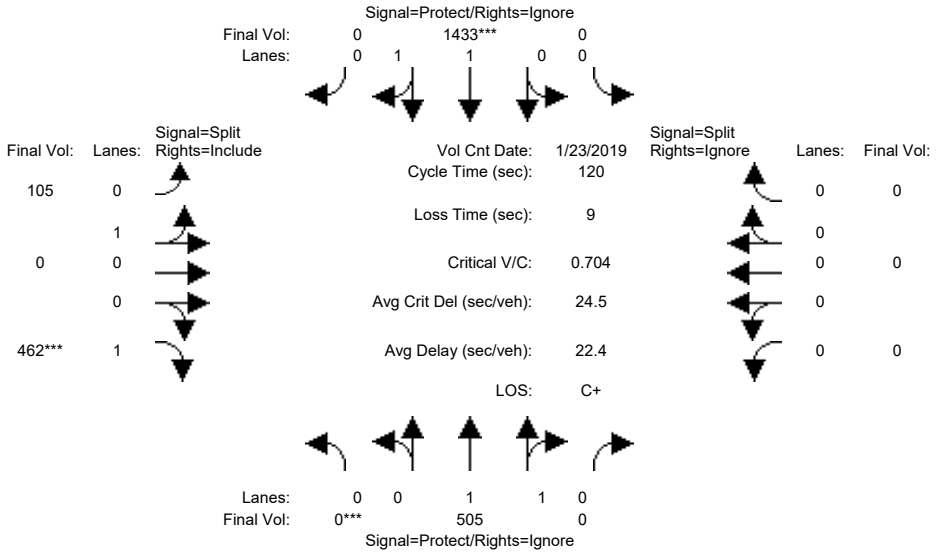
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Background PM PP + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Min. Green:	7	10	10	7	10	10	10	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	386	255	0	1311	716	105	0	399	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	386	255	0	1311	716	105	0	399	0	0	0
Added Vol:	0	119	91	0	122	0	0	0	63	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	505	346	0	1433	716	105	0	462	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	505	0	0	1433	0	105	0	462	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	505	0	0	1433	0	105	0	462	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	505	0	0	1433	0	105	0	462	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.95	0.95	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1800	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.14	0.00	0.00	0.39	0.00	0.06	0.00	0.26	0.00	0.00	0.00
Crit Moves:	****				****				****			
Green Time:	0.0	66.0	0.0	0.0	66.0	0.0	45.0	0.0	45.0	0.0	0.0	0.0
Volume/Cap:	0.00	0.25	0.00	0.00	0.70	0.00	0.16	0.00	0.70	0.00	0.00	0.00
Uniform Del:	0.0	14.1	0.0	0.0	19.8	0.0	24.9	0.0	31.9	0.0	0.0	0.0
IncremntDel:	0.0	0.1	0.0	0.0	1.1	0.0	0.1	0.0	3.5	0.0	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Delay/Veh:	0.0	14.1	0.0	0.0	21.0	0.0	25.0	0.0	35.3	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	14.1	0.0	0.0	21.0	0.0	25.0	0.0	35.3	0.0	0.0	0.0
LOS by Move:	A	B	A	A	C+	A	C	A	D+	A	A	A
HCM2kAvgQ:	0	5	0	0	20	0	3	0	16	0	0	0

Note: Queue reported is the number of cars per lane.

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Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

Intersection	???				Background PM + Mit				Background PM PP + Mit						???			
	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#2 [ ]	?	xx.x	x.xxx	xx.x	C+	21.4	0.671	23.3	C+	22.4	0.704	+ 0.033	24.5	+ 1.2	?	xx.x	x.xxx	xx.x

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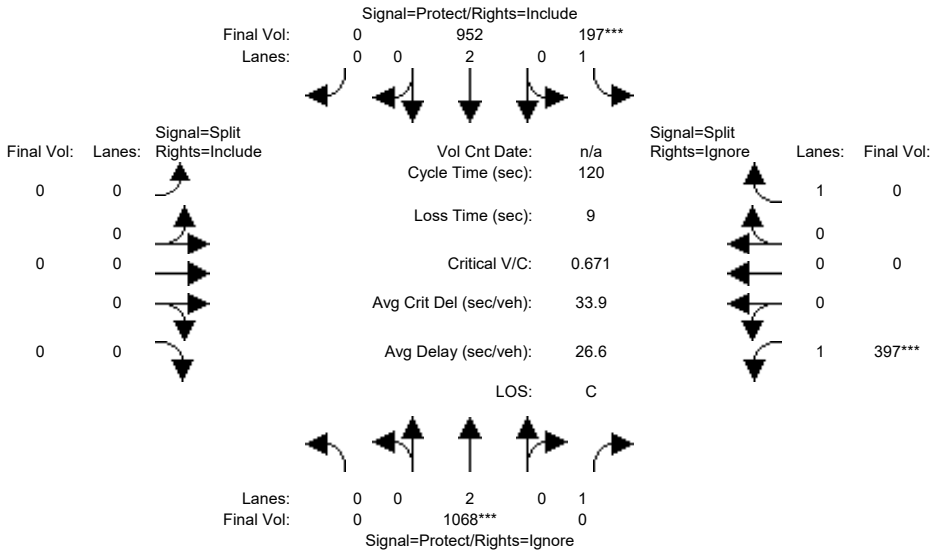
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative AM

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	0	909	431	174	801	0	0	0	0	310	0	768
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	1027	487	197	905	0	0	0	0	350	0	868
Added Vol:	0	41	41	0	47	0	0	0	0	47	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1068	528	197	952	0	0	0	0	397	0	868
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	1068	0	197	952	0	0	0	0	397	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	1068	0	197	952	0	0	0	0	397	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	1068	0	197	952	0	0	0	0	397	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.28	0.00	0.11	0.25	0.00	0.00	0.00	0.00	0.23	0.00	0.00
Crit Moves:		****		****						****		
Green Time:	0.0	50.3	0.0	20.1	70.4	0.0	0.0	0.0	0.0	40.6	0.0	0.0
Volume/Cap:	0.00	0.67	0.00	0.67	0.43	0.00	0.00	0.00	0.00	0.67	0.00	0.00
Uniform Del:	0.0	28.2	0.0	46.8	13.7	0.0	0.0	0.0	0.0	34.0	0.0	0.0
IncremntDel:	0.0	1.1	0.0	5.9	0.1	0.0	0.0	0.0	0.0	3.0	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Delay/Veh:	0.0	29.3	0.0	52.8	13.8	0.0	0.0	0.0	0.0	37.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	29.3	0.0	52.8	13.8	0.0	0.0	0.0	0.0	37.0	0.0	0.0
LOS by Move:	A	C	A	D-	B	A	A	A	A	D+	A	A
HCM2kAvgQ:	0	16	0	8	9	0	0	0	0	14	0	0

Note: Queue reported is the number of cars per lane.

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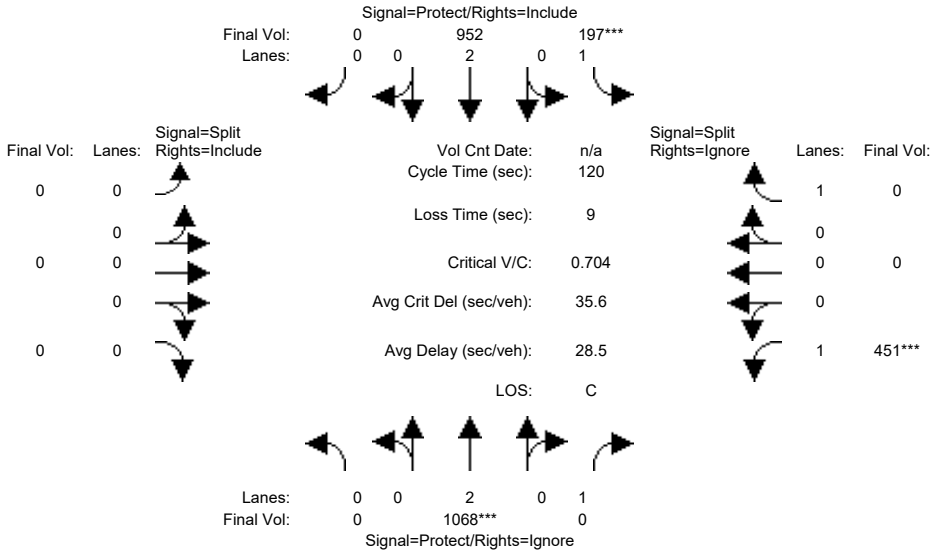
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative AM PP

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	0	909	431	174	801	0	0	0	0	310	0	768
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	1027	487	197	905	0	0	0	0	350	0	868
Added Vol:	0	41	64	0	47	0	0	0	0	101	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1068	551	197	952	0	0	0	0	451	0	868
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	1068	0	197	952	0	0	0	0	451	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	1068	0	197	952	0	0	0	0	451	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	1068	0	197	952	0	0	0	0	451	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.28	0.00	0.11	0.25	0.00	0.00	0.00	0.00	0.26	0.00	0.00
Crit Moves:		****		****						****		
Green Time:	0.0	47.9	0.0	19.1	67.1	0.0	0.0	0.0	0.0	43.9	0.0	0.0
Volume/Cap:	0.00	0.70	0.00	0.70	0.45	0.00	0.00	0.00	0.00	0.70	0.00	0.00
Delay/Veh:	0.0	31.6	0.0	55.6	15.7	0.0	0.0	0.0	0.0	36.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	31.6	0.0	55.6	15.7	0.0	0.0	0.0	0.0	36.0	0.0	0.0
LOS by Move:	A	C	A	E+	B	A	A	A	A	D+	A	A
HCM2kAvgQ:	0	17	0	9	10	0	0	0	0	16	0	0

Note: Queue reported is the number of cars per lane.

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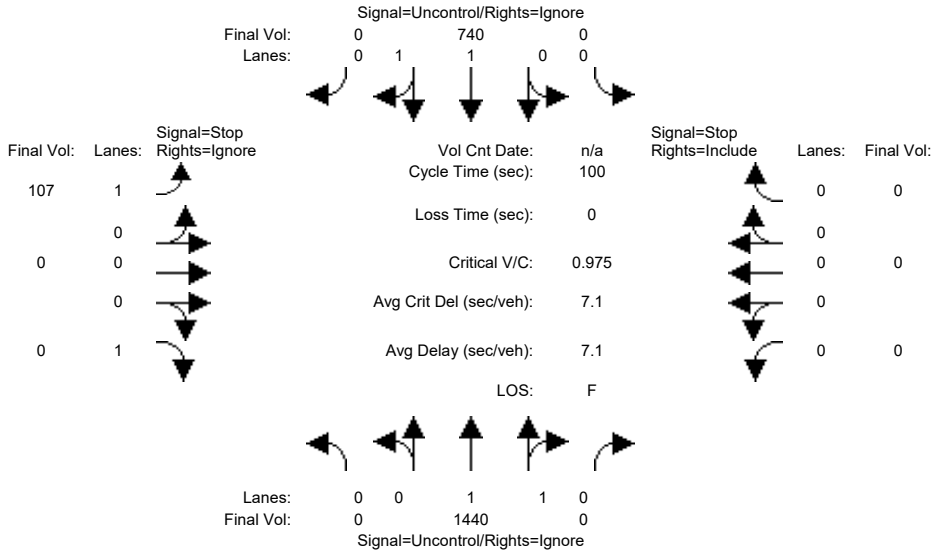
Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Cumulative AM

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Volume Module:												
Base Vol:	0	1202	573	0	572	521	95	0	122	0	0	0
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	1358	647	0	646	589	107	0	138	0	0	0
Added Vol:	0	82	41	0	94	0	0	0	47	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1440	688	0	740	589	107	0	185	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	0	1440	0	0	740	0	107	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	1440	0	0	740	0	107	0	0	0	0	0
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.0	xxxx	7.1	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.6	xxxx	3.4	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	1460	xxxx	370	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	110	xxxx	602	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	110	xxxx	602	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	0.97	xxxx	0.00	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	6.2	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	152.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	F	*	*	*	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			152.0			xxxxxx		
ApproachLOS:	*			*			F			*		

Note: Queue reported is the number of cars per lane.

Peak Hour Delay Signal Warrant Report

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1440	688	0	740	589	107	0	185	0	0	0
ApproachDel:	xxxxxx			xxxxxx			152.0			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=12.3]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=292]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3750]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1440	688	0	740	589	107	0	185	0	0	0

Major Street Volume: 3458
Minor Approach Volume: 292
Minor Approach Volume Threshold: -159 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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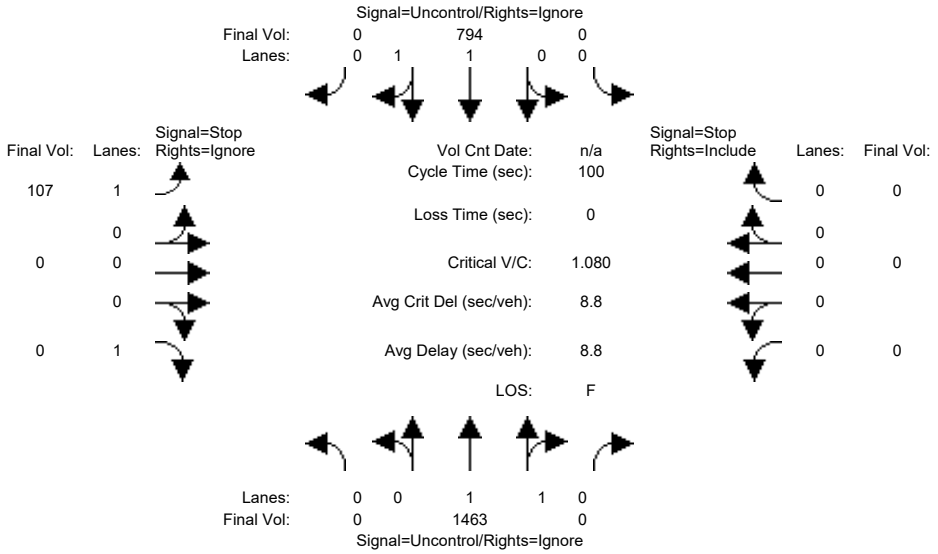
Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Cumulative AM PP

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Volume Module:												
Base Vol:	0	1202	573	0	572	521	95	0	122	0	0	0
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	1358	647	0	646	589	107	0	138	0	0	0
Added Vol:	0	105	84	0	148	0	0	0	76	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1463	731	0	794	589	107	0	214	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	0	1463	0	0	794	0	107	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	1463	0	0	794	0	107	0	0	0	0	0
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.0	xxxx	7.1	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.6	xxxx	3.4	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	1526	xxxx	397	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	99	xxxx	577	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	99	xxxx	577	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	1.08	xxxx	0.00	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	6.9	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	193.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	F	*	*	*	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			193.3			xxxxxx		
ApproachLOS:	*			*			F			*		

Note: Queue reported is the number of cars per lane.

Peak Hour Delay Signal Warrant Report

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1463	731	0	794	589	107	0	214	0	0	0
ApproachDel:	xxxxxx			xxxxxx			193.3			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=17.2]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=321]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3899]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1 0		0 0 1	1 0		1 0 0	0 1		0 0 0	0 0	
Initial Vol:	0	1463	731	0	794	589	107	0	214	0	0	0

Major Street Volume: 3578
Minor Approach Volume: 321
Minor Approach Volume Threshold: -174 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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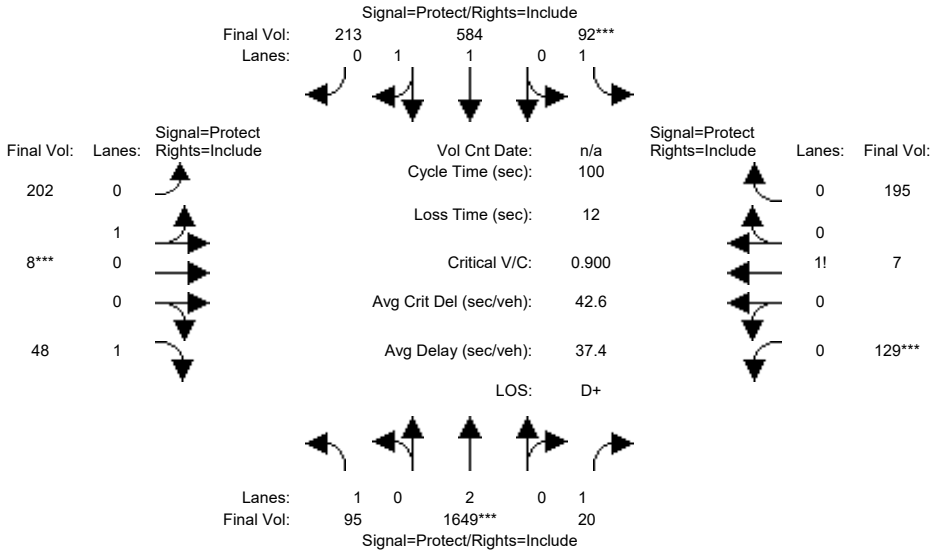
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative AM

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	94	1354	20	92	395	209	197	8	46	129	7	195
Growth Adj:	1.00	1.13	1.00	1.00	1.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	94	1530	20	92	446	209	197	8	46	129	7	195
Added Vol:	1	119	0	0	138	4	5	0	2	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	95	1649	20	92	584	213	202	8	48	129	7	195
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	95	1649	20	92	584	213	202	8	48	129	7	195
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	95	1649	20	92	584	213	202	8	48	129	7	195
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	95	1649	20	92	584	213	202	8	48	129	7	195
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.45	0.55	0.96	0.04	1.00	0.39	0.02	0.59
Final Sat.:	1750	3800	1750	1750	2711	988	1731	69	1750	682	37	1031
Capacity Analysis Module:												
Vol/Sat:	0.05	0.43	0.01	0.05	0.22	0.22	0.12	0.12	0.03	0.19	0.19	0.19
Crit Moves:		****		****				****		****		
Green Time:	13.4	47.5	47.5	7.0	41.2	41.2	12.8	12.8	12.8	20.7	20.7	20.7
Volume/Cap:	0.41	0.91	0.02	0.75	0.52	0.52	0.91	0.91	0.21	0.91	0.91	0.91
Uniform Del:	39.7	24.3	13.9	45.6	22.1	22.1	43.1	43.1	39.1	38.8	38.8	38.8
IncremntDel:	1.2	7.6	0.0	22.6	0.3	0.3	36.6	36.6	0.5	26.7	26.7	26.7
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	40.8	31.9	13.9	68.2	22.4	22.4	79.7	79.7	39.6	65.5	65.5	65.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	40.8	31.9	13.9	68.2	22.4	22.4	79.7	79.7	39.6	65.5	65.5	65.5
LOS by Move:	D	C	B	E	C+	C+	E-	E-	D	E	E	E
HCM2kAvgQ:	3	23	0	5	10	10	10	10	2	15	15	15

Note: Queue reported is the number of cars per lane.

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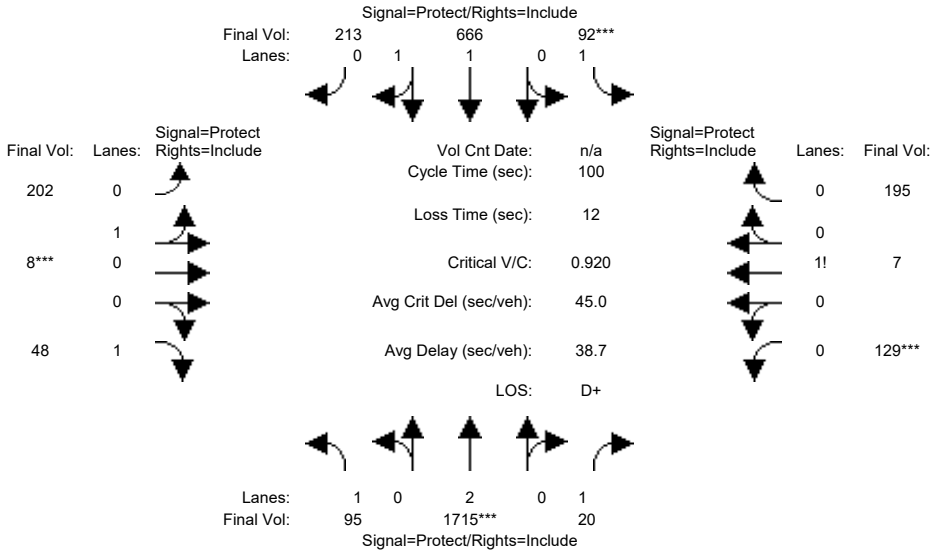
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative AM PP

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	94	1354	20	92	395	209	197	8	46	129	7	195
Growth Adj:	1.00	1.13	1.00	1.00	1.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	94	1530	20	92	446	209	197	8	46	129	7	195
Added Vol:	1	185	0	0	220	4	5	0	2	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	95	1715	20	92	666	213	202	8	48	129	7	195
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	95	1715	20	92	666	213	202	8	48	129	7	195
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	95	1715	20	92	666	213	202	8	48	129	7	195
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	95	1715	20	92	666	213	202	8	48	129	7	195
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.50	0.50	0.96	0.04	1.00	0.39	0.02	0.59
Final Sat.:	1750	3800	1750	1750	2803	896	1731	69	1750	682	37	1031
Capacity Analysis Module:												
Vol/Sat:	0.05	0.45	0.01	0.05	0.24	0.24	0.12	0.12	0.03	0.19	0.19	0.19
Crit Moves:		****		****				****		****		
Green Time:	12.6	48.3	48.3	7.0	42.7	42.7	12.5	12.5	12.5	20.2	20.2	20.2
Volume/Cap:	0.43	0.93	0.02	0.75	0.56	0.56	0.93	0.93	0.22	0.93	0.93	0.93
Delay/Veh:	41.8	33.9	13.5	68.2	22.0	22.0	85.5	85.5	39.9	70.7	70.7	70.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	41.8	33.9	13.5	68.2	22.0	22.0	85.5	85.5	39.9	70.7	70.7	70.7
LOS by Move:	D	C-	B	E	C+	C+	F	F	D	E	E	E
HCM2kAvgQ:	3	24	0	5	11	11	10	10	2	15	15	15

Note: Queue reported is the number of cars per lane.

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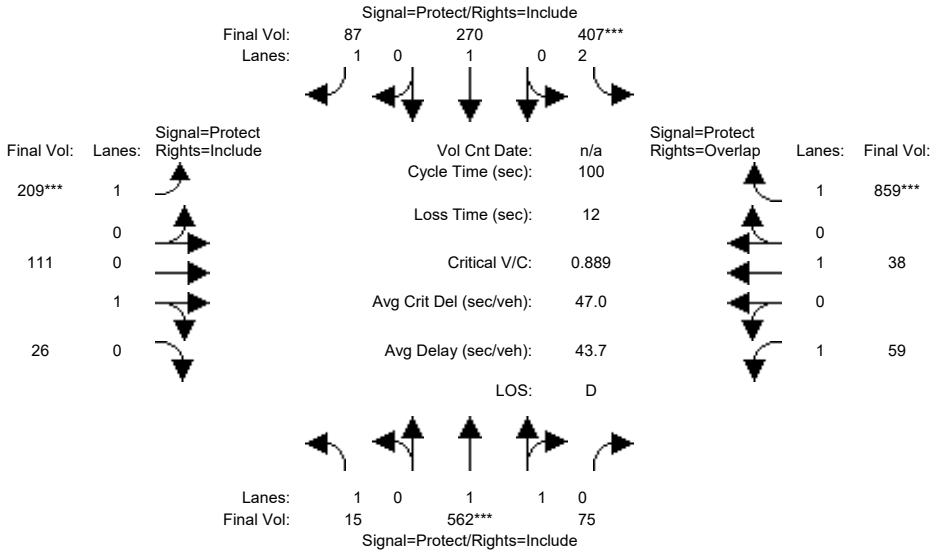
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative AM

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	15	562	75	237	270	87	209	111	26	59	38	654
Growth Adj:	1.00	1.00	1.00	1.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.13
Initial Bse:	15	562	75	268	270	87	209	111	26	59	38	739
Added Vol:	0	0	0	139	0	0	0	0	0	0	0	120
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	562	75	407	270	87	209	111	26	59	38	859
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	15	562	75	407	270	87	209	111	26	59	38	859
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	15	562	75	407	270	87	209	111	26	59	38	859
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	15	562	75	407	270	87	209	111	26	59	38	859
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.98	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.76	0.24	2.00	1.00	1.00	1.00	0.81	0.19	1.00	1.00	1.00
Final Sat.:	1750	3264	436	3150	1900	1750	1750	1458	342	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.17	0.17	0.13	0.14	0.05	0.12	0.08	0.08	0.03	0.02	0.49
Crit Moves:		****		****			****					****
Green Time:	11.2	19.4	19.4	14.5	22.7	22.7	13.4	31.8	31.8	22.3	40.7	55.2
Volume/Cap:	0.08	0.89	0.89	0.89	0.63	0.22	0.89	0.24	0.24	0.15	0.05	0.89
Uniform Del:	39.8	39.3	39.3	41.9	34.8	31.4	42.6	25.1	25.1	31.3	18.0	19.7
IncremntDel:	0.2	13.1	13.1	18.8	2.9	0.3	31.1	0.2	0.2	0.2	0.0	10.2
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	40.0	52.4	52.4	60.8	37.7	31.7	73.7	25.4	25.4	31.4	18.0	29.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	40.0	52.4	52.4	60.8	37.7	31.7	73.7	25.4	25.4	31.4	18.0	29.9
LOS by Move:	D	D-	D-	E	D+	C	E	C	C	C	B	C
HCM2kAvgQ:	0	11	11	8	7	2	10	3	3	2	1	29

Note: Queue reported is the number of cars per lane.

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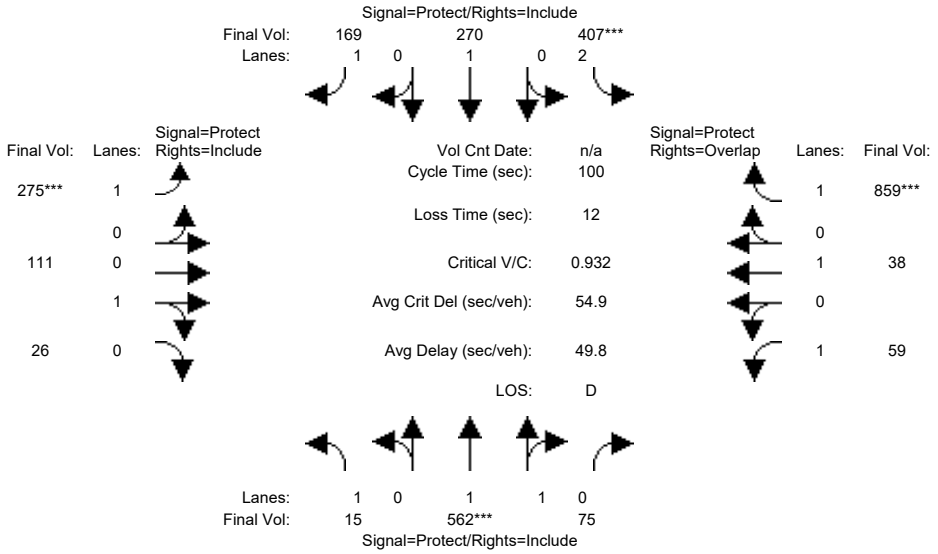
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative AM PP

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	15	562	75	237	270	87	209	111	26	59	38	654
Growth Adj:	1.00	1.00	1.00	1.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.13
Initial Bse:	15	562	75	268	270	87	209	111	26	59	38	739
Added Vol:	0	0	0	139	0	82	66	0	0	0	0	120
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	15	562	75	407	270	169	275	111	26	59	38	859
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	15	562	75	407	270	169	275	111	26	59	38	859
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	15	562	75	407	270	169	275	111	26	59	38	859
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	15	562	75	407	270	169	275	111	26	59	38	859
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.98	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.76	0.24	2.00	1.00	1.00	1.00	0.81	0.19	1.00	1.00	1.00
Final Sat.:	1750	3264	436	3150	1900	1750	1750	1458	342	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.17	0.17	0.13	0.14	0.10	0.16	0.08	0.08	0.03	0.02	0.49
Crit Moves:		****		****			****					****
Green Time:	10.7	18.5	18.5	13.9	21.7	21.7	16.9	32.7	32.7	22.9	38.8	52.7
Volume/Cap:	0.08	0.93	0.93	0.93	0.66	0.45	0.93	0.23	0.23	0.15	0.05	0.93
Delay/Veh:	40.4	59.8	59.8	69.4	39.6	34.8	75.9	24.7	24.7	30.9	19.1	37.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	40.4	59.8	59.8	69.4	39.6	34.8	75.9	24.7	24.7	30.9	19.1	37.8
LOS by Move:	D	E+	E+	E	D	C-	E-	C	C	C	B-	D+
HCM2kAvgQ:	0	12	12	9	7	5	13	3	3	2	1	31

Note: Queue reported is the number of cars per lane.

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Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

	???				Cumulative AM				Cumulative AM PP						???			
Intersection	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	?	xx.x	x.xxx	xx.x	C	26.6	0.671	33.9	C	28.5	0.704	+ 0.033	35.6	+ 1.6	?	xx.x	x.xxx	xx.x
#2	?	xx.x	x.xxx	xx.x	F	7.1	0.975	7.1	F	8.8	1.080	+ 0.106	8.8	+ 1.6	?	xx.x	x.xxx	xx.x
#3	?	xx.x	x.xxx	xx.x	D+	37.4	0.900	42.6	D+	38.7	0.920	+ 0.020	45.0	+ 2.4	?	xx.x	x.xxx	xx.x
#4	?	xx.x	x.xxx	xx.x	D	43.7	0.889	47.0	D	49.8	0.932	+ 0.043	54.9	+ 7.9	?	xx.x	x.xxx	xx.x

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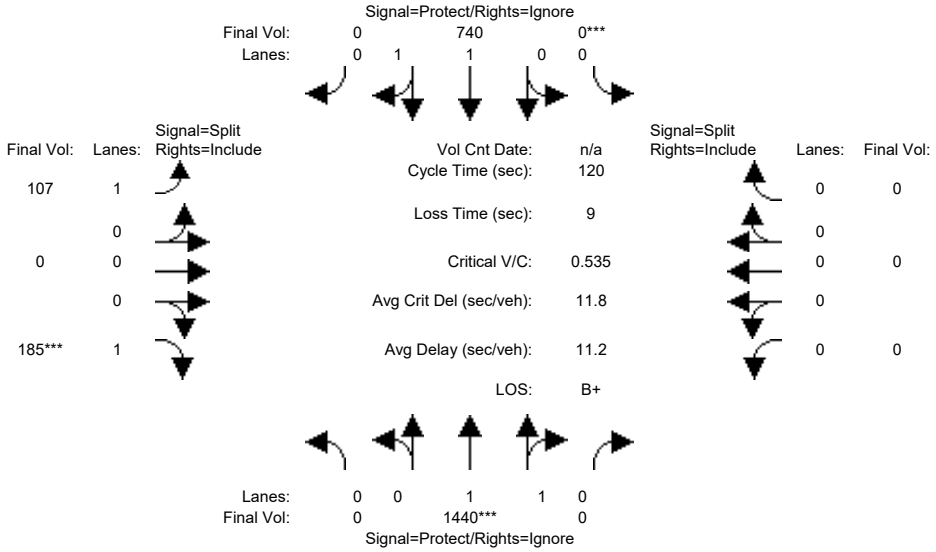
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative AM + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	0	1202	573	0	572	521	95	0	122	0	0	0
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	1358	647	0	646	589	107	0	138	0	0	0
Added Vol:	0	82	41	0	94	0	0	0	47	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1440	688	0	740	589	107	0	185	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	1440	0	0	740	0	107	0	185	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	1440	0	0	740	0	107	0	185	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	0	1440	0	0	740	0	107	0	185	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1750	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.39	0.00	0.00	0.20	0.00	0.06	0.00	0.11	0.00	0.00	0.00
Crit Moves:		****		****					****			
Green Time:	0.0	87.3	0.0	0.0	87.3	0.0	23.7	0.0	23.7	0.0	0.0	0.0
Volume/Cap:	0.00	0.54	0.00	0.00	0.28	0.00	0.31	0.00	0.54	0.00	0.00	0.00
Uniform Del:	0.0	7.3	0.0	0.0	5.6	0.0	41.2	0.0	43.2	0.0	0.0	0.0
IncremntDel:	0.0	0.2	0.0	0.0	0.1	0.0	0.5	0.0	1.6	0.0	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Delay/Veh:	0.0	7.5	0.0	0.0	5.6	0.0	41.7	0.0	44.9	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	7.5	0.0	0.0	5.6	0.0	41.7	0.0	44.9	0.0	0.0	0.0
LOS by Move:	A	A	A	A	A	A	D	A	D	A	A	A
HCM2kAvgQ:	0	11	0	0	5	0	4	0	7	0	0	0

Note: Queue reported is the number of cars per lane.

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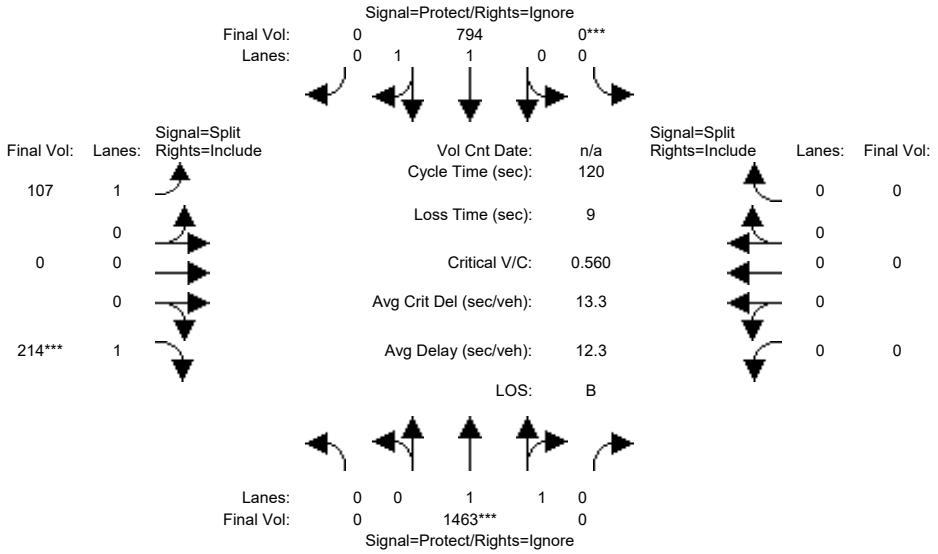
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative AM PP + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module:												
Base Vol:	0	1202	573	0	572	521	95	0	122	0	0	0
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	1358	647	0	646	589	107	0	138	0	0	0
Added Vol:	0	105	84	0	148	0	0	0	76	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	1463	731	0	794	589	107	0	214	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	1463	0	0	794	0	107	0	214	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	1463	0	0	794	0	107	0	214	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	0	1463	0	0	794	0	107	0	214	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1750	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.40	0.00	0.00	0.21	0.00	0.06	0.00	0.12	0.00	0.00	0.00
Crit Moves:		****		****					****			
Green Time:	0.0	84.8	0.0	0.0	84.8	0.0	26.2	0.0	26.2	0.0	0.0	0.0
Volume/Cap:	0.00	0.56	0.00	0.00	0.30	0.00	0.28	0.00	0.56	0.00	0.00	0.00
Delay/Veh:	0.0	8.8	0.0	0.0	6.6	0.0	39.5	0.0	43.6	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	8.8	0.0	0.0	6.6	0.0	39.5	0.0	43.6	0.0	0.0	0.0
LOS by Move:	A	A	A	A	A	A	D	A	D	A	A	A
HCM2kAvgQ:	0	12	0	0	6	0	4	0	8	0	0	0

Note: Queue reported is the number of cars per lane.

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Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

Intersection	???				Cumulative AM + Mit				Cumulative AM PP + Mit						???			
	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#2 [ ]	?	xx.x	x.xxx	xx.x	B+	11.2	0.535	11.8	B	12.3	0.560	+ 0.025	13.3	+ 1.5	?	xx.x	x.xxx	xx.x

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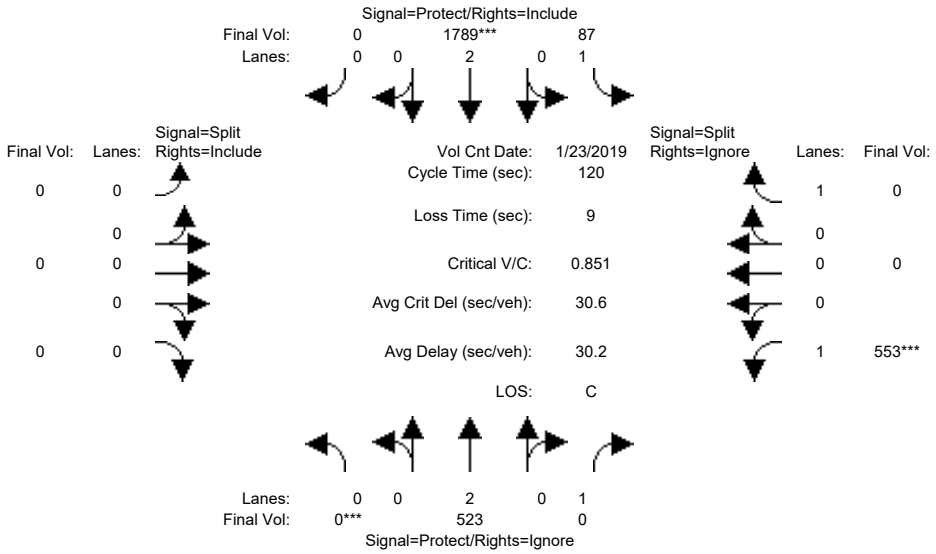
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative PM

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	405	88	77	1541	0	0	0	0	447	0	561
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	458	99	87	1741	0	0	0	0	505	0	634
Added Vol:	0	65	65	0	48	0	0	0	0	48	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	523	164	87	1789	0	0	0	0	553	0	634
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	523	0	87	1789	0	0	0	0	553	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	523	0	87	1789	0	0	0	0	553	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	523	0	87	1789	0	0	0	0	553	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.14	0.00	0.05	0.47	0.00	0.00	0.00	0.00	0.32	0.00	0.00
Crit Moves:	****				****					****		
Green Time:	0.0	46.6	0.0	19.8	66.4	0.0	0.0	0.0	0.0	44.6	0.0	0.0
Volume/Cap:	0.00	0.35	0.00	0.30	0.85	0.00	0.00	0.00	0.00	0.85	0.00	0.00
Uniform Del:	0.0	26.0	0.0	44.0	22.6	0.0	0.0	0.0	0.0	34.7	0.0	0.0
IncremntDel:	0.0	0.1	0.0	0.6	3.5	0.0	0.0	0.0	0.0	10.4	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Delay/Veh:	0.0	26.1	0.0	44.6	26.1	0.0	0.0	0.0	0.0	45.1	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	26.1	0.0	44.6	26.1	0.0	0.0	0.0	0.0	45.1	0.0	0.0
LOS by Move:	A	C	A	D	C	A	A	A	A	D	A	A
HCM2kAvgQ:	0	7	0	3	30	0	0	0	0	23	0	0

Note: Queue reported is the number of cars per lane.

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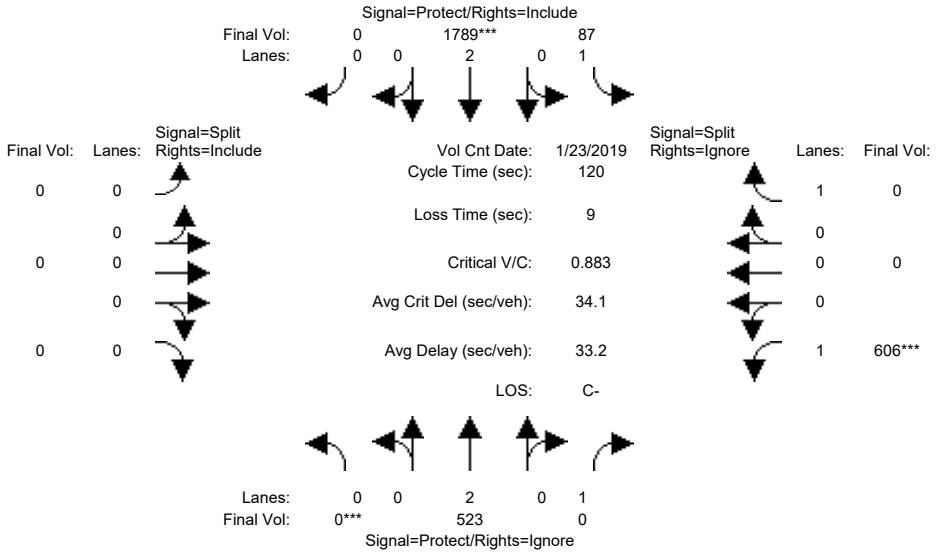
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative PM PP

Intersection #1: I-280 NB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 NB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	405	88	77	1541	0	0	0	0	447	0	561
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	458	99	87	1741	0	0	0	0	505	0	634
Added Vol:	0	65	89	0	48	0	0	0	0	101	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	523	188	87	1789	0	0	0	0	606	0	634
User Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	523	0	87	1789	0	0	0	0	606	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	523	0	87	1789	0	0	0	0	606	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	523	0	87	1789	0	0	0	0	606	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	1.00	1.00	2.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	3800	1750	1750	3800	0	0	0	0	1750	0	1750
Capacity Analysis Module:												
Vol/Sat:	0.00	0.14	0.00	0.05	0.47	0.00	0.00	0.00	0.00	0.35	0.00	0.00
Crit Moves:	****				****					****		
Green Time:	0.0	44.9	0.0	19.0	64.0	0.0	0.0	0.0	0.0	47.0	0.0	0.0
Volume/Cap:	0.00	0.37	0.00	0.31	0.88	0.00	0.00	0.00	0.00	0.88	0.00	0.00
Uniform Del:	0.0	27.2	0.0	44.7	24.7	0.0	0.0	0.0	0.0	33.9	0.0	0.0
IncremntDel:	0.0	0.2	0.0	0.6	5.0	0.0	0.0	0.0	0.0	13.0	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
Delay/Veh:	0.0	27.4	0.0	45.3	29.7	0.0	0.0	0.0	0.0	46.9	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	27.4	0.0	45.3	29.7	0.0	0.0	0.0	0.0	46.9	0.0	0.0
LOS by Move:	A	C	A	D	C	A	A	A	A	D	A	A
HCM2kAvgQ:	0	7	0	3	32	0	0	0	0	26	0	0

Note: Queue reported is the number of cars per lane.

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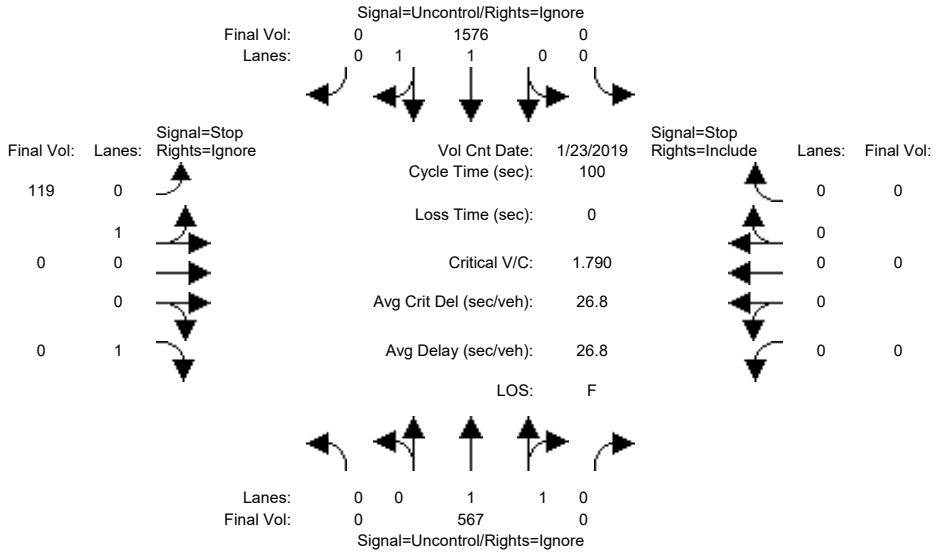
Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Cumulative PM

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	386	255	0	1311	716	105	0	399	0	0	0
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	436	288	0	1481	809	119	0	451	0	0	0
Added Vol:	0	131	65	0	95	0	0	0	48	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	567	353	0	1576	809	119	0	499	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00
PHF Volume:	0	567	0	0	1576	0	119	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	567	0	0	1576	0	119	0	0	0	0	0
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6.8	6.5	6.9	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	1860	2144	788	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	66	49	338	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	66	49	338	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	1.79	0.00	0.00	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	*	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	66	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	10.7	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	511.5	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	F	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			511.5			xxxxxx		
ApproachLOS:	*			*			F			*		

Note: Queue reported is the number of cars per lane.

Peak Hour Delay Signal Warrant Report

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1 0	0	1	0 0	0	0
Initial Vol:	0	567	353	0	1576	809	119	0	499	0	0	0
ApproachDel:	xxxxxx			xxxxxx			511.5			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=87.7]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=618]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=3923]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1 0	0	1	0 0	0	0
Initial Vol:	0	567	353	0	1576	809	119	0	499	0	0	0

Major Street Volume: 3306
Minor Approach Volume: 618
Minor Approach Volume Threshold: -140 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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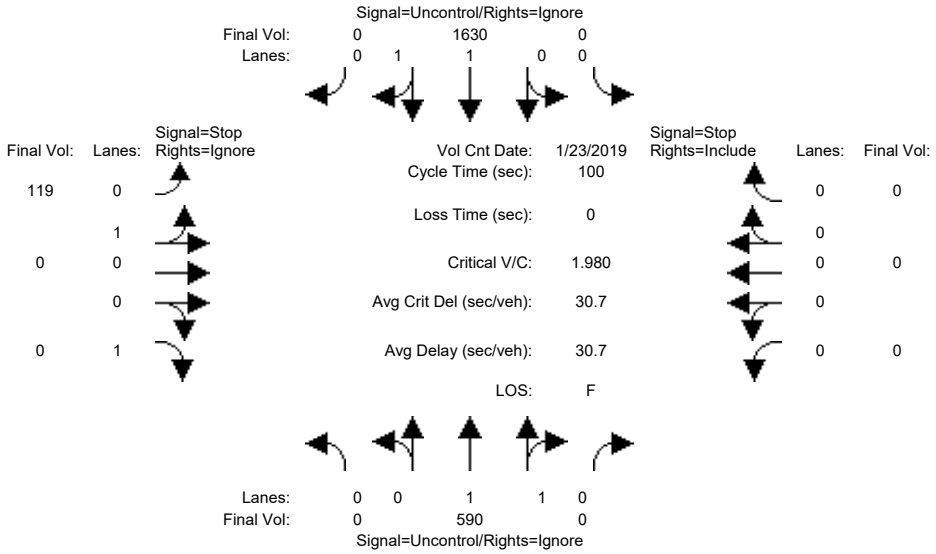
Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Cumulative PM PP

Intersection #2: I-280 SB Ramps / Foothill Expy




```
Street Name:          Foothill Expy                    I-280 SB Ramps
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM
Base Vol:       0  386   255     0 1311   716   105    0   399     0    0     0
Growth Adj:  1.13 1.13  1.13  1.13 1.13  1.13  1.13 1.13  1.13  1.13 1.13  1.13
Initial Bse:    0  436   288     0 1481   809   119    0   451     0    0     0
Added Vol:      0  154   108     0  149     0     0    0    76     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  590   396     0 1630   809   119    0   527     0    0     0
User Adj:    1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  0.00  1.00 1.00  1.00
PHF Volume:     0  590     0     0 1630     0   119    0     0     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0  590     0     0 1630     0   119    0     0     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  1926 2221   815  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx    60   44   325  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx    60   44   325  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  1.98 0.00  0.00  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx    60 xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx  11.3 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx 605.4 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     F    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx            605.4           xxxxxx
ApproachLOS:         *                *               F                *
Note: Queue reported is the number of cars per lane.
                  Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #2 I-280 SB Ramps / Foothill Expy
********************************************************************************
Future Volume Alternative: Peak Hour Warrant Met
```

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1 0	0	1	0 0 0	0	0
Initial Vol:	0 590	396		0 1630	809		119 0	527		0 0	0	
ApproachDel:	xxxxxx			xxxxxx			605.4			xxxxxx		

Approach[eastbound][lanes=2][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=108.6]
SUCCEED - Vehicle-hours >= 5 for two or more lane approach.
Signal Warrant Rule #2: [approach volume=646]
SUCCEED - Approach volume >= 150 for two or more lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=4071]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

SIGNAL WARRANT DISCLAIMER
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Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #2 I-280 SB Ramps / Foothill Expy

****

Future Volume Alternative: Peak Hour Warrant Met

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Lanes:	0 0 1	1	0	0 0 1	1	0	0 1 0	0	1	0 0 0	0	0
Initial Vol:	0 590	396		0 1630	809		119 0	527		0 0	0	

Major Street Volume: 3426
Minor Approach Volume: 646
Minor Approach Volume Threshold: -155 [less than minimum of 150]

SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an "indicator" of the likelihood of an unsignalized intersection warranting a traffic signal in the future. Intersections that exceed this warrant are probably more likely to meet one or more of the other volume based signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace a rigorous and complete traffic signal warrant analysis by the responsible jurisdiction. Consideration of the other signal warrants, which is beyond the scope of this software, may yield different results.

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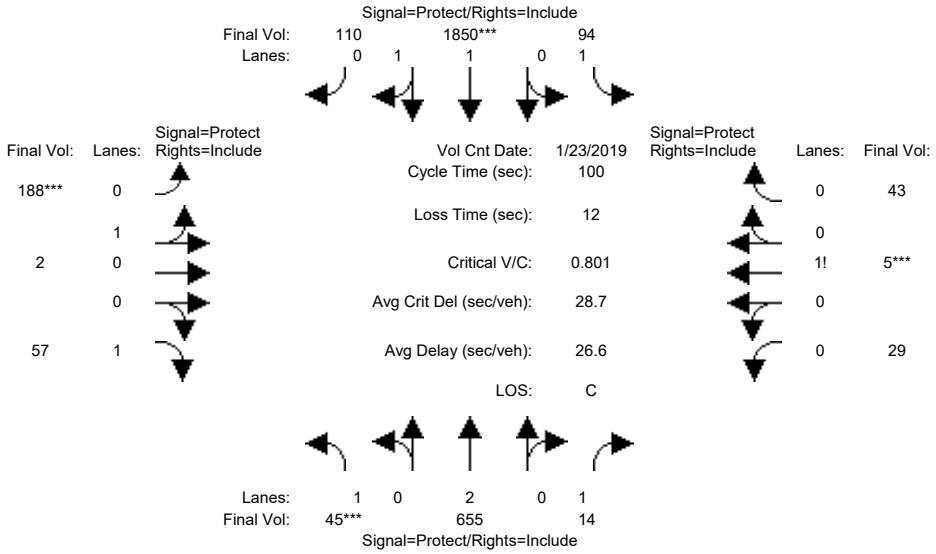
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative PM

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	43	411	14	94	1515	105	183	2	55	29	5	43
Growth Adj:	1.00	1.13	1.00	1.00	1.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	43	464	14	94	1712	105	183	2	55	29	5	43
Added Vol:	2	191	0	0	138	5	5	0	2	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	45	655	14	94	1850	110	188	2	57	29	5	43
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	45	655	14	94	1850	110	188	2	57	29	5	43
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	45	655	14	94	1850	110	188	2	57	29	5	43
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	45	655	14	94	1850	110	188	2	57	29	5	43
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.88	0.12	0.99	0.01	1.00	0.38	0.06	0.56
Final Sat.:	1750	3800	1750	1750	3492	208	1781	19	1750	659	114	977
Capacity Analysis Module:												
Vol/Sat:	0.03	0.17	0.01	0.05	0.53	0.53	0.11	0.11	0.03	0.04	0.04	0.04
Crit Moves:	****				****		****				****	
Green Time:	7.0	47.1	47.1	19.1	59.2	59.2	11.8	13.1	13.1	8.7	10.0	10.0
Volume/Cap:	0.37	0.37	0.02	0.28	0.89	0.89	0.89	0.81	0.25	0.51	0.44	0.44
Uniform Del:	44.4	16.9	14.1	34.6	17.7	17.7	43.5	42.2	39.0	43.6	42.4	42.4
IncremntDel:	1.9	0.1	0.0	0.5	5.2	5.2	34.6	18.0	0.6	2.8	1.8	1.8
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	46.3	17.0	14.1	35.0	22.9	22.9	78.1	60.2	39.6	46.4	44.1	44.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	46.3	17.0	14.1	35.0	22.9	22.9	78.1	60.2	39.6	46.4	44.1	44.1
LOS by Move:	D	B	B	D+	C+	C+	E-	E	D	D	D	D
HCM2kAvgQ:	1	6	0	3	30	30	9	8	2	3	3	3

Note: Queue reported is the number of cars per lane.

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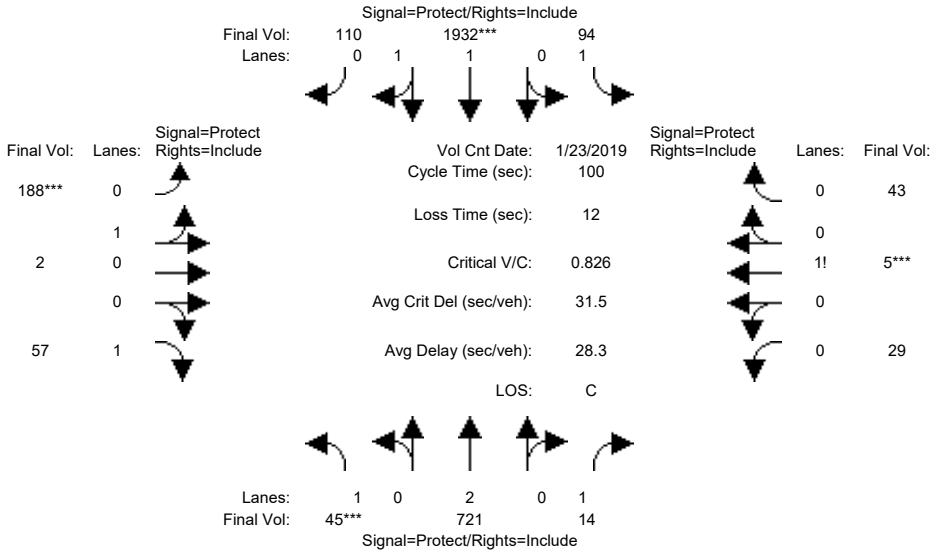
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative PM PP

Intersection #3: Foothill Boulevard / Cristo Rey Drive/Starling Drive



Street Name:	Foothill Boulevard						Cristo Rey Drive/Starling Drive					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	43	411	14	94	1515	105	183	2	55	29	5	43
Growth Adj:	1.00	1.13	1.00	1.00	1.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	43	464	14	94	1712	105	183	2	55	29	5	43
Added Vol:	2	257	0	0	220	5	5	0	2	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	45	721	14	94	1932	110	188	2	57	29	5	43
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	45	721	14	94	1932	110	188	2	57	29	5	43
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	45	721	14	94	1932	110	188	2	57	29	5	43
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	45	721	14	94	1932	110	188	2	57	29	5	43
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	1.00	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Lanes:	1.00	2.00	1.00	1.00	1.89	0.11	0.99	0.01	1.00	0.38	0.06	0.56
Final Sat.:	1750	3800	1750	1750	3501	199	1781	19	1750	659	114	977
Capacity Analysis Module:												
Vol/Sat:	0.03	0.19	0.01	0.05	0.55	0.55	0.11	0.11	0.03	0.04	0.04	0.04
Crit Moves:	****				****		****				****	
Green Time:	7.0	48.7	48.7	17.9	59.6	59.6	11.4	12.9	12.9	8.5	10.0	10.0
Volume/Cap:	0.37	0.39	0.02	0.30	0.93	0.93	0.93	0.82	0.25	0.52	0.44	0.44
Uniform Del:	44.4	16.3	13.3	35.6	18.2	18.2	43.9	42.4	39.2	43.8	42.4	42.4
IncremntDel:	1.9	0.1	0.0	0.5	7.4	7.4	42.5	20.2	0.6	3.1	1.8	1.8
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	46.3	16.4	13.3	36.1	25.6	25.6	86.4	62.7	39.8	46.9	44.1	44.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	46.3	16.4	13.3	36.1	25.6	25.6	86.4	62.7	39.8	46.9	44.1	44.1
LOS by Move:	D	B	B	D+	C	C	F	E	D	D	D	D
HCM2kAvgQ:	1	7	0	3	34	34	10	8	2	3	3	3

Note: Queue reported is the number of cars per lane.

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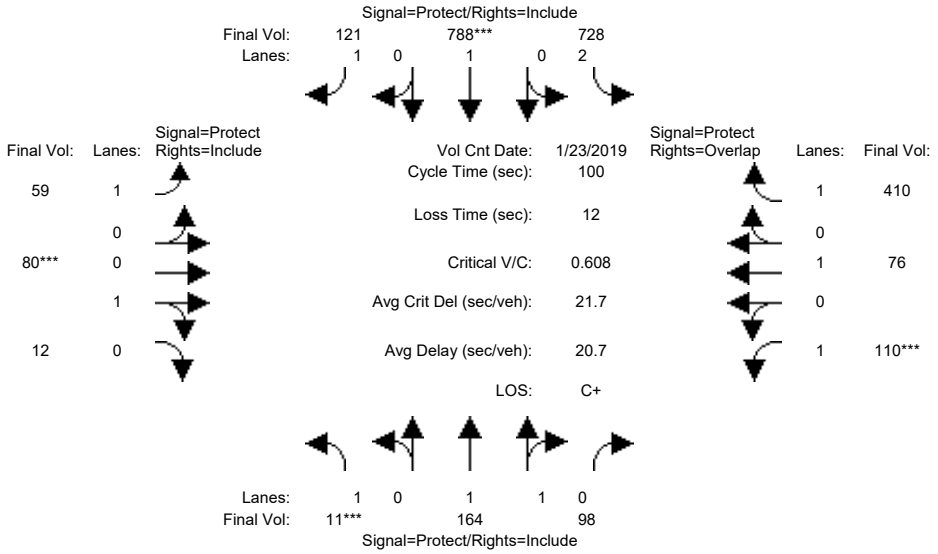
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative PM

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	11	164	98	520	788	121	59	80	12	110	76	192
Growth Adj:	1.00	1.00	1.00	1.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.13
Initial Bse:	11	164	98	588	788	121	59	80	12	110	76	217
Added Vol:	0	0	0	140	0	0	0	0	0	0	0	193
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	164	98	728	788	121	59	80	12	110	76	410
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	11	164	98	728	788	121	59	80	12	110	76	410
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	11	164	98	728	788	121	59	80	12	110	76	410
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	11	164	98	728	788	121	59	80	12	110	76	410
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.99	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.23	0.77	2.00	1.00	1.00	1.00	0.87	0.13	1.00	1.00	1.00
Final Sat.:	1750	2315	1383	3150	1900	1750	1750	1565	235	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.07	0.07	0.23	0.41	0.07	0.03	0.05	0.05	0.06	0.04	0.23
Crit Moves:	****				****			****		****		
Green Time:	7.0	20.7	20.7	47.9	61.7	61.7	8.0	10.0	10.0	9.3	11.4	59.3
Volume/Cap:	0.09	0.34	0.34	0.48	0.67	0.11	0.42	0.51	0.51	0.67	0.35	0.40
Uniform Del:	43.5	33.8	33.8	17.6	12.6	7.9	43.8	42.7	42.7	43.8	40.9	10.8
IncremntDel:	0.3	0.3	0.3	0.2	1.6	0.0	2.1	2.5	2.5	10.5	1.0	0.2
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	43.8	34.1	34.1	17.9	14.1	7.9	45.9	45.1	45.1	54.3	41.9	11.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.8	34.1	34.1	17.9	14.1	7.9	45.9	45.1	45.1	54.3	41.9	11.1
LOS by Move:	D	C-	C-	B	B	A	D	D	D	D-	D	B+
HCM2kAvgQ:	0	3	3	8	15	2	2	4	4	5	2	7

Note: Queue reported is the number of cars per lane.

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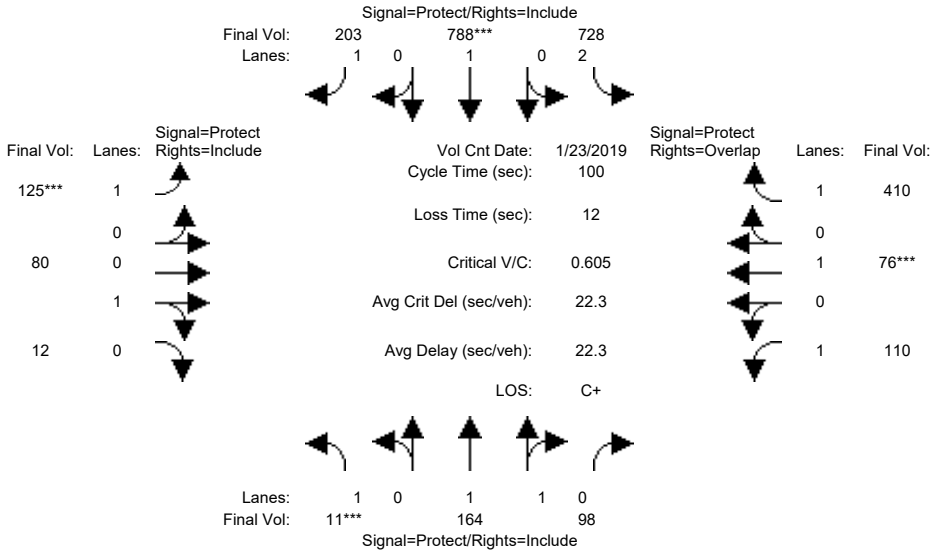
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative PM PP

Intersection #4: Foothill Boulevard / Stevens Creek Boulevard



Street Name:	Foothill Boulevard						Stevens Creek Boulevard					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	7	10	10	7	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	11	164	98	520	788	121	59	80	12	110	76	192
Growth Adj:	1.00	1.00	1.00	1.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.13
Initial Bse:	11	164	98	588	788	121	59	80	12	110	76	217
Added Vol:	0	0	0	140	0	82	66	0	0	0	0	193
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	164	98	728	788	203	125	80	12	110	76	410
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	11	164	98	728	788	203	125	80	12	110	76	410
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	11	164	98	728	788	203	125	80	12	110	76	410
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	11	164	98	728	788	203	125	80	12	110	76	410
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.99	0.95	0.83	1.00	0.92	0.92	0.95	0.95	0.92	1.00	0.92
Lanes:	1.00	1.23	0.77	2.00	1.00	1.00	1.00	0.87	0.13	1.00	1.00	1.00
Final Sat.:	1750	2315	1383	3150	1900	1750	1750	1565	235	1750	1900	1750
Capacity Analysis Module:												
Vol/Sat:	0.01	0.07	0.07	0.23	0.41	0.12	0.07	0.05	0.05	0.06	0.04	0.23
Crit Moves:	****				****		****				****	
Green Time:	7.0	20.4	20.4	47.2	60.6	60.6	10.4	12.0	12.0	8.4	10.0	57.2
Volume/Cap:	0.09	0.35	0.35	0.49	0.68	0.19	0.68	0.43	0.43	0.75	0.40	0.41
Uniform Del:	43.5	34.1	34.1	18.2	13.3	8.8	43.2	40.8	40.8	44.8	42.2	12.0
IncremntDel:	0.3	0.3	0.3	0.3	1.7	0.1	10.3	1.3	1.3	18.8	1.4	0.3
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	43.8	34.4	34.4	18.4	15.0	8.9	53.5	42.1	42.1	63.5	43.6	12.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	43.8	34.4	34.4	18.4	15.0	8.9	53.5	42.1	42.1	63.5	43.6	12.3
LOS by Move:	D	C-	C-	B-	B	A	D-	D	D	E	D	B
HCM2kAvgQ:	0	3	3	9	15	3	5	3	3	5	3	8

Note: Queue reported is the number of cars per lane.

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Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

	???				Cumulative PM				Cumulative PM PP						???			
Intersection	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	?	xx.x	x.xxx	xx.x	C	30.2	0.851	30.6	C-	33.2	0.883	+ 0.033	34.1	+ 3.5	?	xx.x	x.xxx	xx.x
#2	?	xx.x	x.xxx	xx.x	F	26.8	1.790	26.8	F	30.7	1.980	+ 0.190	30.7	+ 3.9	?	xx.x	x.xxx	xx.x
#3	?	xx.x	x.xxx	xx.x	C	26.6	0.801	28.7	C	28.3	0.826	+ 0.025	31.5	+ 2.8	?	xx.x	x.xxx	xx.x
#4	?	xx.x	x.xxx	xx.x	C+	20.7	0.608	21.7	C+	22.3	0.605	- 0.003	22.3	+ 0.6	?	xx.x	x.xxx	xx.x

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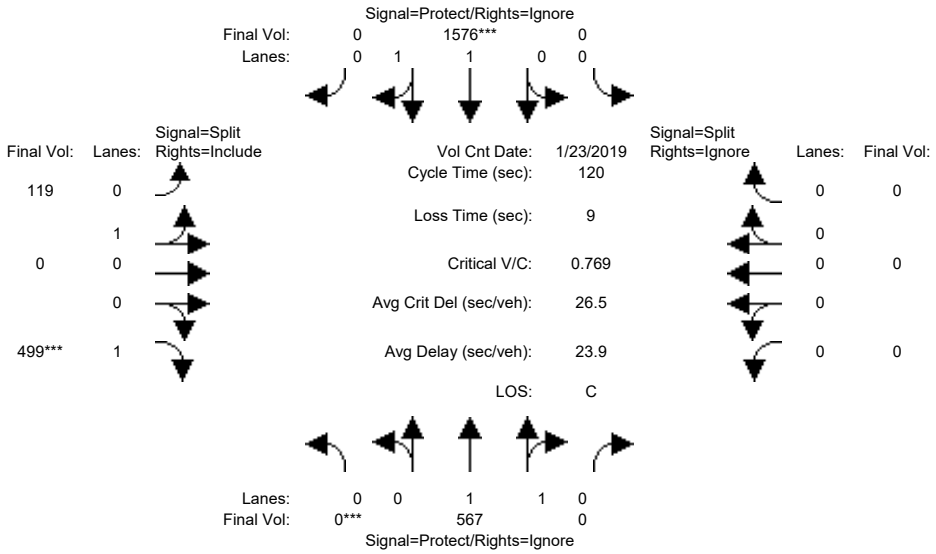
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative PM + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Min. Green:	7	10	10	7	10	10	10	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	386	255	0	1311	716	105	0	399	0	0	0
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	436	288	0	1481	809	119	0	451	0	0	0
Added Vol:	0	131	65	0	95	0	0	0	48	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	567	353	0	1576	809	119	0	499	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	567	0	0	1576	0	119	0	499	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	567	0	0	1576	0	119	0	499	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	567	0	0	1576	0	119	0	499	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.95	0.95	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1800	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.15	0.00	0.00	0.43	0.00	0.07	0.00	0.29	0.00	0.00	0.00
Crit Moves:	****				****				****			
Green Time:	0.0	66.5	0.0	0.0	66.5	0.0	44.5	0.0	44.5	0.0	0.0	0.0
Volume/Cap:	0.00	0.28	0.00	0.00	0.77	0.00	0.18	0.00	0.77	0.00	0.00	0.00
Uniform Del:	0.0	14.1	0.0	0.0	20.8	0.0	25.4	0.0	33.2	0.0	0.0	0.0
IncremntDel:	0.0	0.1	0.0	0.0	1.8	0.0	0.1	0.0	5.6	0.0	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Delay/Veh:	0.0	14.2	0.0	0.0	22.6	0.0	25.6	0.0	38.8	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	14.2	0.0	0.0	22.6	0.0	25.6	0.0	38.8	0.0	0.0	0.0
LOS by Move:	A	B	A	A	C+	A	C	A	D+	A	A	A
HCM2kAvgQ:	0	5	0	0	24	0	3	0	19	0	0	0

Note: Queue reported is the number of cars per lane.

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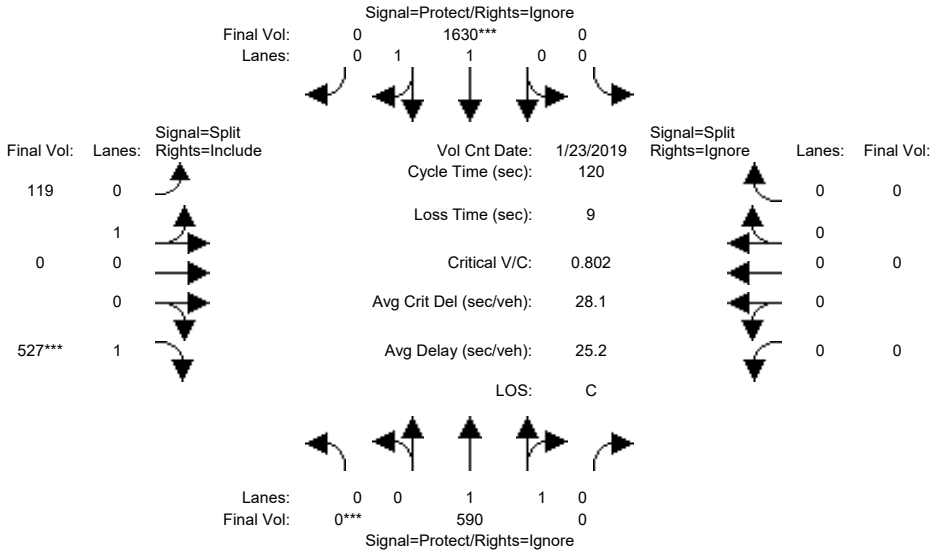
Level Of Service Computation Report
2000 HCM Operations (Future Volume Alternative)
Cumulative PM PP + Mit

Intersection #2: I-280 SB Ramps / Foothill Expy



Street Name:	Foothill Expy						I-280 SB Ramps					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Min. Green:	7	10	10	7	10	10	10	10	10	10	10	10
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume Module: >> Count Date: 23 Jan 2019 << 05:00:00 PM												
Base Vol:	0	386	255	0	1311	716	105	0	399	0	0	0
Growth Adj:	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Initial Bse:	0	436	288	0	1481	809	119	0	451	0	0	0
Added Vol:	0	154	108	0	149	0	0	0	76	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	590	396	0	1630	809	119	0	527	0	0	0
User Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
PHF Volume:	0	590	0	0	1630	0	119	0	527	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	590	0	0	1630	0	119	0	527	0	0	0
PCE Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
MLF Adj:	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
FinalVolume:	0	590	0	0	1630	0	119	0	527	0	0	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.92	0.97	0.92	0.92	0.97	0.92	0.95	0.95	0.92	0.92	1.00	0.92
Lanes:	0.00	2.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Final Sat.:	0	3700	0	0	3700	0	1800	0	1750	0	0	0
Capacity Analysis Module:												
Vol/Sat:	0.00	0.16	0.00	0.00	0.44	0.00	0.07	0.00	0.30	0.00	0.00	0.00
Crit Moves:	****				****				****			
Green Time:	0.0	65.9	0.0	0.0	65.9	0.0	45.1	0.0	45.1	0.0	0.0	0.0
Volume/Cap:	0.00	0.29	0.00	0.00	0.80	0.00	0.18	0.00	0.80	0.00	0.00	0.00
Uniform Del:	0.0	14.5	0.0	0.0	21.8	0.0	25.1	0.0	33.5	0.0	0.0	0.0
IncremntDel:	0.0	0.1	0.0	0.0	2.4	0.0	0.1	0.0	7.0	0.0	0.0	0.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	0.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Delay/Veh:	0.0	14.6	0.0	0.0	24.1	0.0	25.2	0.0	40.5	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	14.6	0.0	0.0	24.1	0.0	25.2	0.0	40.5	0.0	0.0	0.0
LOS by Move:	A	B	A	A	C	A	C	A	D	A	A	A
HCM2kAvgQ:	0	6	0	0	26	0	3	0	20	0	0	0

Note: Queue reported is the number of cars per lane.

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Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

Intersection	???				Cumulative PM + Mit				Cumulative PM PP + Mit						???			
	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#2 [ ]	?	xx.x	x.xxx	xx.x	C	23.9	0.769	26.5	C	25.2	0.802	+ 0.033	28.1	+ 1.6	?	xx.x	x.xxx	xx.x

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Appendix D:
Freeway Segment Screening Analysis



Table D-1: Project Trips and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips
I-280	Wolfe Rd. to Lawrence Expwy.	EB	6,900	69	AM PM	10 10
		WB	6,900	69	AM PM	21 21
I-280	De Anza Blvd. to Wolfe Rd.	EB	6,900	69	AM PM	10 10
		WB	6,900	69	AM PM	21 21
I-280	SR 85 to De Anza Blvd.	EB	6,900	69	AM PM	10 10
		WB	6,900	69	AM PM	21 21
I-280	Foothill Expwy. to SR 85	EB	6,900	69	AM PM	43 43
		WB	6,900	69	AM PM	58 58
I-280	Magdalena Av. to Foothill Expwy.	EB	6,900	69	AM PM	29 29
		WB	6,900	69	AM PM	24 24
I-280	El Monte Rd. to Magdalena Av.	EB	9,200	92	AM PM	29 29
		WB	9,200	92	AM PM	24 24
I-280	La Barranca Rd. to El Monte Rd.	EB	9,200	92	AM PM	29 29
		WB	9,200	92	AM PM	24 24
I-280	Page Mill Rd. to La Barranca Rd.	EB	9,200	92	AM PM	29 29
		WB	9,200	92	AM PM	24 24
I-280	Alpine Rd. to Page Mill Rd.	EB	9,200	92	AM PM	29 29
		WB	9,200	92	AM PM	24 24
I-280	Alpine Rd. to Sand Hill Rd.	EB	9,200	92	AM PM	29 29
		WB	9,200	92	AM PM	24 24

Table D-1: Project Trips and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips
I-280	Sand Hill Rd. to Woodside Rd.	EB	9,200	92	AM PM	29 29
		WB	9,200	92	AM PM	24 24
I-280	Woodside Rd. to Farm Hill Blvd.	EB	9,200	92	AM PM	17 17
		WB	9,200	92	AM PM	14 14
I-280	Farm Hill Blvd. to Canada Rd.	EB	9,200	92	AM PM	17 17
		WB	9,200	92	AM PM	14 14
I-280	Canada Rd. to Edgewood Rd.	EB	9,200	92	AM PM	17 17
		WB	9,200	92	AM PM	14 14
I-280	Edgewood Rd. to SR 92	EB	11,500	115	AM PM	17 17
		WB	11,500	115	AM PM	14 14
I-280	SR 92 to Bunker Hill Dr.	EB	9,200	92	AM PM	9 9
		WB	9,200	92	AM PM	7 7
I-280	Bunker Hill Dr. to Hayne Rd.	EB	9,200	92	AM PM	9 9
		WB	9,200	92	AM PM	7 7
I-280	Hayne Rd. to Trousdale Dr.	EB	9,200	92	AM PM	9 9
		WB	9,200	92	AM PM	7 7
I-280	Trousdale Dr. to Larkspur Dr.	EB	9,200	92	AM PM	9 9
		WB	9,200	92	AM PM	7 7
I-280	Larkspur Dr. to SR 35	EB	9,200	92	AM PM	9 9
		WB	9,200	92	AM PM	7 7

Table D-1: Project Trips and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips
I-280	SR 35 to San Bruno Ave.	EB	9,200	92	AM PM	9 9
		WB	9,200	92	AM PM	7 7
I-280	San Bruno Ave. to I-380	EB	9,200	92	AM PM	4 4
		WB	9,200	92	AM PM	3 3
I-280	I-380 to Westborough Blvd.	EB	9,200	92	AM PM	4 4
		WB	9,200	92	AM PM	3 3
I-280	Westborough Blvd. to Hickey Blvd	EB	9,200	92	AM PM	4 4
		WB	9,200	92	AM PM	3 3
US 101	I-880 to Old Bayshore Hwy.	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	Old Bayshore Hwy. to N. First St.	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	N. First St. to Guadalupe Pkwy.	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	Guadalupe Pkwy. to De La Cruz Blvd.	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	De La Cruz Blvd. to Montague Expwy. / Santa Tomas Expwy.	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	Montague Expwy. / Santa Tomas Expwy. to Bowers Av. / Great America Pkwy.	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4

Table D-1: Project Trips and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips
US 101	Bowers Av. / Great American Pkwy. to Lawrence Expwy.	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	Lawrence Expwy. to N. Fair Oaks Av.	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	N. Fair Oaks Av. to N. Mathilda Av.	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	N. Mathilda Av. to SR 237	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	SR 237 to Moffett Blvd.	NB	6,900	69	AM PM	5 5
		SB	6,900	69	AM PM	4 4
US 101	Moffett Blvd. to SR 85	NB	6,900	69	AM PM	9 9
		SB	6,900	69	AM PM	7 7
US 101	SR 85 to N. Shoreline Blvd.	NB	9,200	92	AM PM	10 10
		SB	6,900	69	AM PM	13 13
US 101	N. Shoreline Blvd. to Rengstorff Av.	NB	6,900	69	AM PM	10 10
		SB	6,900	69	AM PM	13 13
US 101	Rengstorff Av. to San Antonio Av.	NB	6,900	69	AM PM	10 10
		SB	6,900	69	AM PM	13 13
US 101	San Antonio Av. to Oregon Expwy.	NB	6,900	69	AM PM	10 10
		SB	6,900	69	AM PM	13 13

Table D-1: Project Trips and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips
US 101	Oregon Expwy. to Embarcadero Rd.	NB	6,900	69	AM PM	10 10
		SB	6,900	69	AM PM	13 13
US 101	Embarcadero Rd. to University Av.	NB	6,900	69	AM PM	10 10
		SB	6,900	69	AM PM	13 13
US 101	University Av. to Willow Rd.	NB	6,900	69	AM PM	10 10
		SB	6,900	69	AM PM	13 13
US 101	Willow Rd. to Marsh Rd.	NB	6,900	69	AM PM	10 10
		SB	6,900	69	AM PM	13 13
US 101	Marsh Rd. to SR 84	NB	6,900	69	AM PM	7 7
		SB	6,900	69	AM PM	9 9
US 101	SR 84 to Whipple Ave.	NB	6,900	69	AM PM	17 17
		SB	6,900	69	AM PM	21 21
US 101	Whipple Ave. to Holly St.	NB	9,200	92	AM PM	17 17
		SB	6,900	69	AM PM	21 21
US 101	Holly St. to Ralston Ave.	NB	9,200	92	AM PM	17 17
		SB	9,200	92	AM PM	21 21
US 101	Ralston Ave. to E. Hillsdale Blvd.	NB	9,200	92	AM PM	17 17
		SB	9,200	92	AM PM	21 21
US 101	E. Hillsdale Blvd. to SR 92	NB	9,200	92	AM PM	17 17
		SB	9,200	92	AM PM	21 21

Table D-1: Project Trips and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips
US 101	SR 92 to 3rd Avenue	NB	9,200	92	AM PM	14 14
		SB	9,200	92	AM PM	17 17
US 101	3rd Ave. to Bayshore Blvd./Poplar Ave.	NB	9,200	92	AM PM	14 14
		SB	9,200	92	AM PM	17 17
US 101	Bayshore Blvd./Poplar Ave. to Peninsula Ave.	NB	9,200	92	AM PM	14 14
		SB	9,200	92	AM PM	17 17
US 101	Peninsula Ave. to Broadway	NB	9,200	92	AM PM	14 14
		SB	9,200	92	AM PM	17 17
US 101	Broadway to Millbrae Ave.	NB	9,200	92	AM PM	14 14
		SB	11,500	115	AM PM	17 17
US 101	Millbrae Ave. to Airport Access	NB	11,500	115	AM PM	7 7
		SB	11,500	115	AM PM	9 9
US 101	Airport Access to I-380	NB	11,500	115	AM PM	7 7
		SB	11,500	115	AM PM	9 9
US 101	I-380 to Airport Blvd.	NB	11,500	115	AM PM	7 7
		SB	11,500	115	AM PM	9 9
SR 237	SR 85 to Central Expwy.	EB	4,400	44	AM PM	10 10
		WB	4,400	44	AM PM	13 13
SR 237	Central Expwy. to Maude Av.	EB	4,400	44	AM PM	10 10
		WB	4,400	44	AM PM	13 13

Table D-1: Project Trips and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips
SR 237	Maude Av. to US 101	EB	4,400	44	AM PM	10 10
		WB	4,400	44	AM PM	13 13
SR 237	US 101 to Mathilda Av.	EB	4,400	44	AM PM	3 3
		WB	4,400	44	AM PM	5 5
SR 237	Mathilda Av. to N. Fair Oaks Av.	EB	4,600	46	AM PM	3 3
		WB	6,900	69	AM PM	5 5
SR 237	N. Fair Oaks Av. to Lawrence Expwy.	EB	4,600	46	AM PM	3 3
		WB	4,600	46	AM PM	5 5
SR 237	Lawrence Expwy. to Great America Pkwy.	EB	4,600	46	AM PM	3 3
		WB	4,600	46	AM PM	5 5
SR 237	Great America Pkwy. to N. First St.	EB	4,600	46	AM PM	3 3
		WB	4,600	46	AM PM	5 5
SR 237	N. First St. to Zanker Rd.	EB	4,600	46	AM PM	3 3
		WB	4,600	46	AM PM	5 5
SR 237	Zanker Rd. to McCarthy Blvd.	EB	4,600	46	AM PM	3 3
		WB	4,600	46	AM PM	5 5
SR 237	McCarthy Blvd. to I-880	EB	4,600	46	AM PM	3 3
		WB	4,600	46	AM PM	5 5
SR 85	I-280 to W. Homestead Rd.	NB	4,600	46	AM PM	27 27
		SB	4,600	46	AM PM	33 33

Table D-1: Project Trips and 1% Freeway Segment Capacity Comparison

Freeway	Segment	Direction	Capacity[1]	1% Capacity	Peak Hour[2]	Project Trips
SR 85	W. Homestead Rd. to W. Fremont Av.	NB	4,600	46	AM PM	27 27
		SB	4,600	46	AM PM	33 33
SR 85	W. Fremont Av. to El Camino Real	NB	4,600	46	AM PM	27 27
		SB	4,600	46	AM PM	33 33
SR 85	El Camino Real to SR 237	NB	4,600	46	AM PM	27 27
		SB	6,900	69	AM PM	33 33
SR 85	SR 237 to Central Expwy.	NB	4,600	46	AM PM	17 17
		SB	4,600	46	AM PM	21 21
SR 85	Central Expwy. to US 101	NB	4,600	46	AM PM	17 17
		SB	4,600	46	AM PM	21 21

Notes:

1. Capacity in vehicles per hour (vph) based on number of lanes.
2. AM = morning peak hour (between 7:00 and 9:00 AM), PM = evening peak hour (between 4:00 and 6:00 PM).

Source: *2016 Annual Monitoring and Conformance Report*, VTA. Fehr & Peers, January 2019.

Appendix E:
Lehigh Historical Truck Data



Table E1: Lehigh Historical Truck Data			
From	To	Rolling # Trucks per year	
		Cement Truck Trucks	Rock Plant Trucks
Sep-08	Sep-09	32138	30,167
Oct-08	Oct-09	31888	30,573
Nov-08	Nov-09	32814	31,797
Dec-08	Dec-09	33105	32,661
Jan-09	Jan-10	32618	33,060
Feb-09	Feb-10	33007	33,706
Mar-09	Mar-10	32994	35,100
Apr-09	Apr-10	32757	35,114
May-09	May-10	33077	34,989
Jun-09	Jun-10	33768	35,821
Jul-09	Jul-10	33863	36,397
Aug-09	Aug-10	34266	37,962
Sep-09	Sep-10	34424	38,517
Oct-09	Oct-10	34998	37,943
Nov-09	Nov-10	34952	37,177
Dec-09	Dec-10	34800	36,308
Jan-10	Jan-11	35970	36,264
Feb-10	Feb-11	36560	35,907
Mar-10	Mar-11	36727	34,427
Apr-10	Apr-11	37520	34,457
May-10	May-11	38197	34,733
Jun-10	Jun-11	38858	32,723
Jul-10	Jul-11	39720	31,376
Aug-10	Aug-11	41005	29,705
Sep-10	Sep-11	41852	28,727
Oct-10	Oct-11	40738	25,632
Nov-10	Nov-11	40758	22,621
Dec-10	Dec-11	42408	20,584
Jan-11	Jan-12	43697	18,424
Feb-11	Feb-12	45122	16,867
Mar-11	Mar-12	45818	15,256
Apr-11	Apr-12	45698	12,828
May-11	May-12	46604	9,730
Jun-11	Jun-12	46450	7,496
Jul-11	Jul-12	46559	4,979
Aug-11	Aug-12	46306	2,400
Sep-11	Sep-12	46365	197
Oct-11	Oct-12	49056	0
Nov-11	Nov-12	49996	0
Dec-11	Dec-12	49577	0
Jan-12	Jan-13	49320	0
Feb-12	Feb-13	48517	0
Mar-12	Mar-13	49195	0
Apr-12	Apr-13	50720	0
May-12	May-13	51297	0
Jun-12	Jun-13	51769	104
Jul-12	Jul-13	52072	347
Aug-12	Aug-13	52455	618
Sep-12	Sep-13	53264	863
Oct-12	Oct-13	52941	1,309
Nov-12	Nov-13	52336	1,702
Dec-12	Dec-13	52720	2,234
Jan-13	Jan-14	52843	2,991
Feb-13	Feb-14	53234	3,641
Mar-13	Mar-14	53174	4,735
Apr-13	Apr-14	53226	6,262
May-13	May-14	52878	7,656
Jun-13	Jun-14	53800	8,995
Jul-13	Jul-14	54704	9,377
Aug-13	Aug-14	54798	9,684
Sep-13	Sep-14	54871	10,382
Oct-13	Oct-14	54952	11,008
Nov-13	Nov-14	55686	11,554
Dec-13	Dec-14	55898	11,247

Jan-14	Jan-15	56241	10,497
Feb-14	Feb-15	56658	9,930
Mar-14	Mar-15	57675	8,899
Apr-14	Apr-15	57699	7,586
May-14	May-15	57488	6,192
Jun-14	Jun-15	56938	4,749
Jul-14	Jul-15	56592	4,124
Aug-14	Aug-15	56421	3,546
Sep-14	Sep-15	56106	2,681
Oct-14	Oct-15	55939	1,609
Nov-14	Nov-15	56046	670
Dec-14	Dec-15	56159	445
Jan-15	Jan-16	55398	438
Feb-15	Feb-16	55017	355
Mar-15	Mar-16	53910	292
Apr-15	Apr-16	53420	78
May-15	May-16	53245	78
Jun-15	Jun-16	53568	78
Jul-15	Jul-16	53204	78
Aug-15	Aug-16	53575	78
Sep-15	Sep-16	53778	0
Oct-15	Oct-16	53888	0
Nov-15	Nov-16	53990	0
Dec-15	Dec-16	54349	0
Jan-16	Jan-17	53777	0
Feb-16	Feb-17	51963	0
Mar-16	Mar-17	50605	0
Apr-16	Apr-17	48056	0
May-16	May-17	48056	0
Jun-16	Jun-17	47352	0
Jul-16	Jul-17	46805	0
Aug-16	Aug-17	46619	0
Sep-16	Sep-17	45659	0
Oct-16	Oct-17	44614	0
Nov-16	Nov-17	43413	0
Dec-16	Dec-17	42277	0
Jan-17	Jan-18	42253	
Feb-17	Feb-18	43805	
Mar-17	Mar-18	44309	
Apr-17	Apr-18	46041	
May-17	May-18	45674	
Jun-17	Jun-18	42084	
Jul-17	Jul-18	41696	
Aug-17	Aug-18	41240	
Sep-17	Sep-18	41410	
Average of annual # trucks		**46,961**	**11,797**

Table E2: Summary of 10 year Truck Data (September 2008 to September 2018)

	Type of truck		Total
	Cement	Rock Plant	
Average # of trucks annually	46,961	11,797	58,758
Average # of trucks daily (1)	188	47	235

(1) One year is equivalent to 250 working days. Therefore, Average # of trucks annually/250 = Average # of trucks daily

Lehigh Hanson

HEIDELBERGCEMENT Group