

Valley Water

AUGUST 5, 2024

Anderson Dam Seismic Retrofit Project

Partially Recirculated Draft Environmental Impact Report

SCH # 2013082052

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Acronyms and Abbreviations

µg/m^3	micrograms per cubic meter
AMP	Adaptive Management Program
ATCM	Airborne Toxic Control Measures
BAAQMD	Bay Area Air Quality Management District
BHBA	Basalt Hill Borrow Area
BMP	best management practice
BOC	Board of Consultants
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
CARB	California Air Resources Board
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CM	Conservation Measure (only used for Ogier Ponds and Coyote Percolation Dam)
CO_2e	carbon dioxide equivalent
County	Santa Clara County
cy	cubic yard(s)
dBA	A-weighted decibel
dBL	XXX
DPM	diesel particulate matter
DSOD	California Department of Water Resources, Division of Safety of Dams
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EMFAC	Emission FACtor model
FAHCE	Fish and Aquatic Habitat Collaborative Effort
FERC	Federal Energy Regulatory Commission
FOCP	Federal Energy Regulatory Commission Order Compliance Project
GHG	greenhouse gas
gpm	gallons per minute
HI	hazard index
HLOW	high-level outlet works
hp	horsepower
HRA	health risk assessment
Hz	Hertz
in/sec	inches per second
kg	kilogram
kW	Kilowatt

L_{dn} or DNL	energy average of the A-weighted sound levels occurring during a 24-hour period
L_{eq}	equivalent steady-state sound level
LLOW	low-level outlet works
m^3	cubic meter
MDAQMD	Mojave Desert Air Quality Management District
MEI	maximum exposed individual
MT	metric tons
NAAQS	National Ambient Air Quality Standards
NOA	naturally occurring asbestos
NO_X	nitrogen oxides
OEHHA	California Office of Environmental Health Hazard Assessment
PM	particulate matter
PM_{10}	particulate matter of aerodynamic radius of 10 micrometers or less
$PM_{2.5}$	particulate matter of aerodynamic radius of 10 micrometers or less
PPV	peak particle velocity
PRC	Public Resources Code
Project	Anderson Dam Seismic Retrofit Project
ROG	reactive organic gases
SLM	sound level meter
SMP	Valley Water Stream Maintenance Program
SO_X	Sulfur oxides
TAC	toxic air contaminant
TNTe	Trinitrotoluene equivalent
US 101	U.S. Highway 101
USEPA	U.S. Environmental Protection Agency
Valley Water	Santa Clara Valley Water District
VdB	vibration velocity in decibels
VHP	Santa Clara Valley Habitat Plan

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Chapter 1
INTRODUCTION

The Santa Clara Valley Water District (Valley Water) has prepared this Partially Recirculated Draft Environmental Impact Report (EIR) to provide the public, responsible agencies, and trustee agencies with additional information regarding the potential environmental effects of the Anderson Dam Seismic Retrofit Project (Project). The Project involves retrofitting and upgrading Anderson Dam and associated facilities to meet Federal Energy Regulatory Commission (FERC), California Department of Water Resources (DWR), Division of Safety of Dams (DSOD), and Valley Water public safety requirements, decommissioning the hydroelectric facility at the dam to reduce operating costs, implementing Conservation Measures that include Phase 1 measures described in the Fish and Aquatic Habitat Collaborative Effort (FAHCE) Settlement Agreement Regarding Water Rights of the Santa Clara Valley Water District on Coyote, Guadalupe, and Stevens Creeks, initialed by the Initialing Parties on May 27, 2003 (hereafter referred to as the FAHCE Settlement Agreement) and Fish Habitat Restoration Plan within Coyote Creek, and continuing to operate the dam after retrofit, consistent with the FAHCE rule curves.

Valley Water has prepared this Partially Recirculated Draft EIR pursuant to requirements under the California Environmental Quality Act (CEQA) (Public Resources Code [PRC] section 21000 et seq.) and the CEQA Guidelines (14 California Code of Regulations [CCR] section 15000 et seq.), in particular CEQA Guidelines Section 15088.5, which sets forth the requirements for recirculated Draft EIRs.

The Draft EIR for the Project was circulated for public review between September 1 and November 8, 2023. After circulation of the Draft EIR, Valley Water met with the Project Board of Consultants (BOC), which reviews the Project and makes recommendations to FERC, to discuss updated design plans and construction sequencing. In response to that meeting and BOC recommendations, Valley Water now proposes to make certain construction changes such as extending work hours, adding some weekend days, and beginning work on certain Project components sooner. These proposed changes would allow Valley Water to construct planned Project components within the planned construction timeline before the wet season each year to improve its ability to complete the Project on schedule.

As detailed in Chapter 2, *Project Changes*, the Project description was revised to reflect these changes to the construction schedule and construction hours, as well as to the average and maximum daily workers now estimated to be required for the Seismic Retrofit component and a minor variance to Best Management Practice (BMP) AQ-1 (Use Dust Control Measures). These Project changes necessitated revisions to certain impact analyses in the aesthetics, air quality, greenhouse gas (GHG) emissions, and noise and vibration sections of the Draft EIR, which are included in this Partially Recirculated Draft EIR. The changes to the Project do not substantially change the information, analysis, or significance conclusions in the remaining sections of the Draft EIR. Therefore, revisions to those sections are not included in this Partially Recirculated Draft EIR.

1.1 Overview of California Environmental Quality Act Requirements

Pursuant to Section 15088.5 of the CEQA Guidelines, a lead agency is required to recirculate an EIR when significant new information is added to the EIR after public notice is given of the availability of the Draft EIR for public review under Section 15087 but before certification. As used in this section, the term "information" can include changes in the project or environmental setting as well as additional data or other information. In the case of the Project Draft EIR, the new information being added includes the Project description changes mentioned above, and the resulting revisions to certain portions of the aesthetics, air quality, GHG emissions, and noise and vibration sections of the Draft EIR. If the Draft EIR revision is limited to a few chapters or portions of the Draft EIR, the lead agency need only recirculate the chapters or portions that have been modified (CEQA Guidelines Section 15088.5[c]). In that case, the lead agency may request that reviewers limit their comments to the recirculated portions of the Draft EIR (CEQA Guidelines Section 15088.5[f][2]).

1.2 Scope of Partially Recirculated Draft Environmental Impact Report

As described in Chapter 2, *Project Changes*, of this report, the Partially Recirculated Draft EIR includes several Project description changes. Specifically, the Project description was revised to reflect changes to the Seismic Retrofit component's construction schedule and construction hours, estimated average and maximum daily workers, and a minor variance to BMP AQ-1, as well as to correct typographical errors.

Revisions are limited to the following modified sections of the Draft EIR:

- Section 3.1, *Aesthetics*: Analysis of nighttime light and glare during Seismic Retrofit construction (Impact AES-3).
- Section 3.3, *Air Quality*: Revision of BMP AQ-1; analysis of Seismic Retrofit construction-related air quality emissions (Impacts AQ-1, AQ-2, and AQ-3).
- Section 3.9, *Greenhouse Gas Emissions*: Analysis of Seismic Retrofit construction-related GHG emissions (Impacts GHG-1 and GHG-2).
- Section 3.16, *Noise and Vibration*: Addition of two new noise sensitive receptors; analysis of Seismic Retrofit construction-related noise and vibration (Impacts NOI-1 and NOI-2).
- Minor editorial clarifications are also made to the above revised sections.

Chapter 3, *Revised EIR Analysis*, of this document includes a detailed description of the revisions to these sections being recirculated to the public for additional comment. In addition, two appendices to the Partially Recirculated Draft EIR provide additional technical information related to the air quality, GHG, and noise and vibration impact analyses.

1.3 Partially Recirculated Draft Environmental Impact Report Public Review Period and Comment Process

Public notice and circulation of a Recirculated Draft EIR is subject to the same notice and consultation requirements that applied to the original Draft EIR, per CEQA Guidelines Sections 15086 and 15087. Valley Water has issued a Notice of Availability to provide agencies and the public

with formal notification that the Partially Recirculated Draft EIR is available for review and comment. In addition, notice of the Partially Recirculated Draft EIR, with required content, was sent directly to each commenter that commented on the Draft EIR (CEQA Guidelines 15088.5[f][3]).

The Notice of Availability, Partially Recirculated Draft EIR, and select appendices are available at the following website: https://www.valleywater.org/public-review-documents. The Partially Recirculated Draft EIR and select appendices are also available for review at the following locations:

Santa Clara Valley Water District
5750 Almaden Expressway
San José, CA 95118-3686

City of Morgan Hill
17575 Peak Avenue
Morgan Hill, CA 95037

City of Morgan Hill Library
60 West Main Ave
Morgan Hill, CA 95037

The Partially Recirculated Draft EIR can be reviewed between the hours of 7:30 a.m. and 5:00 p.m., Monday through Thursday, at the Valley Water headquarters building, located at 5750 Almaden Expressway, San José, CA 95118. Please contact Ms. Tiffany Chao at (408) 630-3107 to arrange a date and time for review.

Valley Water is circulating this Partially Recirculated Draft EIR for a 45-day public review and comment period. The purpose of public circulation is to provide agencies, stakeholders, and interested individuals with opportunities to comment on the contents of the Partially Recirculated Draft EIR. **Pursuant to Section 15088.5(f)(2) of the CEQA Guidelines, Valley Water directs that reviewers of this Partially Recirculated Draft EIR limit their comments to those that relate to the sections of the Partially Recirculated Draft EIR that have been revised and recirculated.**

Written comments concerning this Partially Recirculated Draft EIR should be mailed or emailed during this review period and should be directed to the name and address listed below. Please submit your written comments at the earliest possible date, but no later than September 20, 2024, which is 45 days from the August 5, 2024, release date for the Partially Recirculated Draft EIR.

Tiffany Chao, Senior Water Resources Specialist
Santa Clara Valley Water District
5750 Almaden Expressway
San José, CA 95118-3686
(408) 630-3107
ADSRPcomments@valleywater.org

1.4 Final EIR and EIR Certification

Valley Water will respond to written comments received during the public review period that raise significant environmental issues related to the contents of this Partially Recirculated Draft EIR in the Final EIR. The Final EIR will consist of the Draft EIR, the recirculated portions of the Draft EIR, a response to comments document that will respond to substantive comments received on the Draft

EIR and the recirculated portions of the Draft EIR, and any revisions to the Draft EIR and the recirculated portions of the Draft EIR.

Prior to any decision on the Project, the Valley Water Board of Directors will review the Final EIR and consider certifying the document as complying with CEQA at a regularly scheduled Board meeting. Upon certification of the Final EIR, Valley Water may proceed with Project approval actions. Approval of the Project would be preceded by written findings for each significant adverse environmental effect identified in the EIR (CEQA Guidelines Section 15091), and if necessary, a statement of overriding considerations (CEQA Guidelines Section 15093). At the time that CEQA findings are adopted, Valley Water would also adopt a mitigation monitoring and reporting program for adopted mitigation measures.

1.5 Contents of Partially Recirculated Draft EIR

This Partially Recirculated Draft EIR contains the following components. Changes to the Draft EIR text made by this Partially Recirculated Draft EIR are shown in underline (new text added) and strikeout (deleted text).

Chapter 1, Introduction. This chapter describes the Project background, purpose and organization of the Partially Recirculated Draft EIR, and public review process.

Chapter 2, Project Changes. This chapter describes the changes to the Project as originally presented in the Draft EIR.

Chapter 3, Revised EIR Analysis. Chapter 3 includes four sections that show the Project's revised direct and cumulative impact analyses, as applicable, based on the Project description changes. Minor revisions are also made to the *Environmental Setting* and *Methodology and Approach to Impact Analysis* sections, where appropriate. The following resource topics are addressed in Chapter 3:

- 3.1 – Aesthetics
- 3.3 – Air Quality
- 3.9 – Greenhouse Gas Emissions
- 3.16 – Noise and Vibration

Chapter 4, List of Preparers and Contributors. This is a list of the individuals involved in preparing the Partially Recirculated Draft EIR and their responsibilities.

Revised Appendices. The two appendices to the Partially Recirculated Draft EIR provide additional, more technical or specialized information about air quality, GHG, and noise impacts. These appendices were provided with the Draft EIR and have been revised in this Partially Recirculated Draft EIR to reflect the Project changes, as well as to provide additional technical documentation of both the Draft EIR and Partially Recirculated Draft EIR impact analyses.

Appendix E Air Quality, Greenhouse Gas and Health Risk Assessment Technical Report

Appendix M Noise and Vibration Impact Assessment

Chapter 2
PROJECT CHANGES

2.1 Introduction

This section describes the changes to the Draft EIR Project description. Chapter 3, *Revised EIR Analysis*, includes the revised environmental setting, methodology/approach, and analysis (as applicable) based on these Project changes.

The Project involves retrofitting and upgrading Anderson Dam and its associated facilities to meet FERC, DSOD, and Valley Water public safety requirements. The Project also includes decommissioning the hydroelectric facility at the dam, implementing Conservation Measures, and continuing to operate and maintain the dam once the retrofit has been completed. The Project consists of numerous Project components that fall into six overarching categories:

1) **Seismic Retrofit.** Project components related to the Anderson Dam facility upgrades and improvements to stabilize and mitigate potential seismic risks and comply with current public safety requirements.
2) **Conservation Measures.** Project components designed to avoid and minimize adverse environmental impacts and, in some cases, provide environmental benefits.
3) **Construction Monitoring.** Project components include habitat and species monitoring during construction to document project effects on the environment.
4) **Post-Construction Anderson Dam Facilities Operations and Maintenance:** Project components that involve how proposed, permanent Anderson Dam facilities would be operated and maintained following construction. These Project components include implementation of the FAHCE Phase 1 flow measures at the Anderson Dam facility, post-construction monitoring, and post-construction maintenance.
5) **Post-Construction Conservation Measure Operations and Maintenance:** Project components that involve how proposed, permanent Conservation Measure facilities would be operated and maintained following construction. These Conservation Measure facilities include implementation of the Ogier Ponds Conservation Measure (CM), North Channel Extension, Phase 2 Coyote Percolation Dam Fish Passage Enhancements (Phase 2 Coyote Percolation Dam CM), and the Sediment Augmentation Program.
6) **Post-Construction Project and FAHCE Adaptive Management Program**: Adaptive management of all post-construction operations, and all habitat restoration Conservation Measures components would occur in accordance with the FAHCE Adaptive Management Plan (AMP). Pursuant to the FAHCE Framework, a Project-specific ADSRP AMP has been developed. The AMP includes four key elements: measurable objectives for steelhead and salmon fisheries and their habitats; compliance monitoring, validation monitoring, and long-

term trend monitoring; adaptive actions that may be identified to assure measurable objectives are met; and reporting.[1]

The Project changes only pertain to the Seismic Retrofit component, specifically relating to the Seismic Retrofit construction hours/schedule, estimated average and maximum daily workers, and a minor variance related to implementation of BMP AQ-1 (Use Dust Control Measures). Refer to Section 2.5, *Seismic Retrofit Construction*, of the Draft EIR for a complete description of this Project component. **Table 2-1** compares the Project schedule and hours evaluated in the Draft EIR with those evaluated in this Partially Recirculated Draft EIR. The revisions to the daily number of workers estimates are included in **Table 2-2** in Section 2.5.1.2, *Work Hours and Crew Size*, and the variance to BMP AQ-1 is included in Section 2.11.1, *Best Management Practices*, below.

Table 2-1. Comparison of Seismic Retrofit Construction Schedule in Draft EIR and Partially Recirculated Draft EIR

Seismic Retrofit Construction Schedule Element	Project Evaluated in Draft EIR	Changes Evaluated in this Partially Recirculated Draft EIR
Low Level Outlet Works	Begin the following activities in Year 2: installation and operation of the water treatment system; excavation of upstream portal, downstream portal, trench, outlet structure foundation; tunneling; and tunnel lining (see Table 2-3 in the Draft EIR for details)	Move the start of the activities described as beginning in Year 2 in the Draft EIR to beginning in Year 1. No change in the total construction duration for these activities (see revised Table 2-3 below for details and comparison of changes)
Saturday Work	Limited to tunneling for the high and low level outlet works, communications/paving activities on Cochrane Road, and support production (Years 2 through 6)	Can occur for all construction activities, as necessary (Years 1 through 7)
Sunday Work	No Sunday work	Up to 12 Sundays in Years 1 through 3, 40 Sundays in Year 4, and 12 Sundays in Years 5 through 7
Nighttime Work	Can occur during excavation of the existing dam, construction of the replacement dam, tunneling for the high- and low-level outlet works, communications/paving activities on Cochrane Road, and support production, as necessary (Years 2 through 6)	Can occur during the same activities evaluated in the Draft EIR as well as during construction of the spillway and conversion of the existing Stage 1 Diversion System into the Stage 2 Diversion System (Years 1 through 7)

[1] Note: Item 6, Post-Construction Project and FAHCE Adaptive Management Program, was mistakenly omitted from the Executive Summary of the Draft EIR on page ES-10 (Post-Construction Conservation Measure Operations and Maintenance was repeated twice). Since the Post-Construction Project and FAHCE Adaptive Management Program component was correctly evaluated in the Draft EIR, this is a typographical correction and not a Project change subject to this Partially Recirculated Draft EIR.

2.2 Project Changes

The following section presents applicable sections of the Draft EIR that have been revised using underline (new text included) and strikeout (removed text) to reflect the Project changes included in this Partially Recirculated Draft EIR. The Draft EIR page numbers are included in parentheses next to each heading for ease of cross-referencing.

2.5 Seismic Retrofit Construction (Draft EIR p. 2-32)

Construction activities for the Seismic Retrofit components include the following: site mobilization and preparation, including clearing and preparing temporary construction access and haul roads, staging and stockpile areas; reservoir dewatering and cofferdam construction; construction of the temporary water diversion system; dam excavation and fill (including dredging, excavation of embankment materials from borrow areas and disposal of excess materials at disposal areas); construction of the new outlet works and spillway; construction other ancillary facilities; the decommissioning of the hydroelectric facility; and site restoration. Additionally, all of the Seismic Retrofit components would be constructed on bedrock foundations or on compacted fill materials that do not exhibit shrink/swell behavior.

These stages of construction are described in more detail in the sections below.

2.5.1 Construction Process and Phasing (Draft EIR p. 2-32)

2.5.1.1 Schedule (Draft EIR p. 2-32)

Construction of the Seismic Retrofit components is planned to extend over a 7-year duration. Seismic Retrofit components activities are expected to commence in the spring of Year 1 and extend through the winter of Year 7. The following bullet points provide an overview of the construction activities projected to occur by calendar year:

- Year 1: Site mobilization; full dewatering of the reservoir from deadpool to elev. 450 feet; ~~and~~ preparation of staging areas, access and haul roads, in-reservoir stockpile areas, and borrow sites[2]; and begin tunneling for the low-level outlet works (LLOW).
- Year 2: Full dewatering of the reservoir from deadpool to elev. 450 feet; cofferdam and extension pipe construction; conversion of existing Stage 1 Diversion System into Stage 2 Diversion System; dam excavation to interim dam[3] with crest of elev. 565 feet (Stage 1a Dam Excavation); and tunneling for high-level outlet works (HLOW)
- Year 3: Dam excavation to interim dam with crest El. 556 feet (Stage 1b Dam Excavation); construction of HLOW; and demolition of the existing spillway
- Year 4: Dam excavation to a remnant core (Stage 2a Dam Excavation) and dam fill to interim dam with crest elev. 556 feet (Stage 2b Fill); and construction of the spillway.

2 Since the issuance of the FERC Order, technical work reveals that deadpool is actually approximately elevation 490 feet NAVD 88, and Valley Water's request to correct the FERC Order definition of deadpool is pending.

3 During excavation of the existing dam and construction of the replacement dam there will be four winter seasons when reservoir inflows will be conveyed past the dam site through a diversion system. Inflows that exceed the capacity of the diversion system will form temporary reservoirs behind interim dams (Valley Water 2021f).

- Year 5: Dam fill to interim dam with crest elev. 565 feet (Stage 3a Dam Fill); construction of the spillway; and construction of the ~~low-level outlet works (~~LLOW~~)~~
- Year 6: Dam fill to new dam crest elev. 657 feet (Stage 3b Dam Fill); completion of LLOW, including sloping intake structure and outlet structure; completion of the spillway, including the unlined chute, and refilling of the reservoir
- Year 7: Permanent roadways and site restoration; and repaving Cochrane Road

Where appropriate, construction years are referred to throughout this section to provide the reader with a general understanding for the phase at which construction would be occurring. Note that references to the "dry season" refer generally to spring and summer months when rainfall would not be expected (e.g., April 15 through October 15); references to the "wet season" refer to fall and winter months when rainfall would be expected (October 15 through April 15).[4] In general, in-channel work downstream of the dam, would occur during the dry season, but could be extended in a given year with regulatory agency approvals, contingent on weather conditions, implementation of BMPs, and remaining work activities that would need to be completed within the work season. Work within the reservoir area, including dam excavation and reconstruction, would occur in work season that extends into the "wet season" from April 1 to November 30 or later to complete work for public safety. In-channel work would occur from June 15 to October 15.

2.5.1.2 Work Hours and Crew Size (Draft EIR p. 2-33)

~~Generally,~~ ~~c~~Construction activities would be conducted during a single 10-hour shift per day, between 6:00 a.m. and 4:00 p.m., Monday through ~~Friday~~ Saturday, with limited Sunday work. Sunday work would include up to 12 Sundays in Years 1 through 3, up to 40 Sundays in Year 4, and up to 12 Sundays in Years 5 through 7. Specific project components that would require modified construction hours ~~changes to this schedule~~ include:

- Excavation of the existing dam and construction of the replacement dam and spillway, and conversion of existing Stage 1 Diversion System into Stage 2 Diversion System – two 10-hour shifts, with a 0.5-hour lunch break (one shift between 6:00 a.m. and 4:30 p.m., and the second shift from 6:00 p.m. to 4:30 a.m., Monday through ~~Friday~~ Saturday and certain Sundays)
- Blasting at the Basalt Hill Borrow Area (BHBA) (described in Section 2.5.2) – restricted hours of 8:00 a.m. to 5:00 p.m.;
- Cochrane Road – communication lines and repaving – construction may occur outside the work window of 6:00 am and 4:00 pm, including weekends on a limited basis up to 24-hours a day, 6 days per week;
- Delivery of materials – 7:00 a.m. to 8:00 p.m, Monday to Friday;
- Tunneling (e.g., use of a road header) required for the outlet works (e.g., construction of the HLOW and LLOW at the dam) – up to 24 hours per day, 6 days per week; and,

[4] Note that dry and wet season definitions can change in consultation with regulatory agencies based on predicted weather and precipitation conditions for each year.

- Support production (e.g., concrete placement) – 24 hours per day, 6 days per week (Valley Water 2021d)

The number of workers on site would vary based on the phase of construction. A summary of the average and maximum number of workers associated with the Project by construction phase and year is provided in **Table 2-2**.

Table 2-2. Seismic Retrofit Workers by Construction Phase

Construction Phase	Construction Year	Daily Number of Workers (Average/Maximum)
Site Mobilization	Year 1	75/115 ~~40/55~~
Stage 1a Dam Excavation	Year 2	145/180 ~~120/195~~
Stage 1b Dam Excavation	Year 3	155/200 ~~140/230~~
Stage 2a Excavation and Fill	Year 4	135/200 ~~130/190~~
Stage 2b Excavation and Fill	Year 4	190/240 ~~170/205~~
Stage 3a Dam Fill	Year 5	170/230 ~~150/235~~
Stage 3b Dam Fill	Year 6	165~~135~~/235
Site Restoration	Year 7	55/~~85~~100

Source: AECOM ~~2022~~ 2024

2.5.1.3 Typical Equipment (Draft EIR p. 2-34)

The types of equipment needed for construction and durations of use would vary widely based on the project component and phase of construction. Where appropriate, typical construction equipment is discussed throughout this section to provide the reader with a general understanding of the types of construction equipment that may be used. A detailed summary of typical construction equipment required for each construction phase is provided in **Table 2-3**.

Table 2-3. Seismic Retrofit Construction Sequencing and Required Construction Equipment

Project Component	Construction Phase	Construction Activity	Approximate Duration (months)	Equipment Type
Haul and Access Roads, Stockpile and Staging Area Preparation	Year 1	Construction of the haul roads and preparation of stockpile areas	8	Bulldozers, excavators, dump trucks, water truck, motor grader, track drills
Active Treatment System (described in Section 2.5.4.2)	Years 1 ~~2~~ to 6	Installation and operation of the water treatment system	72	3,000 gpm treatment system
Cofferdam	Year 2	Construction of the cofferdam	2	Articulated dump trucks, bulldozers, loader, long-reach excavator, track drill, crane, vibratory sheet pile driver, welder, concrete trucks, concrete pump truck, concrete vibrators, generator (80 kW)
Bypass Pump System and Extension Pipe	Years 2 to 6	Construction of the diversion extension pipe and bypass flows to Stage 2 Diversion System	60	Articulated dump truck, excavator, crane, vibratory plate, tampers, welder, generator (80 kW)
Bypass Pump System	Years 2, 6	Installation of the pumps and pipes, bypass flows to the Stage 1 Diversion System in Year 2 and to HLOW intake in Year 6	13	Three 15 cfs capacity pumps (up to two operating and one as backup), site generator (2,000 kW), truck, and loader
Dam	Stages 1a, 1b, 2a Excavation (Years 2, 3, 4)	Excavation of the existing dam (includes work at stockpile areas and reservoir disposal area)	17	Large rigid-body dump trucks, articulated dump trucks, large and medium excavators, water trucks, motor graders, bulldozers, bulldozers w/discs, rock screen for oversize materials, pumps, generator (80 kW)

Project Component	Construction Phase	Construction Activity	Approximate Duration (months)	Equipment Type
Dam	Stages 2b, 3a, 3b Fill (Years 4, 5, 6)	Construction of replacement dam (includes work at stockpile areas)	18	Large rigid-body dump trucks, articulated dump trucks, highway dump trucks, large and medium excavators, loaders, water trucks, motor graders, bulldozers, bulldozers with discs, compactors, tampers, compressors, grade-all, generator (80 kW)
Import Filter and Drain Material	Stages 2b, 3a, 3b Fill (Years 4, 5, 6)	Hauling filter and drain material to the site and stockpiling in staging area 1E	29	Highway dump trucks, bulldozer, loader
LLOW	Years 1, 2, 4, 5	Excavation of upstream portal, downstream portal, trench, and outlet structure foundation	5	Large excavator, articulated dump trucks, track drills, compressor, bobcat, shotcrete batch plant, loader, manlift, pumps, generator (80 kW)
LLOW	Year 1, 2	Tunnel excavation	2.5	Articulated dump trucks, compressors, bobcat, shotcrete batch plant, loader, manlift, pumps, ventilation fan, road-header, robotic shotcrete machine, scoop trams, generator (80 kW)
LLOW	Years 1, 2, 3, 4, 5, 6	Tunnel lining	2	Compressor, loader, manlift, crane, pumps, ventilation fan, welder, concrete trucks, concrete pump truck, concrete vibrators, generator (80 kW)
LLOW	Years 5, 6	Construction of sloping intake structure, concrete encasement, pipe supports, and outlet structure	20	Large excavator, articulated dump trucks, track drills, compressors, bobcat, loader, manlift, crane, pumps, welder, concrete trucks, concrete pump truck, concrete vibrators, generator (80 kW)

Project Component	Construction Phase	Construction Activity	Approximate Duration (months)	Equipment Type
LLOW	Year 6	Pipe, mechanical and electrical installation	12	Crane, manlift, welder, loader, generator (80 kW)
HLOW	Year 2	HLOW and access adit tunnel portal excavation	6	Large excavator, articulated dump trucks, track drills, compressors, bobcat, shotcrete batch plant, loader, manlift, generator (80 kW)
HLOW	Year 2	HLOW tunnel and access adit tunnel excavation	6.5	Articulated dump trucks, compressors, bobcat, shotcrete batch plant, loader, manlift, pumps, ventilation fan, road-header, robotic shotcrete machine, scoop trams, generator (80 kW)
HLOW	Year 2	HLOW tunnel and access adit tunnel lining	5	Compressors, loader, manlift, crane, pumps, ventilation fan, welder, concrete trucks, concrete pump truck, concrete vibrators, generator (80 kW)
HLOW	Year 3	Gate shaft excavation	2	Crane, small excavator, articulated dump trucks, track drills, compressors, shotcrete batch plant, loader, manlift, pumps, ventilation fan, robotic shotcrete machine, welder, generator (80 kW)
HLOW	Year 3	Gate shaft lining	2.5	Crane, compressors, loader, manlift, pumps, ventilation fan, welder, concrete trucks, concrete pump truck, concrete vibrators, generator (80 kW)
HLOW	Year 3	Construction of intake structure	2	Large excavator, articulated dump trucks, compressor, bobcat, loader, manlift, crane, welder, concrete trucks, concrete pump truck, concrete vibrators, generator (80 kW)

Project Component	Construction Phase	Construction Activity	Approximate Duration (months)	Equipment Type
HLOW	Year 3	Pipe, mechanical and electrical installation	3	Crane, manlift, welder, loader, generator (80 kW)
Tie-back Wall at Cochrane Road	Year 3	Construction of the tie-back wall at Cochrane Road	2.5	Medium excavator, articulated dump trucks, track drill, compressor, shotcrete batch plant, loader, manlift, generator (80 kW)
Spillway	Years 2, 3	Demolition of existing spillway	10	Excavator-mounted hoe-rams, excavators, loader, highway legal dump trucks, water trucks, compressors, jackhammers, generator (80 kW)
Spillway	Years 3, 4	Excavation and foundation preparation	15	Large and medium excavators, articulated dump trucks, highway legal dump trucks, water truck, track drills, compressors, bobcat, shotcrete batch plant, loader, pumps, generator (80 kW)
Spillway	Years 3, 4, 5	Construction of spillway structure	21	Compressors, bobcat, loader, manlift, crane, pumps, welder, concrete trucks, concrete pump truck, concrete vibrators, generator (80 kW)
Develop BHBA	Year 5	Preparation, excavation, blasting, and hauling of material	11	Large excavators, bulldozers with rippers, articulated dump trucks, track drills, explosives truck, blasting, compressor, shotcrete batch plant, loader, manlift, generator (80 kW)
Develop Packwood Gravel Borrow Pit	Year 5	Strip sediment, excavate test trenches, excavation of borrow pit, hauling of excavated materials, and moisture conditioning	1.5	Large and medium excavators, bulldozers, articulated dump trucks, bulldozers with discs

Project Component	Construction Phase	Construction Activity	Approximate Duration (months)	Equipment Type
Main Avenue Pipeline, Anderson Force Main	Year 5	Connection of the Main Avenue Pipeline and Anderson Force Main to the LLOW outlet structure	1.5	Excavators, dump trucks, compactors, vibratory plates, tampers, welder, pumps, generator (80 kW)
Permanent Access Roads	Year 7	Restoration of parking areas, construction of permanent access roads, and repaving Cochrane Road	9	Large and medium excavators, bulldozers, articulated dump trucks, highway legal dump tracks, water truck, track drills, compressor, shotcrete batch plant, loader, manlift, motor grader, compactors, asphalt paving machine, concrete trucks, concrete pump truck, concrete vibrators, generator (80 kW)
Restoration Enhancements	Years 7 to 8	Fine grading, tree planting, construction of recreational features (Serpentine Bridge, interpretive trail, picnic facilities, fences), revegetation/landscaping, restoration of parking areas, restoration of leach field, and bathroom remodels	12	Bobcat, watering truck, small excavator, and grader

Source: AECOM 2022

Key: cfs = cubic feet per second; gpm = gallons per minute; HLOW = high-level outlet works; kW = kilowatt; LLOW = low-level outlet works

2.5.4 Construction Details and Methods for Selected Project Components (Draft EIR p. 2-55)

2.5.4.3 Temporary Diversion System (Draft EIR p. 2-57)

The Project includes two stages of water diversion throughout construction activities. The Stage 1 Temporary Diversion System would be converted to the Stage 2 Diversion System to continue to bypass flows in Coyote Creek behind Anderson Reservoir around the Project Area, and return flows to lower Coyote Creek throughout Project construction. The Stage 1 Diversion System would consist of a lake tap pipe with trash rack, tunnel, and an outlet structure with two 102-inch-diameter fixed cone valves and a 24-inch-diameter sleeve valve (**Figure 2-5**). The Stage 2 Diversion System would largely consist of the Stage 1 Diversion System with the exception of a screened intake structure and tunnel that would replace the lake tap pipe and trash rack of the Stage 1 Diversion System.

To convert the Stage 1 Diversion System to the Stage 2 Diversion System, the Stage 1 Diversion System would be operated until the reservoir is completely dewatered, which is expected to occur in spring of Year 1 ~~2~~ of Project construction. Once the reservoir is dewatered, construction of the Stage 2 Diversion System would begin. This conversion is expected to begin ~~occur~~ in Year 1 ~~2~~ of Project construction, after the reservoir is completely dewatered, and would be completed by Year 2.

Construction of the water diversion system would generally involve: excavation of the upstream diversion intake portal, excavation and support for the diversion system horseshoe tunnels (upstream portion of the low-level outlet tunnel), construction of the tunnel linings, construction of the diversion intake structure, and construction of the diversion extension pipe, including a section at the right end of the cofferdam that would be encased in concrete to allow heavy truck traffic to cross the pipe. Once the temporary diversion system is in place, the temporary bypass pumping system (described above) would be shutoff and inflows would be directed into the diversion extension pipe and through the Stage 2 Diversion System. The 350-foot-long, 8-foot-diameter steel pipe at the upstream end of the Stage 1 Diversion System would be abandoned by filling with lightweight cellular concrete.

2.5.4.7 Construction of Outlet Works (Draft EIR p. 2-61)

Low-Level Outlet Works (Draft EIR p. 2-61)

Construction of the LLOW would occur in Years 1 through ~~5 and~~ 6. Construction would include the following: trench excavation to uncover the downstream end of the LLOW tunnel and to expose the outlet structure foundation (37,000 cy); removal of the existing bulkhead at the downstream end of the low-level outlet tunnel; construction of the reinforced concrete tunnel; construction of the mass concrete thrust block and low-level outlet structure foundation; construction of the low-level outlet structure; and construction of the tie-ins to the Main Avenue Pipeline and Anderson Force Main Pipeline. Construction would also include excavation of the sloping intake structure foundation (10,700 cy), construction of the sloping intake structure, construction of pipe saddles and installation of the 78-inch pipeline and 33-inch

pipeline within the low-level outlet tunnel, and all mechanical, electrical, and testing/commissioning work to make the LLOW operational. Excavated materials would be hauled to the Reservoir Disposal Area.

2.11 Avoidance and Minimization Measures (Draft EIR p. 2-121)

Valley Water would implement a range of standardized measures to avoid or minimize adverse effects on the environment. These are introduced below and summarized in **Table 2-21**, and described in Appendix A.

2.11.1 Best Management Practices (Draft EIR p. 2-121)

Best management practices (BMPs) are standard practices that prevent, avoid, or minimize potentially adverse effects associated with construction, operations, and maintenance activities. Valley Water routinely incorporates a wide range of BMPs from its *Best Management Practices Handbook* (Valley Water, 2014) into project designs and throughout the implementation of projects. In addition, for work in and near streams, Valley Water would also employ other BMPs included in the *2019–2023 Stream Maintenance Program Manual* (Valley Water 2019; Appendix A), as necessary, to reduce impacts on specific resources. The Project would also include the applicable Valley Water BMPs (as well as VHP conditions), as summarized in **Table 2-21.**

Table 2-21. Relevant BMPs and VHP Conditions

Valley Water SMP/BMP/VHP No.	SMP/BMP/VHP Summary
Air Quality	
BMPs[1]	
AQ-1: Use Dust Control Measures	Would require implementation of dust and air quality management measures, including implementation of BAAQMD's BMPs for dust suppression.[2]

Sources: Valley Water 2014, 2019

Key: AQ = Air Quality; BAAQMD = Bay Area Air Quality Management District

[1] Note: In Draft EIR Table 2-21, in addition to air quality, BMP AQ-1 is listed as applicable to several other resource topics, including agriculture and forestry resources, biological resources, energy, geology and soils, hazards and hazardous materials, hydrology, water supply and water quality, land use, and recreation.

[2] Due to the unique and complex nature of Seismic Retrofit Construction, one minor variance from the BAAQMD BMPs related to vehicle speeds on unpaved roads is necessary in certain situations and areas to make it feasible for the Project, as detailed in Section 3.3.3.7, *Applicable Best Management Practices and BAAQMD Measures*. The 15 miles per hour speed limit would apply to all vehicles and equipment only in areas containing naturally occurring asbestos. Outside of these areas, a 25 mile per hour speed limit would be observed for haul trucks on unpaved roads (light duty pick-up trucks would observe the 15 mile per hour limit), such as the in-reservoir access roads to Stockpile Areas K and L.

Chapter 3
REVISED EIR ANALYSIS

This section includes revised environmental analysis based on proposed Project changes discussed in Chapter 2, *Project Changes*. This document only includes sections of analysis which were materially affected by the proposed changes. All information that was included in the Draft EIR and is excluded in revised form here would remain substantially unchanged, aside from minor changes to accurately reflect the Project changes, and the Draft EIR analysis for non-recirculated Draft EIR sections remains accurate and applicable.

3.1 Aesthetics

3.1.1 Revised Impact Analysis

The analysis of light and glare under Impact AES-3 was revised based on the changes to the Seismic Retrofit construction hours, which includes an increased number of Seismic Retrofit construction activities and construction days involving early morning, evening, and nighttime construction. The analysis under Impact AES-3 presented in the Draft EIR has been revised using underline (new text included) and strikeout (removed text) to reflect the Project changes included in Chapter 2 of this Partially Recirculated Draft EIR that would cause increased construction lighting during early morning, evening, and nighttime construction activities. The Draft EIR page numbers are included in parentheses next to each heading for ease of cross-referencing. Based on these revisions, the impact determinations and mitigation measures remain unchanged from those disclosed in the Draft EIR.

***Impact AES-3: Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area* (Less than Significant with Mitigation)**

Seismic Retrofit Construction (Draft EIR p. 3.1-56)

As described in Chapter 2, *Project Description,* Seismic Retrofit construction activities would routinely occur ~~primarily~~ during daytime hours between 6:00 a.m. and 4:00 p.m. During the daytime hours, the sun's reflection on equipment may create a new source of glare. However, due to the combination of distance from work areas and the nearest sensitive viewers and intervening topography, daytime construction activities would not create a substantial source of light or glare.

Earthwork resulting from the excavation of the existing dam and construction of the replacement dam and spillway, conversion of the Stage 1 Diversion System to the Stage 2 Diversion System, tunneling for the HLOW and LLOW, communications/paving activities on Cochrane Road and support production (e.g., concrete placement) would require work during

early ~~fall~~ mornings, evening, and nighttime hours, and therefore, construction lighting would be necessary during these times. The work requiring construction lighting is anticipated to occur throughout Seismic Retrofit construction, including on Saturdays and select Sundays, as necessary. Additionally, in the event of an emergency, some additional nighttime work and associated lighting may be needed.[1] Due to distance, topography, and/or intervening vegetation, most nighttime, evening, and early ~~fall~~ morning construction activities would not be visible from nearby public roads or vantage points. However, depending on where nighttime, evening, and ~~fall~~ morning activities occur, limited construction lighting may be temporarily visible from nearby public roads, which would be a substantial new source of substantial nighttime lighting adversely affecting public views. This would be a significant impact.

Implementation of **Mitigation Measure AES-3** and VHP Condition 7 would reduce adverse effects on nighttime, evening, and ~~fall~~ morning views due to construction lighting to a level that is less than significant with mitigation.

Significance Conclusion Summary (Draft EIR p. 3.1-57 to 3.1-58)

Use of lighting during early morning, evening, and nighttime construction activities and emergency activities may create a new source of substantial light adversely affecting nighttime views of nearby motorists traveling on public roads near the Seismic Retrofit and Ogier Ponds CM construction areas. Views of such lighting would be a significant impact; however, **Mitigation Measure AES-3** and VHP Condition 7 would require that lighting from the construction areas is shielded, directed downwards and/or away from public roadways and motorists. With this measure implemented, substantial new sources of light and glare would not adversely affect nighttime views of construction areas, and this impact would be less than significant with mitigation.

Once construction of Seismic Retrofit components are completed, existing lighting would be replaced with permanent lighting, as needed (e.g., at the Anderson Dam boat ramp parking area, safety lighting). Replacement lighting would not be substantially different from current lighting throughout the Project Area. Therefore, this impact would be less than significant.

With respect to construction of Conservation Measures, outside of the Ogier Ponds CM, work activities would be small in scale and conducted during the daytime. These activities would mostly be screened by mature vegetation and/or occur away from large numbers of sensitive viewers. These components would not introduce a new substantial source of light or glare, and this impact would be less than significant.

Based on the summary above, Project impacts on light and glare would be **less than significant with mitigation.**

[1] Note: While the Chapter 2, *Project Description*, in the Draft EIR mentioned evening delivery work, the impact analysis under Impact AES-3 did not identify nighttime lighting associated with delivery vehicles, which could occur until 8 p.m., as an aesthetic impact. Delivery vehicles may introduce light after sunset during winter, but this effect is minor since they are present only briefly along public roadways. This clarification is not included in the revised Draft EIR impact analysis as it does not pertain to Project changes.

Cumulative Impact AES-3: Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area (Not Cumulatively Considerable) (Draft EIR p. 3.1-63 to 3.1-64)

Project construction activities would occur primarily during daytime hours; however, earthwork on the excavation of the existing dam and construction of the replacement dam and spillway, conversion of the Stage 1 Diversion System to the Stage 2 Diversion System, tunneling for the HLOW and LLOW, communications/paving activities on Cochrane Road and support production (e.g., concrete placement) would require work during early morning, evening, and nighttime hours. Therefore, early morning, evening, and nighttime construction lighting would be necessary during these work phases.

Cumulative projects, plans, and programs could result in incrementally adverse impacts if they create light or glare in the same Project Area and at the same time as the Project.

Cumulative Effects of Project with the FOCP

The FOCP would be completed before construction activities for the Project begin; these two projects would not result in cumulative impacts related to light and glare. There would be no cumulative effect.

Cumulative Effects of Project with Probable Future Projects, Programs, and Plans

Many of the other reasonably foreseeable future projects identified in Section 3.0.5, *Approach to Cumulative Impacts*, when combined with impacts of the Project (as described in Section 3.1), could result in new sources of substantial light and glare. Construction activities related to Valley Water's other seismic retrofit, dam improvement, and flood protection projects, for example, would result in similar impacts in the event of nighttime work, as would other development projects in the County. Although the other probable future projects would be required to comply with lighting requirements and other development standards, during both construction and operation/maintenance, that would reduce their lighting impacts, the cumulative impact related to light and glare resulting from the Project in combination with these other probable future projects would be significant.

Significance Conclusion Summary

Project construction activities would routinely occur ~~primarily~~ during daytime hours; however, earthwork on the excavation of the existing dam and construction of the replacement dam and spillway, conversion of the Stage 1 Diversion System to the Stage 2 Diversion System, tunneling for the HLOW and LLOW, communications/paving activities on Cochrane Road and support production (e.g., concrete placement) would require work during early morning, evening, and nighttime hours. Therefore, early morning, evening, and nighttime construction lighting would be necessary during these work phases. Additionally, in the event of an emergency, some nighttime work and associated lighting may be needed. Due to distance, topography, location in other viewsheds, and/or intervening vegetation, it is anticipated that most early morning, evening, and nighttime construction activities would not be visible from nearby public roads or residences. However, depending on where these activities occur, early morning, evening, and nighttime construction lighting could be temporarily visible from nearby residences and public

roads, which could be a nuisance to nearby residents and motorists traveling on local roads. This is a significant cumulative impact when added to the impacts of other probable future projects, and the Project's contribution would be cumulatively considerable. **Mitigation Measure AES-3** requires that lighting is shielded and directed downward and/or away from residential areas. Through implementation of **Mitigation Measure AES-3**, the Project's contribution to cumulative impacts related to light and glare would be **not cumulatively considerable**.

3.2 Air Quality

3.2.1 Revised Methodology and Approach to Impact Analysis

Section 3.3.3, *Methodology and Approach to Impact Analysis*, in the Draft EIR has been modified because of the Project changes. Specifically, Draft EIR Section 3.3.3.1, *Seismic Retrofit Construction*, and Section 3.3.3.7, *Applicable Best Management Practices and BAAQMD Measures*, have been modified to account for the revised Seismic Retrofit construction hours and days, beginning work on certain Project components sooner, a minor variance to BMP AQ-1, and other minor clarifications. The text presented in the Draft EIR has been revised below using underline (new text included) and strikeout (removed text) to reflect the changes included in Chapter 2 of this Partially Recirculated Draft EIR, and the Draft EIR page numbers are included in parentheses next to each heading for ease of cross-referencing. The Air Quality, Greenhouse Gas and Health Risk Assessment Technical Report (Appendix E) to the Draft EIR has also been updated to reflect these changes.

3.3.3.1 Seismic Retrofit Construction (Draft EIR p. 3.3-23 to 3.3-25)

As described in Section 3.0, *Introduction*, the baseline for evaluating Seismic Retrofit construction effects is the existing conditions at the time of EIR preparation modified by the FOCP implementation (referred to as the existing conditions baseline). Existing baseline operations for the Project reflect a seismically restricted capacity (e.g., maintenance of the reservoir at deadpool), and flow releases and maintenance activities projected to occur following completion of the FOCP, presently under construction. Similarly, the construction baseline assumes completion of facility upgrades and physical changes associated with the FOCP.

Criteria Pollutant Emissions

The CEQA Air Quality, Greenhouse Gas and Health Risk Assessment Technical Report (Ramboll ~~2023~~ 2024) (Appendix E[2]), which supports the air quality assessment in this section, primarily used the methodology from the California Emissions Estimator Model (CalEEMod) version 2022.1~~.0~~ to quantify the criteria pollutant emissions for the Project. CalEEMod incorporates numerous default assumptions and CARB emission factors for on-road and off-road vehicles. The emission factors for off-road equipment and mobile sources were obtained from the latest versions of CARB's OFFROAD and EMission FACtor (EMFAC) models, respectively. Emissions calculations associated with off-road construction equipment were based on the construction schedule and the type, size, fuel type, tier level, hours of operation and utilization factor for each piece of equipment. For diesel-powered off-road construction equipment, methodologies

[2] Appendix E has been revised in support of this Partially Recirculated Draft EIR.

consistent with CalEEMod were used to estimate emissions. Where Project-specific equipment information was not available, CalEEMod default hp was used. Load factors for each piece of equipment were based on default factors from CalEEMod. On-site boat emissions were estimated using emission factors and methodology from CARB's Pleasure Craft Model Database, matched to their respective gasoline-fueled boat classifications. Blasting-related emissions were estimated using methods from the Mojave Desert Air Quality Management District (MDAQMD) Emissions Inventory Guidance for Mineral Handling and Processing Industries and USEPA's AP-42, and San Joaquin Valley Air Pollution Control District's guidance for hexavalent chromium. Emissions calculations associated with blasting activities were based on the number of blast holes drilled, type of explosives, and amounts of material shifted by blasting, as provided by Valley Water. Emissions assumed one complete blast occurs in 1 hour of activity. Emissions from on-road construction trips for workers, vendors, and haul trucks were estimated using emissions factors from EMFAC2021. EMFAC2021 incorporates the Pavley Clean Car Standards and the Advanced Clean Cars program.

Project construction activities would be completed using a combination of off-road and portable construction equipment. It was assumed that all construction off-road equipment is diesel powered except for those specified as electric or gasoline powered. Specific construction equipment assumptions for each phase and construction trip assumptions for workers, vendors, and haul trucks are provided in Appendix E.

Seismic retrofit construction is anticipated to span a 7-year period. The specific construction phasing schedule is provided in Appendix E. Annual emissions were averaged over ~~260~~ the number of work days ~~of~~ in each construction ~~each~~ year to give average daily emissions in pounds per day. Average daily emissions were calculated for each phase of construction, then summed for all phases that occur concurrently.

Mitigated emissions account for the implementation of **Mitigation Measure AQ-1** and **Mitigation Measure AQ-2**. **Mitigation Measure AQ-1** would require the use of Tier 4 engines for off-road equipment and 2010 or newer on-road heavy duty diesel trucks and boat engines. **Mitigation Measure AQ-2** calls for the use of blasting wind screens during construction blasting activities.

Application of BAAQMD-Recommended Mitigation and ATCMs

BAAQMD recommends the implementation of Basic ~~Construction Mitigation Measures Recommended for All Projects~~ Best Management Practices for Construction-Related Fugitive Dust Emissions (see Appendix A, BMP-AQ-1[3]) as mitigation for fugitive dust from construction. BAAQMD considers the impact of construction-related fugitive dust emissions to be less than significant if all the Basic Best Management Practices (i.e., measures from BMP AQ-1) are implemented.

In addition, all projects must implement any applicable ATCMs. This includes the ATCM for DPM from portable engines; ATCM to limit diesel-fueled commercial motor vehicle idling; ATCM to

[3] Note: As detailed in Section 3.3.3.7, *Applicable Best Management Practices and BAAQMD Measures*, BMP AQ-1 includes a requirement that vehicles on unpaved roads observe a 15 mile per hour speed limit. To make this BMP feasible for the Project, this BMP would be modified to allow haul trucks to travel up to 25 miles per hour on unpaved roads, except in areas with naturally occurring asbestos where the 15 miles per hour limit would still apply.

reduce particulate emissions from diesel-fueled engines (for non-vehicular diesel fuel); ATCM for stationary compression ignition engines; asbestos ATCM for surfacing applications, and asbestos ATCM for construction, grading, and blasting. For more details on NOA, see Section 3.10, *Hazards and Hazardous Materials*.

Quantification methodologies for emission reductions from fugitive dust mitigation measures is not available for all types of mitigation listed in BMP-AQ-1 and **Table 3.3-4**; thus, no quantified reductions in fugitive dust emissions are shown. Instead, these measures represent best practices for controlling fugitive dust and reducing emissions to a less-than-significant level. In addition to the fugitive dust BMPs, the Project would require a BAAQMD-approved Dust Mitigation Plan pursuant to the California Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations (CCR Title 17, Section 93105). The Dust Mitigation Plan would include all applicable dust control BMPs listed in BMP-AQ-1, may include other asbestos-specific dust control requirements, and may also require soil and ambient air sampling for asbestos fibers.

3.3.3.7 Applicable Best Management Practices and BAAQMD Measures (Draft EIR p. 3.3-28 to 3.3-29)

The following Valley Water BMPs would serve to minimize impacts on air quality from the Project (refer to Chapter 2, *Project Description*, for the full text of the BMPs):

- **AQ-1:** Use Dust Control Measures
- **AQ-2:** Avoid Stockpiling Odorous Materials

Additionally, the following BAAQMD-recommended mitigation and airborne toxic control measures (ATCMs) would be implemented**.** BAAQMD recommends the implementation of Basic Best Management Practices for Construction-Related Fugitive Dust Emissions ~~Construction Mitigation Measures Recommended for All Projects as mitigation for fugitive dust from construction,~~ because it is difficult to quantify all types of fugitive dust emissions and reductions of those emissions attributable to mitigation measures. These measures overlap with Valley Water BMP AQ-1. BAAQMD considers the impact of construction-related fugitive dust emissions to be less than significant if all the basic best management practices for construction are implemented. BAAQMD strongly recommends implementing all feasible fugitive dust management practices (e.g., enhanced construction BMPs), especially when construction activities are near sensitive receptors. Due to the unique and complex nature of Seismic Retrofit Construction, one minor variance from the BAAQMD BMPs related to vehicle speeds on unpaved roads is necessary in certain situations and areas to make it feasible for the Project, as shown in the footnote below.

- Basic Best Management Practices for Construction-Related Fugitive Dust Emissions (BAAQMD 2023)
    1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
    2. All haul trucks transporting soil, sand, or other loose material offsite shall be covered.
    3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry

power sweeping is prohibited.

4. All vehicle speeds on unpaved roads not surfaced with aggregate base shall be limited to 15 miles per hour.[4]
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 miles per hour for more than 30 minutes.
7. All trucks and equipment, including their tires, shall be washed prior to leaving the site.
8. Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted wood chips, mulch, or gravel.
9. Publicly visible signs shall be posted with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's General Air Pollution Complaints phone number shall also be visible to ensure compliance with applicable regulations.

As noted above, all projects must implement any applicable ATCMs. This includes the ATCM for DPM from portable engines; ATCM to limit diesel-fueled commercial motor vehicle idling; ATCM to reduce particulate emissions from diesel-fueled engines (for non-vehicular diesel fuel); ATCM for stationary compression ignition engines; asbestos ATCM for surfacing applications, and asbestos ATCM for construction, grading, quarrying, and surface mining operations (discussed in the *Hazards and Hazardous Materials* section). In addition, all projects must comply with BAAQMD Rule 6-1, which limits fugitive particulate emissions, and Rule 6-6, which limits trackout of solid materials onto paved public roads outside the boundaries of large construction sites.

No VHP conditions are applicable to air quality.

3.2.2 Revised Impact Analysis

The analysis of air quality impacts under Impacts AQ-1 through AQ-3 were revised based on the changes to the Seismic Retrofit construction hours and days, beginning work on certain Project components sooner, revised daily construction worker estimates, a minor variance to BMP AQ-1, and other minor clarifications. The analysis under these impact analyses presented in the Draft EIR have been revised using underline (new text included) and strikeout (removed text) to reflect the Project changes included in Chapter 2 of this Partially Recirculated Draft EIR, and the Draft EIR page numbers are included in parentheses next to each heading for ease of cross-referencing. Based on

[4] The 15 miles per hour speed limit would apply to all vehicles and equipment only in areas containing naturally occurring asbestos. Outside of these areas, a 25 mile per hour speed limit would be observed for haul trucks on unpaved roads (light duty pick-up trucks would observe the 15 mile per hour limit), such as the in-reservoir access roads to Stockpile Areas K and L. Limiting haul truck speeds to 15 miles per hour on all unpaved access roads would not be feasible to construct the Project interim dam to its full height, as the interim dam at the proposed height could not be reconstructed in a single work season.

these revisions, the modeled unmitigated and mitigated emissions for criteria air pollutants and health risk generally increase for both Seismic Retrofit construction and overall Project construction (though varies by year and pollutant); however, the impact determinations and mitigation measures remain unchanged from those disclosed in the Draft EIR.

Impact AQ-1: Conflict with or obstruct implementation of the applicable air quality plan (Significant and Unavoidable)

Significance Conclusion Summary (Draft EIR p. 3.3-34 to 3.3-35)

The criteria air pollutant emissions from construction of the Seismic Retrofit component, Ogier Ponds CM, and the Sediment Augmentation Program would exceed BAAQMD thresholds. As described under Impact AQ-2, implementation of **Mitigation Measure AQ-1** would require all construction equipment greater than 25 hp and operating for more than 20 hours over the entire duration of construction activities to be equipped with Tier 4 engines and would require all on-road engines and boats to be year 2010 or newer. Implementation **of Mitigation Measure AQ-1** would also minimize construction equipment idling time and require regular maintenance for all equipment. However, even with implementation of **Mitigation Measure AQ-1**, construction of the Seismic Retrofit component, Ogier Ponds CM, and the Sediment Augmentation Program would exceed BAAQMD thresholds for ROG[5] and NOx. As such, Project construction would conflict with the BAAQMD 2017 Clean Air Plan goal to attain established air quality standards, while Project operation would not exceed any BAAQMD thresholds for the various criteria air pollutants. Therefore, the Project overall would conflict with or obstruct the implementation of an applicable air quality plan, and impacts would be **significant and unavoidable**.

Impact AQ-2: A cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (Significant and Unavoidable)

Construction

Seismic Retrofit Construction (Draft EIR p. 3.3-35 to 3.3-36)

The Seismic Retrofit component would generate criteria air pollutant and/or pre-cursors of criteria air pollutants emissions during the construction period compared to the existing baseline conditions at the time of the EIR preparation modified by the FOCP implementation. As described above, the criteria air pollutant emissions were estimated for off-road equipment, on-road vehicles, and in-water boats and barges expected to be used during the construction phases. In addition, criteria air pollutant emissions related to blasting were estimated.

Table 3.3-5 summarizes the estimated maximum daily average emissions of ROG, NO_X, PM_{10} exhaust, and $PM_{2.5}$ exhaust during construction of the Seismic Retrofit component**.** As shown in

[5] Identification of ROG emissions exceeding the BAAQMD threshold was erroneously missing from the Significance Conclusion Summary under Impact AQ-1. However, ROG emissions were correctly identified as a significant impact in in Table 3.3-5 and the significance conclusion remains unchanged. This minor clarification is unrelated to the Project changes described in Chapter 2 of this Partially Recirculated Draft EIR.

Table 3.3-5, Seismic Retrofit construction emissions would exceed the BAAQMD average daily thresholds for ROG in Year 1 through Year 6 and for NOx in Year ~~2~~1 through Year 7. Therefore, criteria air pollutant emissions from construction of the Seismic Retrofit component would be significant.

However, implementation of **Mitigation Measure AQ-1**, described under Impact AQ-1 above, would require all construction equipment to be equipped with Tier 4 engines and would require all on-road engines and boats to be year 2010 or newer. Implementation of **Mitigation Measure AQ-1** would also minimize construction equipment idling time and require regular maintenance for all equipment. **Table 3.3-6** summarizes the estimated mitigated maximum daily average emissions of ROG, NO_X, PM_{10} exhaust, and $PM_{2.5}$ exhaust during construction of the Seismic Retrofit component**.** As shown in **Table 3.3-6,** mitigated Seismic Retrofit construction emissions would exceed the BAAQMD average daily thresholds for ROG in Year 1 and for NOx in Year 2 through Year ~~7~~6. Therefore, Seismic Retrofit cumulative construction criteria pollutant impacts related to air pollutant emissions and consistency with associated air quality standards would be significant and unavoidable.

Table 3.3-5. Summary of Modeled Emissions of Criteria Air Pollutants by Year for Seismic Retrofit Construction

	ROG	NO_X	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)
Construction Year	**Average Daily Emissions (lbs/day)**			
Year 1	~~227~~398	~~46~~138	~~23~~41	~~17~~32
Year 2	~~86~~88	~~980~~996	33	~~31~~32
Year 3	~~80~~82	~~916~~932	~~31~~32	30
Year 4	~~81~~92	~~900~~1,015	~~30~~34	~~29~~32
Year 5	~~81~~83	~~909~~922	30	29
Year 6	~~84~~86	~~970~~983	~~29~~30	~~28~~29
Year 7	11	~~83~~84	2	2
Maximum Average Daily Emissions	**~~227~~398**	**~~980~~1,015**	**~~33~~41**	**~~31~~32**
BAAQMD Thresholds of Significance (average daily emissions)	54	54	82	54
Exceed Threshold?	***Yes***	***Yes***	*No*	*No*

Source: Appendix E: Table 16

Key: ROG = reactive organic gases, NO_X = nitrogen oxides, PM_{10} = particulate matter 10 microns in diameter or less, $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter; lbs/day = pounds per day

Table 3.3-6. Summary of Mitigated Modeled Emissions of Criteria Air Pollutants by Year for Seismic Retrofit Construction[6]

	ROG	NO_X	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)
Construction Year	**Mitigated Average Daily Emissions(lbs/day)**			
Year 1	~~38~~67	~~11~~28	~~21~~37	~~16~~28
Year 2	~~42~~28	~~272~~224	~~8~~5	~~8~~5
Year 3	28	~~147~~150	~~5~~5	5
Year 4	~~29~~32	~~195~~216	~~5~~6	~~5~~6
Year 5	~~31~~30	~~182~~178	~~6~~5	5
Year 6	~~41~~30	~~300~~262	~~7~~6	~~7~~6
Year 7	~~4~~3	22	1	1
Maximum Average Daily Emissions	**~~42~~67**	**~~300~~262**	**~~21~~37**	**~~16~~28**
BAAQMD Threshold of Significance (average daily emissions)	54	54	82	54
Exceed Threshold?	***~~No~~ Yes***	***Yes***	*No*	*No*

Source: Appendix E: Table 17

Key: ROG = reactive organic gases, NO_X = nitrogen oxides, PM_{10} = particulate matter 10 microns in diameter or less, $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter; lbs/day = pounds per day

Significance Conclusion Summary (Draft EIR p. 3.3-42 to 3.3-46)

Construction of the Seismic Retrofit components, Ogier Ponds CM, and the Sediment Augmentation Program, would exceed the BAAQMD average daily thresholds for criteria air pollutants, while Project operational impacts related to criteria air pollutants would be less than significant. Specifically, Seismic Retrofit construction emissions would exceed the BAAQMD average daily thresholds for ROG in Year 1 through Year 6 and for NOx in Year 1~~2~~ through Year 7. Ogier Ponds CM construction emissions would exceed the BAAQMD average daily threshold for NO_X in Year 6 and Year 7. Sediment Augmentation Program construction emissions would exceed the BAAQMD average daily threshold for NO_X during every year of construction from Year 2 through Year 15. Construction of the North Channel Extension and Phase 2 Coyote Percolation Dam CM would not exceed the BAAQMD average daily thresholds for criteria air pollutants. **Table 3.3-13** summarizes the overall Project construction emissions. As shown in **Table 3.3-13**, overall Project construction emissions would exceed the BAAQMD average daily threshold for ROG during Year 1 through Year ~~7~~6 and for NO_X during Year ~~2~~1 through Year 15.

[6] Note: Mitigation Measure AQ-1 stipulates that on-road engines be model year 2010 or newer; however, for the purposes of modeling, an aggregate model year (i.e., all model years, including engines older than 2010) was assumed for both the unmitigated and mitigated emission factors. This approach results in a conservative assessment of the mitigated criteria pollutant emissions. This also applies to mitigated emissions presented in Tables 3.3-14, 3.3-16, 3.3-24, 3.9-3, and 3.9-7.

Table 3.3-13. Summary of Modeled Emissions of Criteria Air Pollutants by Year for Overall Project Construction

	ROG	NO_X	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)
Construction Year	**Average Daily Emissions (lbs/day)**			
Year 1	~~227~~398	~~46~~138	~~23~~41	~~17~~32
Year 2	~~121~~104	~~1,271~~1,133	~~59~~46	~~45~~38
Year 3	~~112~~97	~~1,178~~1,057	~~50~~41	~~42~~36
Year 4	~~114~~106	~~1,159~~1,127	~~49~~42	~~41~~38
Year 5	~~116~~99	~~1,177~~1,048	~~53~~41	~~43~~35
Year 6	~~153~~132	~~1,421~~1,270	~~56~~46	~~48~~41
Year 7	~~67~~50	~~522~~394	~~33~~24	~~28~~21
Year 8	~~38~~46	~~290~~346	~~21~~24	~~15~~18
Year 9	27	204	16	9
Year 10	27	198	16	9
Year 11	26	192	15	9
Year 12	26	187	15	9
Year 13	25	179	15	8
Year 14	25	177	15	8
Year 15	25	174	14	8
Maximum Average Daily Emissions	**~~227~~398**	**~~1,421~~1,270**	**~~59~~46**	**~~48~~41**
BAAQMD Threshold of Significance	54	54	82	54
Exceed Threshold?	***Yes***	***Yes***	*No*	*No*

Source: Appendix E: Table~~s 16,26,36, and 46~~ 50

Key: ROG = reactive organic gases, NO_X = nitrogen oxides, PM_{10} = particulate matter 10 microns in diameter or less, $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter; lbs/day = pounds per day

In addition, construction-related fugitive dust impacts other than from blasting would remain significant even with implementation of BAAQMD basic BMPs (BMP AQ-1) and **Mitigation Measure AQ-3**, because emissions would remain high near sensitive receptors for a relatively long duration. Fugitive dust impacts from blasting emissions would be less than significant with implementation of **Mitigation Measure AQ-2**. **Mitigation Measure AQ-2**, described below, would require the installation of wind screens during blasting activities to reduce fugitive dust emissions. **Mitigation Measure AQ-3**, described below, would implement BAAQMD's Enhanced Construction BMPs, which includes planting vegetative ground cover or using a soil stabilizer, and minimizing the simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time.

Implementation of **Mitigation Measure AQ-1**, described under Impact AQ-1 above, would require all construction equipment to be equipped with Tier 4 engines and would require all on-road engines and boats to be year 2010 or newer. Implementation of **Mitigation Measure AQ-1** would also minimize construction equipment idling time and require regular maintenance for all

equipment. Mitigated Seismic Retrofit construction emissions would exceed the BAAQMD average daily thresholds for ROG in Year 1 and for NOx in Year 2 through Year 6. Mitigated Ogier Ponds CM construction emissions would exceed the BAAQMD average daily thresholds for NO_X in Year 6 and Year 7. Mitigated Sediment Augmentation Program construction emissions would exceed the BAAQMD average daily thresholds for NO_X during every year of construction from Year 2 through Year 15. **Table 3.3-14** summarizes the mitigated overall Project construction emissions. As shown in **Table 3.3-14**, mitigated overall Project construction emissions would exceed the BAAQMD average daily threshold for ROG during Year 1 and for NO_X during Year 2 through Year 15. Since criteria air pollutant exhaust emissions would remain above the BAAQMD significance threshold even with implementation of **Mitigation Measures AQ-1, AQ-2, and AQ-3**, the overall Project impact related to regional air quality, as well as fugitive dust emissions, would be **significant and unavoidable**.

Table 3.3-14. Summary of Mitigated Modeled Emissions of Criteria Air Pollutants by Year for Overall Project Construction

	ROG	NO_X	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)
Construction Year	**Average Daily Emissions (lbs/day)**			
Year 1	~~38~~67	~~11~~28	~~21~~37	~~16~~28
Year 2	~~51~~32	~~344~~258	~~27~~14	~~15~~8
Year 3	~~37~~32	~~211~~180	~~17~~11	~~11~~8
Year 4	~~38~~36	~~263~~245	~~18~~11	~~11~~8
Year 5	~~41~~34	~~257~~213	~~23~~13	~~13~~9
Year 6	~~60~~43	~~449~~360	~~24~~15	~~17~~11
Year 7	~~20~~14	~~143~~107	~~23~~16	~~12~~9
Year 8	~~11~~14	~~84~~99	~~15~~17	~~8~~9
Year 9	8	62	12	6
Year 10	8	62	12	6
Year 11	8	61	12	6
Year 12	8	61	12	6
Year 13	8	61	12	6
Year 14	8	61	12	6
Year 15	8	63	12	6
Maximum Average Daily Emissions	**~~60~~67**	**~~449~~360**	**~~27~~37**	**~~17~~28**
BAAQMD Threshold of Significance	54	54	82	54
Exceed Threshold?	***Yes***	***Yes***	*No*	*No*

Source: Appendix E: Table~~s 17, 27, 37, and 47~~ 51

Key: ROG = reactive organic gases, NO_X = nitrogen oxides, PM_{10} = particulate matter 10 microns in diameter or less, $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter; lbs/day = pounds per day

These significant criteria air pollutant emissions could lead to increased concentrations of pollutants in the atmosphere and could result in health effects due to the increased emissions. TAC emissions are evaluated further in the HRA, and evaluated under Impact AQ-3 along with the primary $PM_{2.5}$ concentration. The ambient concentration of criteria pollutants is a result of complex atmospheric chemistry. Photochemical grid-based models simulate the chemical interactions and three-dimensional dispersion patterns on a regional, statewide, and national scale. These models are complex and require significant expertise, knowledge, and resources as they build on other third-party models and processing tools that characterize meteorology, emissions, and other environmental conditions, such as land cover, radiative properties, and boundary conditions. Use of these models is typically beyond the resources available for air quality analysis prepared pursuant to CEQA, and even if such an analysis was to be completed consideration would need be given to ensure the results would be meaningful based on modeling and data limitations. This information is not widely available and, where it is available, its use would be speculative.

NO_x and ROG are precursors to ozone, and NO_x, ROG, and sulfur oxides (SO_x) are precursors to secondarily formed $PM_{2.5}$. Chemical and physical processes transform some of these precursors to the criteria pollutant concentrations in the atmosphere. Multiple variables determine whether emissions of air pollutants from the project move and disperse in the atmosphere in a manner in which concentrations of criteria pollutants would become elevated and result in health impacts. A specific mass of precursor emissions does not equate to an equivalent concentration of the resultant ozone or secondary particulate matter in that area. The resulting health effects of ambient air concentrations are further based on a complex relationship of multiple variables and factors. The calculated health effects are dependent upon the concentrations of pollutants to which the receptors are exposed the number and type of exposure pathways for a receptor, and the intake parameters from a receptor, which vary based upon age and sensitivity (e.g., presence of pre-existing conditions). Health effects would be more likely for individuals with greater susceptibility to exposure, and the location of receptors relative to the project impacts would affect where the receptors are exposed to project-related pollutants.

The following is a summary of the health effects from ozone, $PM_{2.5}$ and PM_{10}. Meteorology and terrain play major roles in ozone formation, and conditions for maximum ozone generation occur on days with low wind speeds or stagnant air, warm temperature, and cloudless skies. Short-term exposure (lasting a few hours) to ozone at levels typically observed in the SFBAAB can result in health effects. When inhaled, $PM_{2.5}$ and PM_{10} can penetrate the human respiratory system's natural defenses and damage the respiratory tract. $PM_{2.5}$ and PM_{10} can increase the number and severity of asthma attacks and cause or aggravate bronchitis and other lung diseases. Whereas PM_{10} tends to collect in the upper portion of the respiratory system, $PM_{2.5}$ is so tiny that it can penetrate deeper in the lungs and damage lung tissues. Health effects of $PM_{2.5}$ include mortality (all causes), hospital admissions (respiratory, asthma, cardiovascular), emergency room visits (asthma), and acute myocardial infraction (non-fatal). For ozone, the endpoints are mortality, emergency room visits (respiratory), and hospital admissions (respiratory).

Since ROG and NO_x emissions will remain above the significance threshold, these emissions would be considered **significant and unavoidable**.

Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations (Significant and Unavoidable)

Construction (Draft EIR p. 3.3-46 to 3.3-47)

Construction of the Seismic Retrofit component and Conservation Measures would generate TAC emissions and release $PM_{2.5}$ in proximity to nearby sensitive receptors. In order to determine the impacts of these TAC and $PM_{2.5}$ emissions exposure to sensitive receptors, an HRA was conducted following OEHHA and BAAQMD guidelines for comparison to BAAQMD's risk thresholds for projects (Appendix E). The analysis discusses risk with respect to receptors within 1,000 feet of each specific construction phase, as well as the total risk to receptors from construction of the Seismic Retrofit component and the Conservation Measures components regardless of distance between the activity and the receptor. Air pollution sensitive receptors in proximity to the Project area are discussed in Section 3.3.1.3, *Valley Water and Anderson Dam.* This evaluation does not include NOA. Refer to Section 3.10, *Hazards and Hazardous Materials*, for an evaluation of NOA.

Seismic Retrofit Construction

The results of the HRA for Seismic Retrofit construction are shown in **Table 3.3-15**. As shown in **Table 3.3-15**, emissions from Seismic Retrofit construction would exceed the BAAQMD thresholds for excess lifetime cancer risk, acute HI, and $PM_{2.5}$ concentrations. Therefore, Seismic Retrofit construction would expose receptors to substantial pollutant concentrations and impacts would be significant.

Implementation of **Mitigation Measures AQ-1 and AQ-2**, described under Impact AQ-1 above, would be required. **Mitigation Measure AQ-1** would require all diesel construction equipment to be equipped with Tier 4 engines and would require all on-road engines and boats to be year 2010 or newer. Implementation of **Mitigation Measure AQ-1** would also minimize construction equipment idling time and require regular maintenance for all equipment. **Mitigation Measure AQ-2** would require the installation of three-sided wind screens during blasting activities. **Table 3.3-16** summarizes the mitigated Seismic Retrofit construction HRA results. As shown in **Table 3.3-16**, mitigated Seismic Retrofit construction risks would still exceed the BAAQMD thresholds for excess lifetime cancer risk, acute HI, and $PM_{2.5}$ concentrations. Therefore, Seismic Retrofit construction would expose receptors to substantial pollutant concentrations and impacts would be significant and unavoidable.

Table 3.3-15. Summary of Seismic Retrofit Construction Health Risk Assessment Results

	Excess Lifetime Cancer Risk (in a million)	Chronic HI (unitless)	Acute HI (unitless)	$PM_{2.5}$ Concentration ($\mu g/m^3$)
Seismic Retrofit Construction Risks	~~53~~81	~~0.058~~0.081	15	~~16~~[1] ~~.~~1.7
BAAQMD Thresholds of Significance	10	1	1	0.3
Exceed Threshold?	***Yes***	*No*	***Yes***	***Yes***

Source: Appendix E: Table 56

Key: HI = hazard index; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter; $\mu g/m^3$ = micrograms per cubic meter

Notes:

[1] The unmitigated $PM_{2.5}$ concentration was overestimated in the Draft EIR, which was erroneously calculated using the maximum hourly emission rates. Had there not been this error, the concentration presented in the Draft EIR would have been 1.7 $\mu g/m^3$. Since $PM_{2.5}$ concentration is an annual standard, it has been corrected in this Partially Recirculated Draft EIR to be calculated using average annual emission rates.

Table 3.3-16. Summary of Mitigated Seismic Retrofit Construction Health Risk Assessment Results

	Excess Lifetime Cancer Risk (in a million)	Chronic HI (unitless)	Acute HI (unitless)	$PM_{2.5}$ Concentration ($\mu g/m^3$)
Mitigated Seismic Retrofit Construction Risks	~~18~~17	0.017	3.7	~~0.45~~0.58
BAAQMD Thresholds of Significance	10	1	1	0.3
Exceed Threshold?	***Yes***	*No*	***Yes***	***Yes***

Source: Appendix E: Table 56

Key: HI = hazard index; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter; $\mu g/m^3$ = micrograms per cubic meter

Significance Conclusion Summary (Draft EIR p. 3.3-51 to 3.3-53)

The results of the HRA for all Project construction activities, including the Seismic Retrofit components and Conservation Measures components, are shown in **Table 3.3-23**. Project operational impacts related to TAC emissions would be less than significant. Specifically, as shown in **Table 3.3-23**, Project construction activities related to these components would exceed BAAQMD's significance thresholds for excess lifetime cancer risk, acute HI, and $PM_{2.5}$ concentration.

Implementation of **Mitigation Measure AQ-1** and **Mitigation Measure AQ-2**, described under Impact AQ-1 above, would be required. **Mitigation Measure AQ-1** would require all diesel construction equipment to be equipped with Tier 4 engines and would require all on-road engines and boats to be year 2010 or newer. Implementation of **Mitigation Measure AQ-1** would also minimize construction equipment idling time and require regular maintenance for all

equipment. **Mitigation Measure AQ-2** would require the installation of three-sided wind screens during blasting activities. **Table 3.3-24** summarizes the mitigated overall Project construction HRA results. As shown in **Table 3.3-24**, mitigated overall Project construction risks would exceed the BAAQMD thresholds for excess lifetime cancer risk, acute HI, and $PM_{2.5}$ concentration even with mitigation. Therefore, the Project overall would expose receptors to substantial pollutant concentrations, and impacts would be **significant and unavoidable**.

Table 3.3-23. Summary of Overall Project Construction Health Risk Assessment Results

	Excess Lifetime Cancer Risk	Chronic HI	Acute HI	$PM_{2.5}$ Concentration
	(in a million)	(unitless)	(unitless)	($\mu g/m^3$)
Overall Project Construction Risks	~~65~~82	~~0.070~~0.094	15	~~16~~[1] ~~1~~1.7
BAAQMD Thresholds of Significance	10	1	1	0.3
Exceed Threshold?	***Yes***	*No*	***Yes***	***Yes***

Source: Appendix E: Table 60

Key: HI = hazard index; PM2.5 = particulate matter 2.5 microns or less in diameter; µg/m3 = micrograms per cubic meter

Notes:

[1] The unmitigated $PM_{2.5}$ concentration was overestimated in the Draft EIR, which was erroneously calculated using the maximum hourly emission rates. Had there not been this error, the concentration presented in the Draft EIR would have been 1.7 µg/m³. Since $PM_{2.5}$ concentration is an annual standard, it has been corrected in this Partially Recirculated Draft EIR to be calculated using average annual emission rates.

Table 3.3-24. Summary of Mitigated Overall Project Construction Health Risk Assessment Results

	Excess Lifetime Cancer Risk	Chronic HI	Acute HI	$PM_{2.5}$ Concentration
	(in a million)	(unitless)	(unitless)	($\mu g/m^3$)
Mitigated Overall Project Construction Risks	~~18~~21	~~0.017~~0.021	3.7	~~0.48~~0.64
BAAQMD Thresholds of Significance	10	1	1	0.3
Exceed Threshold?	***Yes***	*No*	***Yes***	***Yes***

Source: Appendix E: Table 60

Key: HI = hazard index; PM2.5 = particulate matter 2.5 microns or less in diameter; µg/m3 = micrograms per cubic meter

BAAQMD *CEQA Guidelines* establish an incremental $PM_{2.5}$ concentration CEQA significance level of 0.3 $\mu g/m^3$, based on an annual average. There are also NAAQS and CAAQS for $PM_{2.5}$. The $PM_{2.5}$ NAAQS include an annual average concentration of 12 $\mu g/m^3$ and a 24-hour average concentration of 35 $\mu g/m^3$ (based on the 8th highest concentration for that averaging time). The $PM_{2.5}$ CAAQS include an annual average concentration of 12 $\mu g/m^3$, but the State has not established a 24-hour average $PM_{2.5}$ CAAQS. Cumulative $PM_{2.5}$ concentrations due to Seismic Retrofit construction activities at the Project MEI are shown in **Table 3.3-25**. The $PM_{2.5}$ concentrations associated with mitigated emissions from Seismic Retrofit construction

represent a small fraction of background and a small fraction of the NAAQS and CAAQS, which provides additional context of the fine particulate matter impacts. While incremental $PM_{2.5}$ concentrations exceed the CEQA significance level of 0.3 µg/m^3, as shown in **Table 3.3-25**, the concentrations for the mitigated scenario would not exceed the NAAQS or CAAQS. Nevertheless, since Project $PM_{2.5}$ concentration would exceed the BAAQMD threshold of 0.3 µg/m^3 with mitigation, this impact would be **significant and unavoidable.**

Table 3.3-25. Background Fine Particulate Matter Concentrations in the Project Area

Pollutant	Averaging Period	AAQS (µg/m^3)	Form of Standard	Background Concentration[1] (µg/m^3)	Unmitigated Project Contribution at $PM_{2.5}$ MEI[2] (µg/m^3)	Mitigated Project Contribution at $PM_{2.5}$ MEI [2, 3] (µg/m^3)
$PM_{2.5}$	24-Hour	35 (NAAQS)	8th Highest Maximum Concentration	32	~~4.5~~10.3	~~1.6~~1.32
$PM_{2.5}$	Annual	12.0 (NAAQS[4] & CAAQS)	~~8th Highest Maximum Concentration~~[5] Annual Mean	10.3	~~0.54~~1.0	~~0.31~~0.48

Source: Appendix E: Summary Table P.

Notes:

[1] Background concentrations are USEPA design values from 2019-2021 for the monitor located at San José – Knox Avenue, the closest $PM_{2.5}$ monitor to the Project area.

[2] Emission rates modeled as emissions in lb/year converted to g/s for 365 days (for comparison to the annual NAAQS) and for a typical day in ~~2029~~ Year 4 (the ~~Project~~ Seismic Retrofit construction year of maximum mitigated $PM_{2.5}$ emissions) and Year 6 (the Seismic Retrofit construction year of maximum unmitigated $PM_{2.5}$ emissions). Emission rates conservatively include fugitive $PM_{2.5}$. The Seismic Retrofit construction contribution was evaluated at the Project $PM_{2.5}$ MEI.

[3] Due to the Project changes, the Seismic Retrofit construction year of maximum mitigated $PM_{2.5}$ emissions has changed from Year 6 in the Draft EIR to Year 4 in this analysis. $PM_{2.5}$ concentrations are dependent not only on emissions, but also the source locations and activities for a given year. Therefore, even though the total emissions increased compared to the Draft EIR, the mitigated 24-hour 8th highest maximum $PM_{2.5}$ concentration decreased due to the other factors (i.e., geographical distribution and magnitude of emissions in a given year) associated with the change in the year of maximum emissions.

[4] On February 7, 2024, the U.S. Environmental Protection Agency (EPA) strengthened the NAAQS for fine particle pollution ($PM_{2.5}$) by revising the level of the primary (health-based) annual $PM_{2.5}$ standard to 9.0 µg/m^3. The effective date of the new standard was May 6, 2024. However, the 12.0 µg/m^3 standard was the standard at the time of Draft EIR preparation, and the Project's unmitigated and mitigated contribution remains well below both the former and new NAAQS standard.

[5] Use of "8th Highest Maximum Concentration" was an error in the Draft EIR and has been adjusted to the correct form of standard here.

Key: AAQS = Ambient Air Quality Standards; CAAQS = California Ambient Air Quality Standards; MEI = maximum exposed individual; NAAQS = National Ambient Air Quality Standards; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter; µg/m^3 = micrograms per cubic meter

***Cumulative Impact AQ-3: Expose sensitive receptors to substantial pollutant concentrations* (Not Cumulatively Considerable)**

Cumulative Effects of Project with Probable Future Projects, Programs, and Plans (Draft EIR p. 3.3-58 to 3.3-59)

As discussed under Section 3.3.3.8, *Thresholds of Significance*, a project would have a cumulatively considerably impact associated with health risks from TAC and $PM_{2.5}$ emissions if the aggregate total emissions of all past, present, and foreseeable future sources within a 1,000-foot radius of the property line of the source plus the project's contribution exceed the lifetime cancer risk of more than 100 in a million, chronic non-cancer HI greater than 10.0, and an incremental increase in the annual average $PM_{2.5}$ concentration of greater than 0.8 µg/m^3. The cumulative impact for the HRA was evaluated at the MEI for Project construction combined with the health risk from stationary and roadway sources within 1,000 feet based on health risk data provided by the BAAQMD. The MEI is the receptor with the highest incremental cancer risk, chronic hazard quotient, and $PM_{2.5}$ concentration from the Project across all populations and exposure scenarios. A summary of the cumulative impacts at the Project MEI is shown in **Table 3.3-27**. As shown in **Table 3.3-27**, cumulative health risks at the MEI would not exceed the BAAQMD thresholds for cumulative health risks. Therefore, the cumulative impact on the exposure of sensitive receptors to substantial pollutant concentrations resulting from the Project in combination with other probable future projects would not be significant, and the Project's contribution would not be cumulatively considerable.

Table 3.3-27. Summary of Cumulative Health Risk Assessment Results

	BAAQMD Threshold of Significance	Mitigated	
		MEI	*Exceed Threshold?*
Excess Lifetime Cancer Risk (in a million)	100	~~19~~21	*No*
Chronic HI	10	~~0.021~~0.022	*No*
$PM_{2.5}$ Concentration (µg/m^3)	0.8	~~0.50~~0.65	*No*

Source: Appendix E: Table 61

Key: HI = hazard index; PM2.5 = particulate matter 2.5 microns or less in diameter; µg/m3 = micrograms per cubic meter; MEI = maximally exposed individual

3.3 Greenhouse Gas Emissions

3.3.1 Revised Impact Analysis

The analysis of GHG emissions under Impact GHG-1 was revised based on the changes to Seismic Retrofit construction, which include extending work hours, adding some weekend days, beginning work on certain Project components sooner, and revised daily construction worker estimates. Overall, the Project changes increase the total Project construction GHG emissions by approximately 16 percent, but these increased emissions would continue to be mitigated to less than significant levels through **Mitigation Measures GHG-1 and GHG-2**. The analysis under Impact GHG-1 presented in the Draft EIR has been revised using underline (new text included) and strikeout (removed text) to

reflect the Project changes included in Chapter 2 of this Partially Recirculated Draft EIR, and the Draft EIR page numbers are included in parentheses next to each heading for ease of cross-referencing. Based on these revisions, the impact determinations and mitigation measures remain unchanged from those disclosed in the Draft EIR.

Impact GHG-1: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment (Less than Significant with Mitigation)

Construction (Draft EIR p. 3.9-19)

Construction of the Seismic Retrofit component would generate temporary GHG emissions primarily from use of construction equipment on site, as well as from vehicles transporting construction workers to and from the Project area and heavy-duty haul trucks transporting materials, equipment, and soil.

Seismic Retrofit Construction

Total GHG emissions for Seismic Retrofit construction are shown in **Table 3.9-3**. As shown in **Table 3.9-3**, Seismic Retrofit construction would generate a total of 155,555 ~~117,406~~ MT of CO_2e over the entire construction duration. This generation of GHG emissions would exceed the net zero threshold for construction GHG emissions. Therefore, Seismic Retrofit construction would generate GHG emissions that may have a significant impact on the environment and impacts would be significant.

However, implementation of **Mitigation Measure GHG-1**, described below, will require Valley Water and/or its construction contractors to use engine electrification and renewable fuels where feasible. **Mitigation Measure AQ-1** would require all on-road engines and boats used in construction to be model year 2010 or newer, which would reduce emissions in Year 1. Implementation of **Mitigation Measure GHG-2**, described below, will require Valley Water to implement carbon offsets before construction activities commence each year in an amount sufficient to reduce GHG emissions remaining after implementation of **Mitigation Measure GHG-1** to less-than-significant levels. With implementation of these mitigation measures, Seismic Retrofit construction-related GHG emissions generation impacts would be less than significant.

Table 3.9-3. Seismic Retrofit Construction GHG Emissions

Construction Year	Unmitigated Seismic Retrofit Construction GHG Emissions (MT of CO_2e)	Mitigated[1] Seismic Retrofit Construction GHG Emissions (MT of CO_2e)	Net GHG Emissions (MT of CO_2e) from Seismic Retrofit Construction with Implementation of Mitigation Measures GHG-1 and GHG-2
Year 1	5,215 ~~1,719~~	4,254	0
Year 2	26,322 ~~20,646~~	26,322	0
Year 3	26,660 ~~20,885~~	26,660	0
Year 4	34,475 ~~24,908~~	34,475	0
Year 5	29,173 ~~22,796~~	29,173	0

Construction Year	Unmitigated Seismic Retrofit Construction GHG Emissions (MT of CO_2e)	Mitigated[1] Seismic Retrofit Construction GHG Emissions (MT of CO_2e)	Net GHG Emissions (MT of CO_2e) from Seismic Retrofit Construction with Implementation of Mitigation Measures GHG-1 and GHG-2
Year 6	29,710 ~~23,304~~	29,710	0
Year 7	4,000 ~~3,148~~	4,000	0
Total	**155,555 ~~117,406~~**	**154,594**	**0**
Construction GHG Emissions Threshold	0	0	0
Exceed Threshold?	***Yes***	***Yes***	***No***

Source: Appendix E: Table 18, Table 19

Key: MT = metric tons; CO_2e = CO_2 equivalent emissions

Notes:

[1] This column only reflects implementation of Mitigation Measure AQ-1's requirement that boat engines used in construction be model year 2010 or newer. As such, this measure only reduces GHG emissions in Year 1. Given the type and duration of electrified equipment use is unknown at this time, to be conservative, reductions from Mitigation Measure GHG-1 are not quantified in this column.

Significance Conclusion Summary (Draft EIR p. 3.9-23)

Project Seismic Retrofit construction and Conservation Measures construction would generate approximately 273,390 ~~235,240~~ MT CO_2e of construction GHG emissions, as shown in **Table 3.9-7**. Project operation would result in negligible generation of GHG emissions and would not utilize any new natural gas in buildings or install any new non-EV charging spaces for maintenance employees or substantially increase operational VMT.

Table 3.9-7. Total Project Construction GHG Emissions

Year	Total Unmitigated Project Construction GHG Emissions (MT of CO_2e)	Total Mitigated[1] Project Construction GHG Emissions (MT of CO_2e)	Total Net GHG Emissions (MT of CO_2e) from Project Construction with Implementation of Mitigation Measures GHG-1 and GHG-2
Year 1	5,215 ~~1,719~~	4,254	0
Year 2	33,250 ~~27,573~~	33,250	0
Year 3	33,093 ~~27,319~~	33,093	0
Year 4	41,248 ~~31,681~~	41,248	0
Year 5	36,423 ~~30,046~~	36,423	0
Year 6	50,192 ~~43,786~~	50,192	0
Year 7	19,627 ~~18,774~~	19,627	0
Year 8	10,159	10,159	0
Year 9	6,373	6,373	0

Year	Total Unmitigated Project Construction GHG Emissions (MT of CO_2e)	Total Mitigated[1] Project Construction GHG Emissions (MT of CO_2e)	Total Net GHG Emissions (MT of CO_2e) from Project Construction with Implementation of Mitigation Measures GHG-1 and GHG-2
Year 10	6,336	6,336	0
Year 11	6,267	6,267	0
Year 12	6,227	6,227	0
Year 13	6,264	6,264	0
Year 14	6,343	6,343	0
Year 15	6,373	6,373	0
Total	**273,390 ~~235,240~~**	**272,429**	**0**

Source: Appendix E: Table 52, Table 53

Key: MT = metric tons; CO_2e = CO_2 equivalent emissions

Notes:

[1] This column only reflects implementation of Mitigation Measure AQ-1's requirement that all boat engines used in construction be model year 2010 or newer. As such, this measure only reduces GHG emissions in Year 1. Given the type and duration of electrified equipment use is unknown at this time, to be conservative, reductions from Mitigation Measure GHG-1 are not quantified in this column.

Implementation of **Mitigation Measure GHG-1**, described below, will require Valley Water and/or its construction contractors to use engine electrification (including hybrid equipment) and renewable fuels where feasible. **Mitigation Measure AQ-1** would require all on-road engines and boats used in construction to be model year 2010 or newer, which would reduce emissions in Year 1. Implementation of **Mitigation Measure GHG-2**, described below, will require Valley Water to purchase carbon offsets before construction activities commence each year in an amount sufficient to reduce any GHG emissions remaining after implementation of **Mitigation Measure GHG-1** to less-than-significant levels. With implementation of **Mitigation Measures GHG-1 and GHG-2**, overall Project construction GHG emissions impacts would be **less than significant with mitigation**.

3.4 Noise and Vibration

3.4.1 Revised Environmental Setting

Section 3.16.1, *Environmental Setting*, of the Draft EIR has been modified to include two additional noise sensitive receptors, R-31 and R-32. These receptors are residences in unincorporated Santa Clara County nearest to the dam and, thus, better represent noise and vibration impacts to receptors subject to the County Noise Ordinance. Draft EIR Section 3.16.1.2, *Valley Water and Anderson Dam*, has been modified to reflect addition of these receptors, and these receptors are also included in the *Revised Impact Analysis* section that follows (see revised Figures 3.16-4 and 3.16-7). The text presented in the Draft EIR has been revised below using underline (new text included) and strikeout (removed text) to show these additions, and the Draft EIR page numbers are included in parentheses next to each heading for ease of cross-referencing. The Noise and Vibration Impact Assessment (Appendix M) to the Draft EIR has also been updated.

3.16.1.2 Valley Water and Anderson Dam (Draft EIR p. 3.16-6)

Noise Sensitive Receptors

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. Noise sensitive receptors are defined as places where noise could interfere with regular activities such as sleeping, talking, and recreation, which include hospitals, residences, convalescent homes, schools, libraries, churches, and other religious institutions.

Existing land uses within and adjacent to the Project Area include Coyote Creek, parkland and hiking trails, the Anderson Reservoir boat ramp, the Anderson Lake County Park Visitor's Center, the Santa Clara County Justice Training Center, the William F. James Boys Ranch, an orchard, and private residences. As such, noise sensitive receptor locations in the Project Area include residential communities, a high school, and public parkland, where sensitive receptors may reside or otherwise conduct regular activities. Sensitive receptors in the Project Area are described below by Project component.

Anderson Dam Seismic Retrofit Components

Nearby sensitive receptors include single-family residences, the William F. James Boys Ranch, and recreational users and staff members at Anderson Lake County Park, Rosendin Park, and nearby recreational trails. Residences and recreational trails along the southwestern bank of the reservoir (i.e., near Stockpile Areas D and K) and in the south area of the dam are within Morgan Hill, with residences closest to the dam within unincorporated Santa Clara County.[7] The William F. James Boys Ranch is located within San José. There are no noise-sensitive receptors located northwest of the dam, within the vicinity of several stockpile areas (Stockpile Areas H, I, J, and L).

Recreational uses at the southeastern bank of the reservoir are located within the county, and recreational uses at the northwestern bank and the northern dam area are within San José. Recreational uses that border the Project Area include the Anderson Lake County Park to the southwest (which includes hiking trails and boating activities within the Seismic Retrofit component Project Area), the Live Oak Picnic Area also to the southwest, and Rosendin Park to the southeast. These recreational areas would be closed during construction.

The predominant noise sources to the southwest of the dam are natural sounds and traffic noise from Cochrane Road. At Anderson Lake County Park and Rosendin Park to the southeast, the predominant noise source is natural sounds.

3.4.2 Revised Methodology and Approach to Impact Analysis

Section 3.16.3, *Methodology and Approach to Impact Analysis*, of the Draft EIR has been modified because of the Project changes. Specifically, Draft EIR Section 3.16.3.1, *Seismic Retrofit Construction*, has been modified to account for the revised Seismic Retrofit construction hours and days, beginning work on certain Project components sooner, and revised daily construction worker

[7] Note: Receptors R-31 and R-32 have been added to the noise analysis to more accurately estimate noise and vibration impacts on residences within unincorporated Santa Clara County.

estimates. The text presented in the Draft EIR has been revised below using underline (new text included) and strikeout (removed text) to reflect the changes included in Chapter 2 of this Partially Recirculated Draft EIR, and the Draft EIR page numbers are included in parentheses next to each heading for ease of cross-referencing. The Noise and Vibration Impact Assessment (Appendix M) to the Draft EIR has also been updated.

3.16.3.1 Seismic Retrofit Construction (Draft EIR p. 3.16-20 to 3.16-22)

Noise

Onsite Noise

Noise levels generated from construction activities would vary depending on the type of equipment in use, how many pieces of equipment are operating at any one time, the proximity of equipment to a noise receptor location (i.e., mobile equipment can be moved around a construction site), and the duration of equipment use. In addition, some equipment or activities, such as pile driving and jackhammering, generate "impulsive" noise levels (i.e., impact noise).

For the purposes of modeling noise from construction equipment and activities, representative noise sources (i.e., construction equipment) were placed at representative geographic locations within each construction area. Equipment and activity locations were estimated based on the construction phasing plan and the *Project Description* (see Section 2.5.1).

Construction activities would occur intermittently at the Project Area over the 7-year construction period of the Seismic Retrofit component. Construction activities could expose sensitive receptors to temporary or extended durational increases in noise and vibration. Construction would result in temporary increases in truck traffic noise along routes for hauling of material from borrow and stockpile areas, as well as along offsite roadways.

Each phase of construction was evaluated separately to identify the potential for noise impacts from each phase with consideration of the factors identified above, specific to each geographic area. Overlapping construction activities were evaluated when activities would overlap during the same time in the same vicinity. **Table 3.16-8** provides a brief summary of the Seismic Retrofit component construction phases, equipment and activities identified in each phase, duration of each phase, and the noise-sensitive receptor areas potentially affected by each construction phase. A more detailed summary of this information can be found in Appendix M.

Table 3.16-8. Noise Assessment by Seismic Retrofit Construction Phase

Construction Phase	Activities	Duration (months)	Noise-Sensitive Receptor Areas Potentially Affected
Year 1	Construction of haul roads and preparation stockpile areas; dredging at dam toe; begin tunneling for the LLOW	9	Residences near Staging Areas 1-4 and Stockpile Area E, juvenile detention center, Holiday Lake Estates residences near Stockpile Area K, residences along truck routes
Year 2 (Stage 1a)	Construction of cofferdam, bypass pump system; excavation of upstream and downstream portals; tunnel excavation	12	Residences near Staging Areas 1, 4, Stockpile Area E, and excavation area; juvenile detention center; Holiday Lake Estates residences near Stockpile Area K; residences along truck routes
Year 3 (Stage 1b)	Excavation, demolish spillway, excavation and foundation preparation; HLOW tunnel excavation and lining; gate shaft excavation and lining	12	Residences near Staging Areas 1-4 and excavation area, juvenile detention center, Holiday Lake Estates residences near Stockpile Area K, residences along truck routes
Year 4	Hauling filler and drain material to site; excavation, fill, and foundation preparation; construction of spillway structure; installation of water treatment system	12	Residences near Staging Areas 1-4 and excavation area, juvenile detention center, Holiday Lake Estates residences near Stockpile Area K, residences along truck routes
Year 5 (Stage 3a)	Hauling filler and drain material to site; excavation; fill; excavation, blasting, and hauling of material; construction of spillway structure; sloping intake structure; excavate downstream portal trench; water treatment system	12	Residences near Staging Areas 1, 4; juvenile detention center; residences along Barnard Rd; western end of Holiday Lake estates; residences along truck routes
Year 6 (Stage 3b)	Hauling filler and drain material to site;	12	Residences near Staging Areas 1, 4, and Stockpile Area E, juvenile detention center,

Construction Phase	Activities	Duration (months)	Noise-Sensitive Receptor Areas Potentially Affected
	excavation; construct bypass pump system; conveying bypass flows; fill; excavation, blasting, and hauling of material; excavate sloping intake structure; construct pipe supports and lining		residences along Barnard Rd residences near Stockpile Area K, western end of Holiday Lake estates, residences along truck routes
Year 7	Construction of concrete lined channel; restoring parking areas; construction of permanent access roads	10	Residences near Staging Areas 1-4 and excavation area, residences along truck routes

Key: HLOW = high-level outlet works

Construction activities would ~~generally~~ be conducted during a 10-hour shift per day, between 6:00 a.m. and 4:00 p.m., Monday through ~~Friday~~ Saturday, with limited Sunday work. ~~Equipment maintenance would occur on Saturdays.~~ Sunday work would include up to 12 Sundays in Years 1 through 3, up to 40 Sundays in Year 4, and up to 12 Sundays in Years 5 through 7. Nighttime construction work could occur during excavation and fill of the dam, tunneling for outlet works, paving activities on Cochrane Road, construction of the spillway and conversion of the existing Stage 1 Diversion System into Stage 2 Diversion System, and support production. The nighttime work could occur during all seven years of construction. Specific Project components that would require ~~changes to this schedule~~ modified construction hours include:

- Excavation of the existing dam and construction of the replacement dam and spillway, and conversion of existing Stage 1 Diversion System into Stage 2 Diversion System—two 10-hour shifts (one shift between 6:00 a.m. and 4:30 p.m., and the second shift from 6:00 p.m. to 4:30 a.m., Monday through ~~Friday~~ Saturday and certain Sundays).
- Blasting at BHBA—restricted hours of 8:00 a.m. to 5:00 p.m.
- Cochrane Road—communication lines and repaving construction may occur 24-hours per day, including weekends, on a limited basis for several consecutive days as needed to avoid traffic and transportation conflicts.
- Delivery of materials (e.g., equipment, aggregate base, and drainage and filter material) —7:00 a.m. to 8:00 p.m.
- Tunneling (e.g., use of a road header) required for the outlet works (e.g., construction of the HLOW and LLOW at the dam)—24 hours per day (two 12-hour shifts), 6 days per week.
- Support production (e.g., concrete placement and formwork for the spillway walls, outlet works, and other concrete structures)—24 hours per day (two 12-hour shifts), 6 days per week.

Offsite Noise

During construction, offsite noise sources consist of daily truck deliveries of rocks, aggregate, and soil to the Project Area, shuttle bus trips for workers between Staging Area 5 and Staging Area 4, and worker vehicle trips to and from staging areas. Noise sensitive receptors consist of residences near the road segments being used. Delivery of materials to the Project Area is assumed to be limited to the hours of 7:00 a.m. to 8:00 p.m.

An approximately 0.8-miles section of Cochrane Road between Malaguerra Avenue and Coyote Road would be fully or partially closed to through traffic during construction. Vehicles would be routed through a detour along Peet Road, Half Road, Elm Road, and East Main Road.

Predicted Seismic Retrofit Component-related vehicle counts were compared to 2015 traffic data for Morgan Hill (City of Morgan Hill 2015). Changes in traffic along US 101 from Seismic Retrofit Component-related traffic were assumed to be negligible. The estimated sound levels for Years 1, 3, and 6 were chosen as Year 1 represents typical daytime truck activity, Year 3 represents greatest nighttime worker activity (worker vehicle and shuttle bus trips), and Year 6 represents greatest daytime and nighttime truck activity.

The estimated noise levels include the following assumptions:

2015 Traffic Data

- 90 percent of traffic occurs during the day (7:00 a.m. to 10:00 p.m.)
- 10 percent of traffic occurs at night (10:00 p.m. to 7:00 a.m.)
- 2015 traffic did not include any trucks, buses, or motorcycles

Project Traffic

- 100 percent of delivery truck traffic occurs during the day (7:00 a.m. to 8:00 p.m.). ~~Except for Years 1 and 7, 80 percent of truck deliveries would occur during the day (100 percent for Years 1 and 7)~~
- The daily maximum estimates were used for analysis

These assumptions are generally conservative since the areas between US 101 and the Project Area have seen significant development since 2015, which means that ambient traffic noise levels were lower in 2015, in general, providing a more conservative baseline for assessing Project impacts.

3.4.3 Revised Impact Analysis

The analysis of noise and vibration impacts in Impacts NOI-1 and NOI-2 were revised based on the changes to the Seismic Retrofit construction hours and days, beginning work on certain Project components sooner, revised daily construction worker estimates, and the addition of two new receptors. The analysis presented in the Draft EIR has been revised using underline (new text included) and strikeout (removed text) to reflect the Project changes included in Chapter 2 of this Partially Recirculated Draft EIR, and the Draft EIR page numbers are included in parentheses next to each heading for ease of cross-referencing. Based on these revisions, the number of receptors exceeding the applicable noise thresholds has increased for all modeled years and activities. Onsite construction noise levels (DNL) would exceed the 10 dBA increase above the ambient threshold at

four receptors in Year 1, compared to three previously reported; at nine receptors in Year 2, compared to two previously reported; at 10 receptors in Year 3, compared to six previously reported; at 12 receptors in Year 6, compared to 10 previously reported; and at five receptors in Year 7, compared to three previously reported. Additionally, with the inclusion of nighttime and Sunday work, the nighttime and Sunday noise thresholds would be exceeded during more years and activities than previously reported. The Draft EIR indicated that nighttime noise thresholds would be exceeded at all receptors in Year 6. However, with the Project changes, Seismic Retrofit nighttime construction noise levels would now also exceed the nighttime construction noise threshold of 50 dBA L_{eq} at 11 receptors in Years 2, 3, and 7. Sunday work would exceed the Santa Clara County Sunday threshold of at four receptors in Years 2, 3, 6, and 7. Despite the increase in the total number of sensitive receptors exceeding the noise thresholds, the impact determinations remain unchanged from those disclosed in the Draft EIR, and noise mitigation measures would continue to apply.

Impact NOI-1: Generate 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, or generation of substantial incremental increase in noise levels (Significant and Unavoidable) (Draft EIR p. 3.16-28 to 3.16-39)

Construction

Seismic Retrofit Construction

Onsite Construction Noise

To assess onsite construction noise levels, the activity or activities with the highest total sound levels (sound levels of all equipment for that activity) for each year were selected to represent the maximum noise impact for each year of construction. For similar activities across multiple years (e.g., dam excavation and fill activities from Year 2 through Year 6), the year with the loudest activity was selected. For example, Year 4 and Year 5 are not explicitly called out in the construction noise level tables (**Table 3.16-10** through **Table 3.16-14**), as noise levels in those years are substantially similar to the noise levels in Year 6 given the similar construction activities. The following construction phases were assessed for Seismic Retrofit construction:

- Year 1, Construction of Haul Roads and Preparation of Stockpile Areas, Begin Tunneling of LLOW
- Year 2, Excavation of Downstream Portal
- Year 3, Excavation and Foundation Preparation of Spillway, Construction of Tie-Back Wall at Cochrane Road
- Year 6, Dam Excavation and Fill
- Year 7, Restoration of Parking Areas and Construction of Permanent Access Roads
- ~~Dam Excavation~~
- ~~Fill~~
- ~~Construction of Concrete Lined Channel~~

Seismic Retrofit construction noise levels are summarized in **Table 3.16-10** through **Table 3.16-14** at the closest noise sensitive receptors. Refer to **Figure 3.16-4** for the locations of sensitive receptors near the Seismic Retrofit construction.

As shown in **Table 3.16-10** through **Table 3.16-14**, onsite construction noise levels (DNL) would exceed the 10 dBA increase above ambient threshold at Receptors R-2, R-4, ~~and~~ R-5, and R-31 during Year 1~~,~~; at Receptors R-2, R-4 through ~~and~~ R-8, R-31, and R-32 during Year 2~~,~~; at Receptors R-2 ~~and R-4~~ through ~~R-8~~ R-9, R-31, and R-32 during Year 3~~,~~; at Receptors R-2 through R-8~~,~~ ~~and~~ Receptors R-10 through R-12, R-31, and R-32 during Year 6~~,~~; and Receptors R-2, R-4, ~~and~~ R-8, R-31, and R-32 during Year 7. Average construction noise levels (L_{eq}) would not exceed the FTA's construction noise daytime threshold of 80 dBA L_{eq}. Receptors R-8~~,~~ ~~and~~ R-9, R-31, and R-32 are located in unincorporated Santa Clara County and would be subject to Santa Clara County's weekday and Saturday daytime construction noise threshold of 60 dBA. Onsite construction noise levels would exceed the Santa Clara County daytime construction noise threshold at Receptors R-8~~,~~ ~~and~~ ~~R-9,~~ R-31, and R-32 in Year 1, at Receptor R-8, R-31, and R-32 in Year 2, at Receptors R-8~~,~~ ~~and~~ R-9, R-31, and R-32 in Year 3, at Receptor R-8, R-31, and R-32 in Year 6, and at Receptor R-8, R-31, and R-32 in Year 7. Nighttime construction noise levels ~~during Year 6~~ would exceed the nighttime construction noise threshold of 50 dBA L_{eq} at Receptors R-1 through R-9, R-31, and R-32 in Years 2, 3 and 7; and at each residential receptor in Year 6. ~~Nighttime construction would not occur during any other modeled construction year.~~ Sunday work would exceed the Santa Clara County Sunday threshold of 50 dBA at Receptors R-8, R-9, R-31, and R-32 during Years 2, 3, 6, and 7. Recreational users at Anderson Lake County Park, Rosendin Park, and the Live Oak Picnic Area would not be impacted as those areas would be closed to users during construction.[8] Therefore, onsite construction noise impacts from construction of the Seismic Retrofit components would be significant.

[8] Note: As discussed during the June 6, 2024, public meeting, Valley Water plans to keep Rosendin Park partially open when blasting activities are not occurring, though the specific details of this approach are currently being finalized, and as such, will be presented in the Final EIR.

Table 3.16-10. Seismic Retrofit Construction Noise Levels - Year 1, Construction of Haul Roads and Preparation for Stockpile Areas, Begin Tunnelling of LLOW

Noise-Sensitive Receptor	Ambient Noise Level (dBA DNL)	Project Construction Noise Level (dBA DNL)	Overall with Project[1] (dBA DNL)	Threshold of Significance[3]	Exceed Threshold (dBA DNL)?	Project Construction, L_{eq} Day/Night	Threshold of Significance (dBA L_{eq}) Day/Night	Significant Impact?
R-1	61	57	62	71	No	62/35 -	80/50	No
R-2	50	68	68	60	**Yes**	72/34 -	80/50	No
R-3	61	71	71	71	No	72/35 -	80/50	No
R-4	54	69	69	64	**Yes**	75/38 -	80/50	No
R-5	54	66	67	64	**Yes**	73/39 -	80/50	No
R-6	54	61	62	64	No	68/41 -	80/50	No
R-7	54	58	60	64	No	65~~64~~/42 -	80/50	No
R-8	49[2]	56	57	59	No	64~~63~~/49 -	60[4]/50	**Yes**
R-9	49[2]	51	53	59	No	58~~57~~/50 -	60[4]/50	~~**Yes**~~ **No**
R-10	45	32	45	55	No	41~~40~~/31 -	80/50	No
R-11	46	33	46	56	No	44/34 -	80/50	No
R-12	48	28	48	58	No	39/<30 -	80/50	No
R-13	50	34	50	60	No	45/35 -	80/50	No
R-31	49[2]	59	60	59	**Yes**	66/42	60[4]/50	**Yes**
R-32	49[2]	58	58	59	No	64/43	60[4]/50	**Yes**

Source: Ramboll. ~~2023~~ 2024. Anderson Dam Seismic Retrofit Project Noise & Vibration Impact Assessment (Appendix M)

Notes:

[1] Overall with Project is the combined level of Project construction plus ambient levels.

[2] Linear interpolation of ambient noise levels at SLM-4 and SLM-5.

[3] A significance threshold of 10 dBA over ambient is used for assessing onsite construction equipment noise.

[4] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime and any time on Sunday.

Table 3.16-11. Seismic Retrofit Construction Noise Levels - Year 2, Excavation of Downstream Portal

Noise-Sensitive Receptor	Ambient Noise Level (dBA DNL)	Project Construction Noise Level (dBA DNL)	Overall with Project[1] (dBA DNL)	Threshold of Significance (dBA DNL)[3]	Exceed Threshold?	Project Construction Noise Level (dBA L_{eq}) Day/Night	Threshold of Significance (dBA L_{eq}) Day/Night	Significant Impact?
R-1	61	61 ~~53~~	64 ~~62~~	71	No	62/62 ~~-~~	80/50	**Yes** ~~No~~
R-2	50	70 ~~62~~	70 ~~62~~	60	**Yes**	67/67 ~~68/-~~	80/50	**Yes** ~~No~~
R-3	61	70 ~~62~~	71 ~~65~~	71	No	67/67 ~~69/-~~	80/50	**Yes** ~~No~~
R-4	54	71 ~~63~~	71 ~~63~~	64	**Yes** ~~No~~	70/70 ~~–~~	80/50	**Yes** ~~No~~
R-5	54	68 ~~60~~	68 ~~61~~	64	**Yes** ~~No~~	69/69 ~~-~~	80/50	**Yes** ~~No~~
R-6	54	69 ~~61~~	69 ~~62~~	64	**Yes** ~~No~~	70/70 ~~71/-~~	80/50	**Yes** ~~No~~
R-7	54	68 ~~62~~	68 ~~63~~	64	**Yes** ~~No~~	69/69 ~~72/-~~	80/50	**Yes** ~~No~~
R-8	49[2]	66 ~~59~~	66 ~~60~~	59	**Yes**	66/66 ~~69/-~~	60[4]/50	**Yes**
R-9	49[2]	58 ~~51~~	58 ~~53~~	59	No	58/58 ~~60/-~~	60[4]/50	**Yes** ~~No~~
R-10	45	34 ~~22~~	45	55	No	35/35 ~~29/-~~	80/50	No
R-11	46	<30 ~~15~~	46	56	No	<30/<30 ~~24/-~~	80/50	No
R-12	48	<30 ~~–~~[5]	48	58	No	<30/<30 ~~–/-~~	80/50	No
R-13	50	<30 ~~22~~	50	60	No	<30/<30 ~~32/-~~	80/50	No
R-31	49[2]	69	69	59	**Yes**	69/69	60[4]/50	**Yes**
R-32	49[2]	72	72	59	**Yes**	74/74	60[4]/50	**Yes**

Source: Ramboll. ~~2023~~ 2024. Anderson Dam Seismic Retrofit Project Noise & Vibration Impact Assessment

Notes:

[1] Overall with Project is the combined level of Project construction plus ambient levels.

[2] Linear interpolation of ambient noise levels at SLM-4 and SLM-5.

[3] A significance threshold of 10 dBA over ambient is used for assessing onsite construction equipment noise.

[4] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime and any time on Sunday.

~~[5] Beyond model search radius.~~

Table 3.16-12. Seismic Retrofit Construction Noise Levels - Year 3, Excavation and Foundation Preparation of Spillway, Construction of Tie-Back Wall at Cochrane Road

Noise-Sensitive Receptor	Ambient Noise Level (dBA DNL)	Project Construction Noise Level (dBA DNL)	Overall with Project[1] (dBA DNL)	Threshold of Significance (dBA DNL)[3]	Threshold Exceeded?	Project Construction Noise Level (dBA L_{eq}) Day/Night	Threshold of Significance (dBA L_{eq}) Day/Night	Significant Impact?
R-1	61	65 ~~56~~	66 ~~62~~	71	No	66/66 ~~-~~	80/50	**Yes** ~~No~~
R-2	50	71 ~~63~~	71 ~~63~~	60	**Yes**	69/69 ~~–~~	80/50	**Yes** ~~No~~
R-3	61	72 ~~64~~	72 ~~66~~	71	**Yes** ~~No~~	71/71 ~~-~~	80/50	**Yes** ~~No~~
R-4	54	73 ~~65~~	73 ~~66~~	64	**Yes**	72/72 ~~–~~	80/50	**Yes** ~~No~~
R-5	54	73 ~~65~~	73 ~~66~~	64	**Yes**	73/73 ~~-~~	80/50	**Yes** ~~No~~
R-6	54	74 ~~66~~	74 ~~66~~	64	**Yes**	76/76 ~~-~~	80/50	**Yes** ~~No~~
R-7	54	73 ~~65~~	73 ~~65~~	64	**Yes**	74/74 ~~-~~	80/50	**Yes** ~~No~~
R-8	49[2]	73 ~~65~~	73 ~~65~~	59	**Yes**	75/75 ~~–~~	60[4]/50	**Yes**
R-9	49[2]	63 ~~55~~	63 ~~56~~	59	**Yes** ~~No~~	64/64 ~~-~~	60[4]/50	**Yes**
R-10	45	33 ~~25~~	45	55	No	33/33 ~~-~~	80/50	No
R-11	46	33 ~~25~~	46	56	No	35/35 ~~-~~	80/50	No
R-12	48	<30 ~~-~~[5]	48	58	No	<30/<30 ~~-~~/	80/50	No
R-13	50	39 ~~31~~	50	60	No	41/41 ~~-~~	80/50	No
R-31	49[2]	74	74	59	**Yes**	75/75	60[4]/50	**Yes**
R-32	49[2]	77	77	59	**Yes**	79/79	60[4]/50	**Yes**

Source: Ramboll. ~~2023~~ 2024. Anderson Dam Seismic Retrofit Project Noise & Vibration Impact Assessment

Notes:

[1] Overall with Project is the combined level of Project construction plus ambient levels.

[2] Linear interpolation of ambient noise levels at SLM-4 and SLM-5.

[3] A significance threshold of 10 dBA over ambient is used for assessing onsite construction equipment noise.

[4] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime and any time on Sunday.

~~[5] Beyond model search radius.~~

Table 3.16-13. Seismic Retrofit Construction Noise Levels - Year 6, Dam Excavation and Fill

Noise-Sensitive Receptor	Ambient Noise Level (dBA DNL)	Project Construction Noise Level (dBA DNL)	Overall with Project[1] Noise Level (dBA DNL)	Threshold of Significance (dBA DNL)[3]	Exceed Threshold?	Project Construction, (dBA L_{eq}) Day/Night	Threshold of Significance (dBA L_{eq}) Day/Night	Exceed Threshold?
R-1	61	63	65	71	No	62/62	80/50	**Yes**
R-2	50	74	74	60	**Yes**	72/72	80/50	**Yes**
R-3	61	78	78	71	**Yes**	73/73	80/50	**Yes**
R-4	54	76	76	64	**Yes**	73/73	80/50	**Yes**
R-5	54	73	73	64	**Yes**	73/73	80/50	**Yes**
R-6	54	69	69	64	**Yes**	69/69	80/50	**Yes**
R-7	54	67	67	64	**Yes**	68/68	80/50	**Yes**
R-8	49[2]	64	64	59	**Yes**	65/65	60[4]/50	**Yes**
R-9	49[2]	59	59	59	No	58/58	60[4]/50	**Yes**
R-10	45	56	56	55	**Yes**	56/56	80/50	**Yes**
R-11	46	58	58	56	**Yes**	57/57	80/50	**Yes**
R-12	48	61	62	58	**Yes**	63/63	80/50	**Yes**
R-13	50	51	54	60	No	52/52	80/50	**Yes**
R-31	49[2]	68	68	59	**Yes**	68 / 68	60[4] / 50	**Yes**
R-32	49[2]	70	70	59	**Yes**	72 / 72	60[4] / 50	**Yes**

Source: Ramboll. ~~2023~~ 2024. Anderson Dam Seismic Retrofit Project Noise & Vibration Impact Assessment

Notes:

[1] Overall with Project is the combined level of Project construction plus ambient levels.

[2] Linear interpolation of ambient noise levels at SLM-4 and SLM-5.

[3] A significance threshold of 10 dBA over ambient is used for assessing onsite construction equipment noise.

[4] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime and any time on Sunday.

Table 3.16-14. Seismic Retrofit Construction Noise Levels - Year 7, Restoration of Parking Areas and Construction of Permanent Access Roads

Noise-Sensitive Receptor	Ambient Noise Level (dBA DNL)	Project Construction Noise Level (dBA DNL)	Overall with Project[1] (dBA DNL)	Threshold of Significance[3]	Exceed Threshold?	Project Construction Noise Level (dBA L_{eq}) Day/Night	Threshold of Significance (dBA L_{eq}) Day/Night	Exceed Threshold?
R-1	61	63 ~~54~~	65 ~~62~~	71	No	62/62 -	80/50	**Yes** ~~No~~
R-2	50	73 ~~65~~	73 ~~65~~	60	**Yes**	72/72 -	80/50	**Yes** ~~No~~
R-3	61	74 ~~66~~	74 ~~67~~	71	No	74/74 -	80/50	**Yes** ~~No~~
R-4	54	74 ~~66~~	74 ~~66~~	64	**Yes**	75/75 -	80/50	**Yes** ~~No~~
R-5	54	72 ~~64~~	72 ~~64~~	64	No	73/73 -	80/50	**Yes** ~~No~~
R-6	54	70 ~~61~~	70 ~~62~~	64	No	70/70 -	80/50	**Yes** ~~No~~
R-7	54	68 ~~60~~	68 ~~61~~	64	No	67/67 -	80/50	**Yes** ~~No~~
R-8	49[2]	68 ~~60~~	68 ~~60~~	59	**Yes**	67/67 -	60[4]/50	**Yes**
R-9	49[2]	59 ~~51~~	60 ~~53~~	59	No	58/58 -	60[4]/50	**Yes** ~~No~~
R-10	45	33 ~~25~~	45	55	No	33/33 -	80/50	No
R-11	46	<30 ~~17~~	46	56	No	<30/<30 ~~27/-~~	80/50	No
R-12	48	<30 -~~[5]~~	48	58	No	<30/<30 ~~-/-~~	80/50	No
R-13	50	35 ~~27~~	50	60	No	37/37 -	80/50	No
R-31	49[2]	69	69	59	**Yes**	69/69	60[4] / 50	**Yes**
R-32	49[2]	72	72	59	**Yes**	74/74	60[4] / 50	**Yes**

Source: Ramboll. ~~2023~~ 2024. Anderson Dam Seismic Retrofit Project Noise & Vibration Impact Assessment

Notes:

[1] Overall with Project is the combined level of Project construction plus ambient levels.

[2] Linear interpolation of ambient noise levels at SLM-4 and SLM-5.

[3] A significance threshold of 10 dBA over ambient is used for assessing onsite construction equipment noise.

[4] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime and any time on Sunday.

~~[5] Beyond model search radius.~~

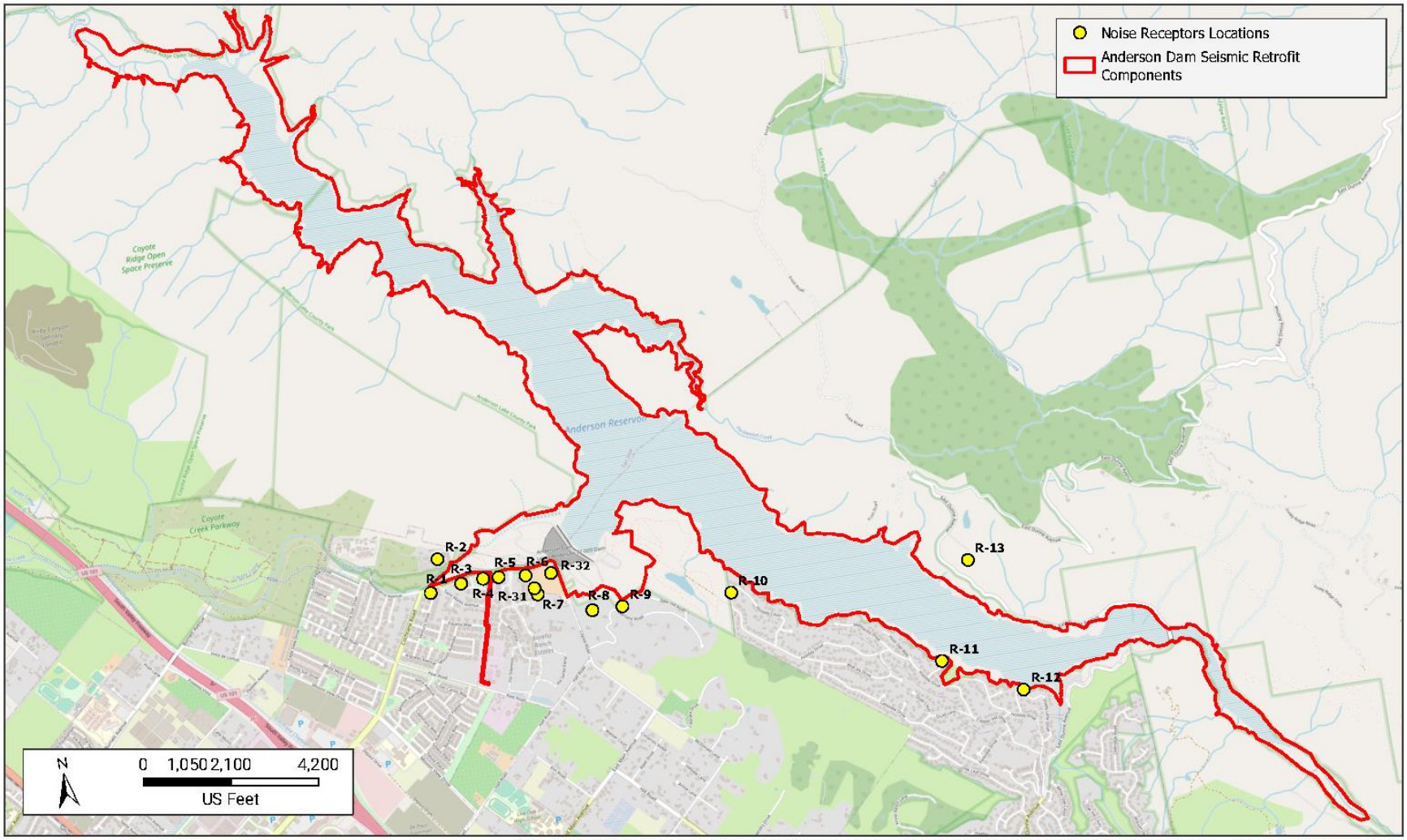


Figure 3.16-4. Seismic Retrofit Construction Equipment Noise Receptor Locations – Anderson Dam Area

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Anderson Dam Seismic Retrofit Project EIR (3403-06)
August 2024

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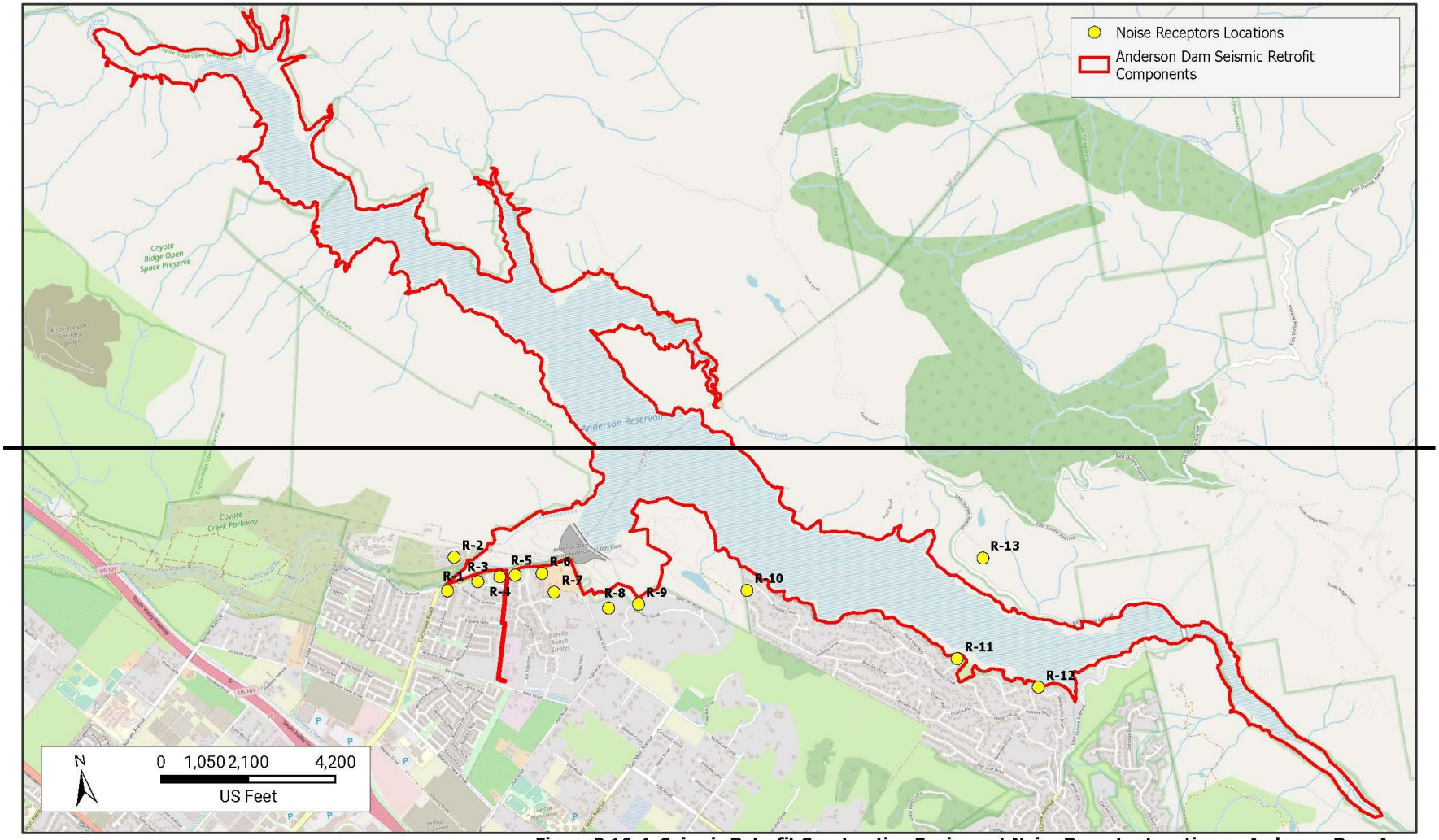


Figure 3.16-4. Seismic Retrofit Construction Equipment Noise Receptor Locations – Anderson Dam Area

Anderson Dam Seismic Retrofit Project EIR (3403-06)
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Offsite Construction Noise

Offsite construction noise sources would consist of daily truck deliveries of rocks, aggregate, and soil to the Project Area, shuttle bus trips for workers between Staging Area 5 and Staging Area 4, and worker vehicle trips to and from staging areas. An approximately 0.8-miles section of Cochrane Road between Malaguerra Avenue and Coyote Road would be fully or partially closed to through traffic during construction. Vehicles would be routed through a detour along Peet Road, Half Road, Elm Road, and East Main Road. Noise-sensitive receptors consist of residences near these roadway segments. Delivery of materials to the Project Area is limited to the hours of 7:00 a.m. to 8:00 p.m.

The estimated offsite construction noise levels for Years 1, 3, and 6 are provided in **Table 3.16-15** through **Table 3.16-17**. These years were chosen as Year 1 represents typical daytime truck activity, Year 3 represents greatest nighttime worker activity (worker vehicle and shuttle bus trips), and Year 6 represents greatest daytime and nighttime truck activity.

As shown in **Table 3.16-15** through **Table 3.16-17,** offsite construction noise levels would exceed the 5 dBA increase above ambient threshold along Route 1b and Route 3. Therefore, offsite construction noise levels would be significant.

Overall Construction Noise

Implementation of **Mitigation Measures NOI-1 and NOI-2** would reduce construction noise impacts. **Mitigation Measure NOI-1**, described below, will require Valley Water to implement a Construction Management Plan, which would require prior notice of construction activities to nearby sensitive receptors, proper maintenance of all construction equipment, equipping all construction equipment with mufflers and air intake silencers, locating staging and delivery areas as far from sensitive receptors as is feasible, enclosing stationary noise sources in temporary sheds, restricting the use of bells, whistles, alarms, and horns, and posting signs at construction area entrances to reinforce the prohibition of unnecessary idling. **Mitigation Measure NOI-2**, described below, is specific to Seismic Retrofit construction and would require the installation of a temporary noise barrier, limiting of construction activity at Staging Area 1 and Stockpile Area E within 300 feet of Receptor R-2 and residences across Cochrane Road, reducing the noise levels generated by track drill rigs to 86 dBA at 50 feet, posting a sign 10 days prior to the start of nighttime construction that details Project construction and provides a noise complaint phone number, and conducting construction noise monitoring during periods of nighttime construction work. **Mitigation Measure NOI-2** will also reduce offsite construction noise levels by reducing speeds along haul routes and routing truck traffic and worker vehicles along Route 1a instead of Route 1b.

Implementation of **Mitigation Measures NOI-1 and NOI-2** will reduce Seismic Retrofit construction noise levels by up to approximately 15 dBA (Bies, Hansen, and Howard 2018, Harris 1991). Therefore, **Mitigation Measures NOI-1 and NOI-2** will reduce nighttime construction noise to approximately 64 ~~58~~ dBA L_{eq} or less. Seismic Retrofit construction noise could still exceed the nighttime construction noise threshold of 50 dBA L_{eq} even with implementation of **Mitigation Measures NOI-1 and NOI-2.** Therefore, Seismic Retrofit construction noise impacts will be significant and unavoidable.

Table 3.16-15. Offsite Seismic Retrofit Construction Road Noise at 50 feet, Year 1

Route	Road Segment	Existing Traffic Noise Level (dBA DNL)	Overall with Project[1] Noise Level (dBA DNL)	Threshold of Significance (dBA DNL)[4]	Exceed Threshold?
1a – Trucks and Worker Vehicles	Cochrane Road – US 101 to Peet[2]	58	58	63	No
	Cochrane Road – Peet to Curve	57	57	62	No
	Cochrane Road – Malaguerra Curve to Staging Area 1	51	~~47~~48	56	No
1b – Trucks and Worker Vehicles	Peet – Cochrane Road to Half Rd	47	52	52	No
	Half Rd – Peet to Cochrane Road	36	~~46~~49	41	Yes
	Cochrane Road – Half Road to Staging Area 4	45	~~50~~[3]51[3]	50	~~No~~ Yes
2 – Worker Vehicles to Staging Area 5	East Dunne Avenue – US 101 to Hill Road	61	62~~61~~	64	No
	Hill Road – East Dunne Avenue to San Pedro Avenue	56	56	61	No
3 – Shuttle Bus Route from Staging Area 5 to Staging Area 4	Hill Road – Diana Avenue to San Pedro Avenue	56	56	61	No
	Hill Road – East Main Ave to Diana Avenue	55	55	60	No
	East Main Avenue – Hill Road to Cochrane Road	45	49~~48~~	50	No
	Cochrane Road – East Main Avenue to Half Road	45	49~~48~~	50	No

Source: Ramboll. ~~2023~~ 2024. Anderson Dam Seismic Retrofit Project Noise & Vibration Impact Assessment

Notes:

[1] Overall with Project is the cumulative level of Project Traffic plus Non-Project Traffic.

[2] This road segment is shared with Route 1b.

[3] Includes traffic noise from Project shuttle buses.

[4] Roadway vehicle noise impacts would be significant where such noise causes an increase of 5 dBA DNL where ambient noise levels are below 60 dBA DNL or causes an increase of 3 dBA DNL where ambient noise levels are 60 dBA DNL or greater.

Table 3.16-16. Offsite Seismic Retrofit Construction Road Noise at 50 feet, Year 3

Route	Road Segment	Existing Traffic Noise Level (dBA DNL)	Overall with Project[1] Noise Level (dBA DNL)	Threshold of Significance (dBA DNL)[4]	Exceed Threshold?
1a – Trucks and Worker Vehicles	Cochrane Road – US 101 to Peet[2]	58	59	63	No
	Cochrane Road – Peet to Curve	57	~~58~~ 57	62	No
	Cochrane Road – Malaguerra Curve to Staging Area 1	51	~~55~~ 53	56	No
1b – Trucks and Worker Vehicles	Peet – Cochrane Road to Half Road	47	~~55~~ 53	52	Yes
	Half Road – Peet to Cochrane Road	36	~~52~~ 48	41	Yes
	Cochrane Road – Half Road to Staging Area 4	45	~~55~~ 54[3]	50	Yes
2 – Worker Vehicles to Staging Area 5	East Dunne Avenue – US 101 to Hill Road	61	62	64	No
	Hill Road – East Dunne Avenue to San Pedro Ave	56	58	61	No
3 – Shuttle Bus Route from Staging Area 5 to Staging Area 4	Hill Road – Diana Avenue to San Pedro Avenue	56	57	61	No
	Hill Road – East Main Avenue to Diana Ave	55	56	60	No
	East Main Avenue – Hill Road to Cochrane Road	45	~~51~~52	50	Yes
	Cochrane Road – East Main Avenue to Half Road	45	52	50	Yes

Source: Ramboll. ~~2023~~ 2024. Anderson Dam Seismic Retrofit Project Noise & Vibration Impact Assessment

Notes:

[1] Overall with Project is the cumulative level of Project Traffic plus Non-Project Traffic.

[2] This road segment is shared with Route 1b.

[3] Includes traffic noise from Project shuttle buses.

[4] Roadway vehicle noise impacts would be significant where such noise causes an increase of 5 dBA DNL where ambient noise levels are below 60 dBA DNL or causes an increase of 3 dBA DNL where ambient noise levels are 60 dBA DNL or greater.

Table 3.16-17. Offsite Seismic Retrofit Construction Road Noise at 50 feet, Year 6

Route	Road Segment	Existing Traffic Noise Level (dBA DNL)	Overall with Project[1] Noise Level (dBA DNL)	Threshold of Significance (dBA DNL)[4]	Exceed Threshold?
1a – Trucks and Worker Vehicles	Cochrane Road – US 101 to Peet[2]	58	~~60~~ 59	63	No
	Cochrane Road – Peet to Curve	57	~~59~~ 58	62	No
	Cochrane Road – Malaguerra Curve to Staging Area 1	51	~~56~~ 53	56	No
1b – Trucks and Worker Vehicles	Peet – Cochrane Road to Half Road	47	~~56~~ 54	52	Yes
	Half Road – Peet to Cochrane Road	36	~~55~~ 49	41	Yes
	Cochrane Road – Half Road to Staging Area 4	45	~~57~~54[3]	50	Yes
2 – Worker Vehicles to Staging Area 5	East Dunne Avenue – US 101 to Hill Road	61	62	64	No
	Hill Road – East Dunne Avenue to San Pedro Ave	56	57	61	No
3 – Shuttle Bus Route from Staging Area 5 to Staging Area 4	Hill Road – Diana Avenue to San Pedro Ave	56	57	61	No
	Hill Road – East Main Avenue to Diana Ave	55	56	60	No
	East Main Avenue – Hill Road to Cochrane Rd	45	51	50	Yes
	Cochrane Road – East Main Avenue to Half Road	45	51	50	Yes

Source: Ramboll. ~~2023~~ 2024. Anderson Dam Seismic Retrofit Project Noise & Vibration Impact Assessment

Notes:

[1] Overall with Project is the cumulative level of Project Traffic plus Non-Project Traffic.

[2] This road segment is shared with Route 1b.

[3] Includes traffic noise from Project shuttle buses.

[4] Roadway vehicle noise impacts would be significant where such noise causes an increase of 5 dBA DNL where ambient noise levels are below 60 dBA DNL or causes an increase of 3 dBA DNL where ambient noise levels are 60 dBA DNL or greater.

Significance Conclusion Summary (Draft EIR p. 3.16-58 to 3.16-59)

Construction of the Seismic Retrofit Component, Ogier Ponds CM, and the Sediment Augmentation Program would exceed applicable construction noise thresholds of significance, while Project operational noise impacts would be less than significant. Specifically, onsite Seismic Retrofit construction noise levels would exceed the 10 dBA increase above ambient threshold at Receptors R-2, R-4, ~~and~~ R-5, and R-31 during Year 1~~,~~; at Receptors R-2, R-4 through ~~and~~ R-8, R-31, and R-32 during Year 2~~,~~; at Receptors R-2 ~~and R-4~~ through ~~R-8~~ R-9, R-31, and R-32 during Year 3~~,~~; at Receptors R-2 through R-8, ~~and Receptors~~ R-10 through R-12, R-31, and R-32 during Year 6~~,~~; and Receptors R-2, R-4, ~~and~~ R-8, R-31, and R-32 during Year 7. On-site construction noise levels would exceed the applicable Santa Clara County daytime construction noise threshold at Receptors R-8, ~~and~~ R-9, R-31, and R-32 in Year 1, at Receptors R-8, R-31, and R-32 in Year 2, at Receptors R-8, ~~and~~ R-9, R-31, and R-32 in Year 3, at Receptors R-8, R-31, and R-32 in Year 6, and at Receptors R-8, R-31, and R-32 in Year 7. Seismic Retrofit nighttime construction noise levels ~~during Year 6~~ would exceed the nighttime construction noise threshold of 50 dBA L_{eq} at Receptors R-1 through R-9, R-31, and R-32 in Years 2, 3 and 7; and at each residential receptor in Year 6. Sunday work would exceed the Santa Clara County Sunday threshold of 50 dBA at Receptors R-8, R-9, R-31, and R-32 during Years 2, 3, 6, and 7. Offsite Seismic Retrofit construction noise levels would exceed the 5 dBA increase above ambient threshold along Route 1b and Route 3.

Onsite Ogier Ponds CM construction noise levels would exceed the 10 dBA increase above ambient threshold at Receptors R-18 through R-20 during the spillway construction phase. Onsite Ogier Ponds CM construction noise levels would exceed the applicable Santa Clara County construction noise threshold at Receptor R-9 during the pond 1 fill import from Basalt Hill excavation construction phase and at Receptor R-20 during the construction of haul roads and preparation of stockpile areas, dewatering of pond 1, pond 1 fill import from Basalt Hill excavation, and spillway construction phases. Offsite Ogier Ponds CM construction noise would exceed the 5 dBA increase above ambient threshold along Cochrane Road between Staging Area 1 to Peet Road during Year 6, Pond 1 Fill. Onsite Sediment Augmentation Program construction noise would exceed the 10 dBA increase above ambient threshold at Receptor R-2 during haul roads and preparation of stockpile areas construction phase. Onsite North Channel Extension and Phase 2 Coyote Percolation Dam construction noise would not exceed applicable construction noise thresholds. Offsite construction noise associated with the North Channel Extension and Phase 2 Coyote Percolation Dam would also not exceed applicable noise thresholds. Implementation of **Mitigation Measure NOI-1**, described below, will require Valley Water to implement a Construction Management Plan, which would require prior notice of construction activities to nearby sensitive receptors, proper maintenance of all construction equipment, equipping all construction equipment with mufflers and air intake silencers, locating staging and delivery areas as far from sensitive receptors as is feasible, enclosing stationary noise sources in temporary sheds, restricting the use of bells, whistles, alarms, and horns, and posting signs at construction area entrances to reinforce the prohibition of unnecessary idling.

Implementation of **Mitigation Measure NOI-2**, described below, is specific to Seismic Retrofit construction and will require the installation of a temporary noise barrier, limiting of construction activity at Staging Area 1 and Stockpile Area E within 300 feet of Receptor R-2 and residences across Cochrane Road, reducing the noise levels generated by track drill rigs to 86 dBA at 50 feet, posting a sign 10 days prior to the start of nighttime construction that provides a noise complaint phone number, and construction noise monitoring during nighttime periods of

construction. **Mitigation Measure NOI-2** will also reduce offsite construction noise levels by reducing speeds along haul routes and routing truck traffic and worker vehicles along Route 1a instead of Route 1b. Mitigated Seismic Retrofit nighttime construction noise levels would still exceed the nighttime construction noise threshold of 50 dBA $L_{eq.}$

Implementation of **Mitigation Measure NOI-3**, described below, is specific to Ogier Ponds CM construction and will require the installation of a temporary noise barrier and the reduction of truck and vehicle speeds along Cochrane Road. Mitigated Ogier Ponds CM offsite construction noise would still exceed the 5 dBA increase above ambient threshold. Mitigated Sediment Augmentation Program onsite construction noise would also still exceed applicable thresholds of significance. Therefore, Project construction would result in generation of a substantial temporary increase in ambient noise levels in the Project vicinity in excess of locally-adopted standards and the standards of other agencies, or would result in generation of substantial incremental increases in noise levels. Impacts would be **significant and unavoidable**.

***Impact NOI-2: Generate excessive groundborne vibration or groundborne noise levels* (Less than Significant with Mitigation) (Draft EIR p. 3.16-61 to 3.16-64)**

Construction

Seismic Retrofit Construction

Vibration from Seismic Retrofit construction is considered for sensitive receptors within 500 feet of construction activity areas. The following activity areas are more than 500 feet from any sensitive receptors, and therefore are not considered:

- BHBA
- Coffer dam
- Dredging
- Packwood Gravel Borrow Area
- Reservoir Disposal Area
- Spillway
- Boat ramp parking area
- Dam toe parking area
- Staging Area 3
- Stockpile Area B
- Stockpile Area C
- Stockpile Area D
- Stockpile Area H
- Stockpile Area L

Seismic Retrofit construction vibration levels at sensitive receptors within 500 feet of the construction activity areas are summarized in **Table 3.16-31** and sensitive receptors are included in **Figure 3.16-7**. Seismic Retrofit construction vibration levels would be significant if they exceed the 0.20 in/sec PPV threshold for structural damage and the indoor impact threshold of 72 VdB

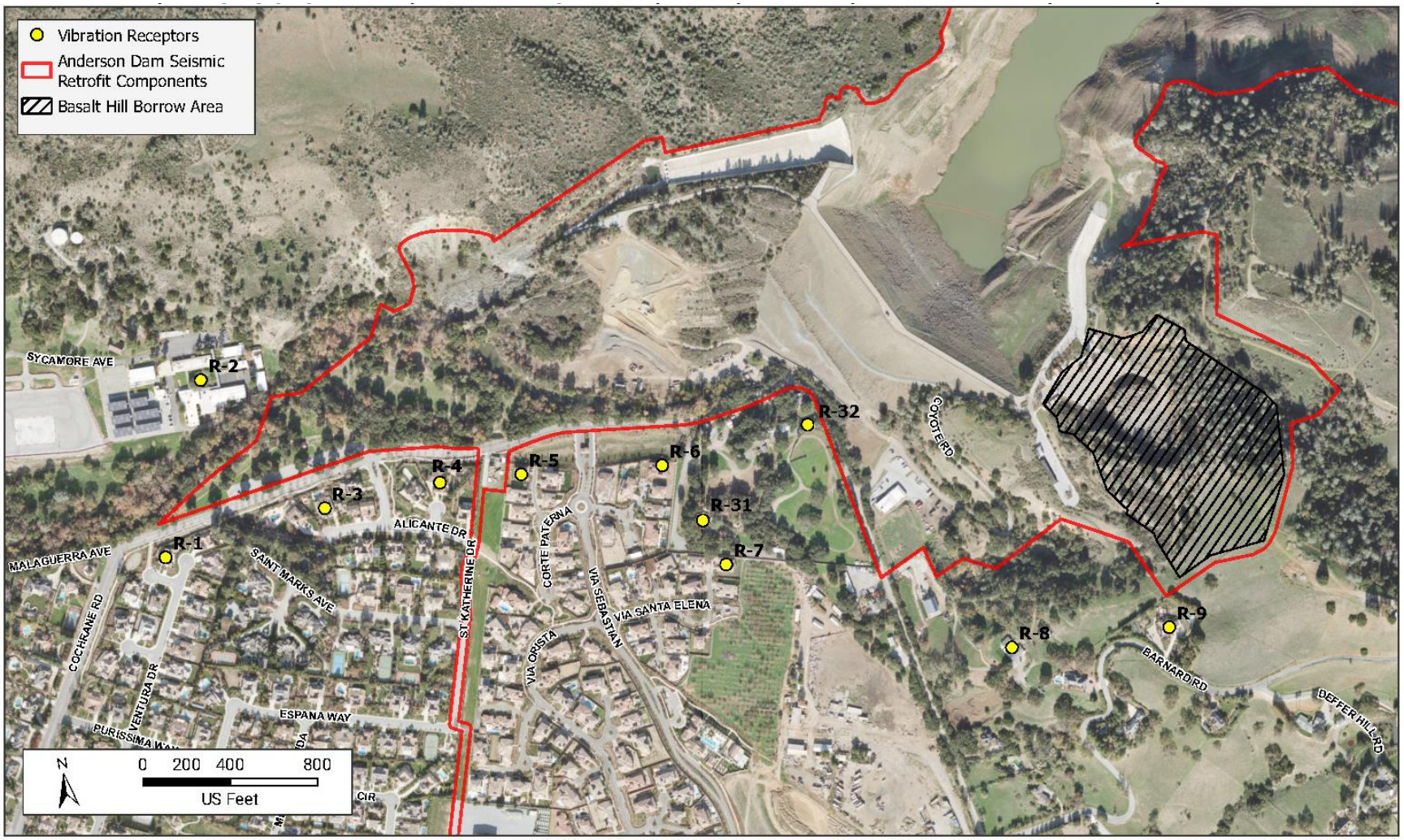
at sensitive receptors. As shown in **Table 3.16-31**, Seismic Retrofit construction vibration would not exceed the 0.20 in/sec PPV threshold for structural damage at any of the nearby sensitive receptors. Seismic Retrofit construction vibration would exceed the 72 VdB indoor impact threshold at Receptors R-2 and R-32. Therefore, Seismic Retrofit construction vibration would be significant.

Implementation of **Mitigation Measure NOI-4**, described below, will require the use of oscillatory or static rollers in lieu of a vibratory roller within 150 feet of residential structures ~~Receptor R-2~~. Implementation of **Mitigation Measure NOI-4** will reduce vibration levels below the 72 VdB indoor impact threshold. Therefore, Seismic Retrofit construction vibration impacts would be less than significant with mitigation incorporated.

Table 3.16-31. Seismic Retrofit Construction Vibration

Receptor	Activity Area	Distance	Maximum Vibration			Significance Thresholds		Exceed Structural Damage Threshold?	Exceed Indoor Impact Threshold?
			Amplitude (PPV, in/sec)	Level (VdB)	Source	Structural Damage (PPV, in/sec)	Indoor Impact (VdB)		
R-6	Excavation	480	0.002	56	Padfoot roller	0.20	72	No	No
	Staging Area 4	340	0.004	60	Road-header	0.20	72	No	No
R-1	Staging Area 4	270	0.006	63	Padfoot roller	0.20	72	No	No
R-4	Staging Area 1	180	0.011	69	Padfoot roller	0.20	72	No	No
	Stockpile Area E	290	0.005	62	Padfoot roller	0.20	72	No	No
R-2	Staging Area 1	120	0.020	74	Padfoot roller	0.20	72	No	**Yes**
	Stockpile Area E	250	0.007	64	Padfoot roller	0.20	72	No	No
MH Vallee Vineyards	Staging Area 2	180	0.005	61	Loader	0.20	72	No	No
R-11	Stockpile Area K - North	320	0.005	61	Padfoot roller	0.20	72	No	No
R-12	Stockpile Area K - South	310	0.005	62	Padfoot roller	0.20	72	No	No
R-32	Staging Area 4	110	0.023	75	Padfoot roller	0.2	72	No	**Yes**

Source: Ramboll. ~~2023~~ 2024. Anderson Dam Seismic Retrofit Project Noise & Vibration Impact Assessment



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Figure 3.16-7. Seismic Retrofit Construction Equipment Vibration Receptor Locations – Anderson Dam Area

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August 2024

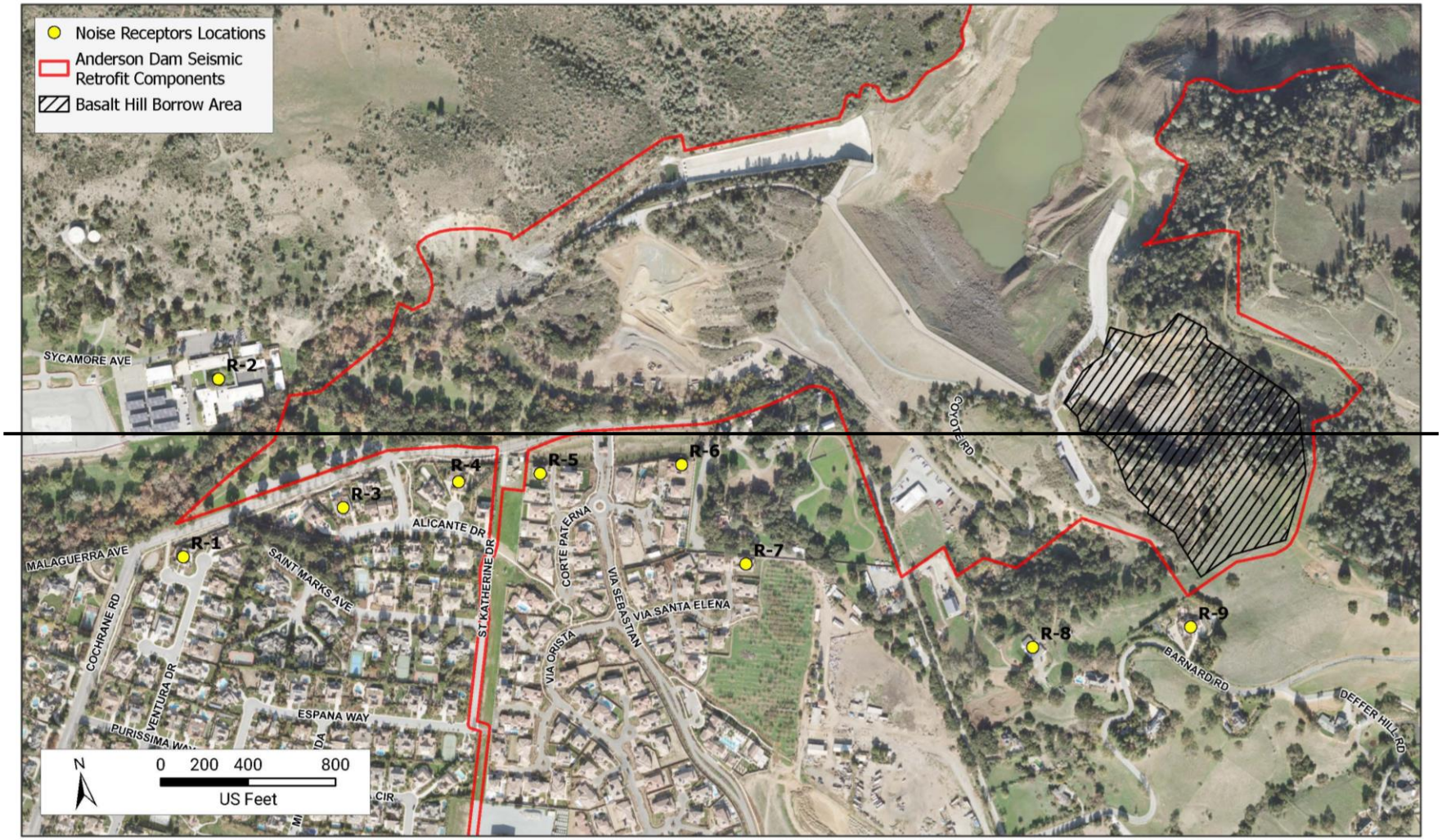


Figure 3.16-7. Conservation Measure Construction Equipment Noise Receptor Locations – Anderson Dam Area

Anderson Dam Seismic Retrofit Project EIR (3403-06)
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Significance Conclusion Summary (Draft EIR p. 3.16-69)

Construction of the Seismic Retrofit components and the Sediment Augmentation Program would exceed construction vibration thresholds of significance. Specifically, Seismic Retrofit construction vibration would exceed the 72 VdB indoor impact threshold at Receptors R-2 and R-32. Blasting activities during Seismic Retrofit construction that occur at a distance greater than 240 feet from the nearest sensitive receptors could exceed applicable blasting thresholds. Sediment Augmentation Program construction vibration would exceed the 72 VdB indoor impact threshold at Receptor R-2.

Implementation of **Mitigation Measure NOI-4**, described below, will require the use of oscillatory or static rollers in lieu of a vibratory roller within 150 feet of residential structures ~~Receptor R-2~~. Implementation of **Mitigation Measure NOI-5**, described below, will require vibration and air overpressure monitoring be conducted while initial blasting activities occur. Monitoring results would be used to adjust blast loading limits to properly reflect site-specific conditions to prevent vibration impacts from blasting from exceeding the building damage thresholds or air overpressure threshold of 133 dBL. Mitigated Seismic Retrofit and Sediment Augmentation Program construction vibration levels would not exceed the 0.20 in/sec PPV threshold for structural damage and the indoor impact threshold of 72 VdB. Therefore, Project construction would not generate excessive groundborne vibration or groundborne noise levels and impacts would be **less than significant with mitigation** incorporated.

Mitigation Measures (Draft EIR p. 3.16-69)

NOI-4 Seismic Retrofit and Sediment Augmentation Program Construction Vibration Reduction

Valley Water and/or its contractor will implement the following vibration mitigation measures for the Seismic Retrofit and Sediment Augmentation Program construction:

1. Use of oscillatory or static rollers (which maintains constant contact with the ground) in lieu of vibratory rollers (which lifts off and pounds the ground) for compaction near residential structures ~~Receptor R-2~~ (within 150 feet)

3.16.5 Cumulative Impacts

***Cumulative Impact NOI-2: Generate excessive groundborne vibration or groundborne noise levels* (Not Cumulatively Considerable)**

Significance Conclusion Summary (Draft EIR p. 3.16-73)

Valley Water would reduce the Project's contribution to cumulative construction vibration impacts through implementation of **Mitigation Measures NOI-4 and NOI-5**. Implementation of **Mitigation Measure NOI-4** will require the use of oscillatory or static rollers in lieu of a vibratory roller within 150 feet of residential structures ~~Receptor R-2~~ during Seismic Retrofit and Sediment Augmentation Program construction. Implementation of **Mitigation Measure NOI-5** will require vibration and air overpressure monitoring be conducted while initial blasting activities occur. Monitoring results would be used to adjust blast loading limits to properly reflect site-specific conditions to prevent vibration impacts from blasting from exceeding the building damage threshold of 0.1884 in/sec PPV if blasting frequency is below 1 Hz, 0.5 in/sec

PPV if blasting frequency is 3 Hz to 40 Hz, 2.0 in/sec PPV ay 40 Hz and above, or the air overpressure threshold of 133 dBL. Tentatively, the maximum loading will not exceed 7.5 lb. TNTe per delay (~3.4 kg). Implementation of **Mitigation Measure NOI-5** will also include a Blasting Plan, which restricts blasting between the hours of 8:00 a.m. and 5:00 p.m. and includes details for nearby sensitive receptors to file complaints. With implementation of **Mitigation Measures NOI-4 and NOI-5**, Project construction vibration levels will not exceed the 0.20 in/sec PPV threshold for structural damage and the indoor impact threshold of 72 VdB, or the blasting vibration and air overpressure significance thresholds, and as a result, impacts related to excessive groundborne vibration would **be not cumulatively considerable**.

Chapter 4
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Appendix E

Air Quality, Greenhouse Gas and Health Risk Assessment Technical Report

Prepared by
Ramboll Americas Engineering Solutions, Inc.
San Francisco, California

Project Number
1690032004

Date
September 5, 2023
Revised: July 16, 2024

AIR QUALITY, GREENHOUSE GAS AND HEALTH RISK ASSESSMENT TECHNICAL REPORT

ANDERSON DAM SEISMIC RETROFIT

SANTA CLARA COUNTY, CALIFORNIA

RAMBOLL

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Acronyms and Abbreviations

ACC	Advanced Clean Cars
AERMET	American Meteorological Society/Environmental Protection Agency Regulatory Model Meteorological Processor
AERMOD	USEPA's atmospheric dispersion modeling system
APCO	Air Pollution Control Officer
AQ	air quality
aREL	acute reference exposure level
ASF	age sensitivity factor
ATCM	California Airborne Toxics Control Measure
BAAQMD	Bay Area Air Quality Management District
BHBA	Basalt Hill Borrow Area
BMP	Best Management Practice
CAAQS	California Ambient Air Quality Standards
Cal/EPA	California Environmental Protection Agency
CalEEMod	California Emissions Estimator Model
CAP	criteria air pollutant
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CO	carbon monoxide
CO_2e	carbon dioxide equivalents
cREL	chronic reference exposure level
CPF	cancer potency factor
cy	cubic yards
DSOD	Division of Safety of Dams
DPF	diesel particulate filter
DPM	diesel particulate matter
EDR	Environmental Data Resources
EIR	Environmental Impact Report
EMFAC	EMission FACtor model
EMISFACT	AERMOD keyword for variable emission factor
FAHCE	Fish and Aquatic Habitat Collaborative Effort
FHRP	Fish Habitat Restoration Plan
FOCP	FERC Order Compliance Project
FERC	Federal Energy Regulatory Commission
GHG	greenhouse gas
g/bhp-hr	gram per brake horsepower hour
g/trip	grams per trip
g/s	gram per second
HARP	Hotspots Analysis and Reporting Program
HI	hazard index
HRA	health risk assessment
HQ	hazard quotient
KRHV	Reid-Hillview Airport
kg	kilogram
L	liter
lbs	pounds
LHDT	light heavy duty truck
m	meter
MDAQMD	Mojave Desert Air Quality Management District
MEI	maximally exposed individual
mph	miles per hour
NAAQS	National Ambient Air Quality Standards
NED	National Elevation Dataset
NHTSA	National Highway Traffic Safety Administration

NMHC	non-methane hydrocarbon
NCDC	National Climatic Data Center
NOA	naturally occurring asbestos
NOx	oxides of nitrogen
OEHHA	Office of Environmental Health Hazard Assessment
OFFROAD2017	(CARB) In-Use Off-Road Equipment model
PC	pleasure craft
PM	particulate matter
$PM_{2.5}$	fine particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10}	particulate matter less than 10 micrometers in aerodynamic diameter
ppm	parts per million
ROG	reactive organic gases
SAFE	Safer Affordable Fuel-Efficient
SCAQMD	South Coast Air Quality Management District
SFDPH	San Francisco Department of Public Health
SJVAPCD	San Joaquin Valley Air Pollution Control District
TAC	toxic air contaminant
TOG	total organic gases
$\mu g/m^3$	microgram per cubic meter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VMT	vehicle miles traveled

1. INTRODUCTION

Ramboll Americas Engineering Solutions, Inc. (Ramboll) conducted an air quality and greenhouse gas (GHG) assessment for the construction and operation of the proposed seismic retrofit of Anderson Dam in Santa Clara County, California (referred to hereafter as the "Proposed Project" or "Project"). The scope and methods used in this assessment are consistent with recommended analyses for projects requiring review under California Environmental Quality Act (CEQA). This document describes the scope and methodology for evaluation of air quality, GHG, and health impacts from Project construction emissions, and cumulative impacts at off-site sensitive receptors. This document also describes the thresholds of significance that were used, which are consistent with the 2022 Bay Area Air Quality Management District (BAAQMD) CEQA Air Quality Guidelines where appropriate.

This assessment was originally prepared in September 2023 and revised in July 2024 to evaluate certain construction changes such as extending work hours, adding some weekend days, beginning work on certain Project components sooner, revising estimated average and maximum daily workers, and a implementing a minor variance to Best Management Practice (BMP) AQ-1 (Use Dust Control Measures) that increases the haul truck speeds on unpaved roads to 25 miles per hour (mph) from 15 mph, except in areas with naturally occurring asbestos.

1.1 Project Description

1.1.1 Existing Conditions

The Project area is located east of U.S. Highway 1 on Cochrane Road. For the purpose of this assessment, the Project area refers to the area within which all construction-related activities or ground disturbances would occur and the areas and facilities that would be operated through the implementation of the Project. The Project area includes Anderson Reservoir, Anderson Dam, Ogier Ponds (approximately 4 miles downstream of Anderson Dam), the Coyote Percolation Dam (approximately 10 miles downstream of Anderson Dam), and lands in the immediate vicinity of Anderson Reservoir and Coyote Creek that are owned by Valley Water and the County of Santa Clara, as well as portions of the Cochrane Road and Coyote Road rights-of-way. The Project area also includes the Coyote Creek channel from Anderson Dam to the Coyote Percolation Dam.

Existing land uses within and adjacent to the Project area include Coyote Creek, parkland and hiking trails, the Anderson Reservoir boat ramp, the Anderson Lake Visitor's Center, the Santa Clara County Justice Training Center, the William F. James Boys Ranch, an orchard, and private residences.

Anderson Dam was completed in 1950, and when operated at the maximum reservoir operating elevation, the dam impounded up to 90,000 acre-feet of water. Anderson Reservoir is part of Valley Water's raw water distribution system, and various infrastructure allows for operational flexibility of the reservoir and the system.

Between 2008 and 2012, several dam safety deficiencies associated with the seismic shaking, faucet offset, flood capacity, and emergency drawdown capabilities were identified. In 2020, the Santa Clara Valley Water District (Valley Water) was mandated by Federal Energy Regulatory Commission (FERC) to implement interim risk reduction measures associated with the Project (i.e., also known as the FERC Order Compliance Project [FOCP]), including restriction of the reservoir. For the purposes of this assessment, existing baseline operations for the Project reflect a seismically restricted capacity (e.g., maintenance of the reservoir at deadpool), and flow releases and maintenance activities projected to occur following completion of the FOCP, presently under construction. Similarly, the construction baseline assumes completion of facility upgrades and physical changes associated with the FOCP. In other words, "existing conditions", including the existing Anderson Dam and Reservoir facilities and environmental settings of resources in the vicinity of the Proposed Project are described as they will be following the FOCP, rather than actual existing conditions at the time that this assessment was written.

1.1.2 Proposed Project

The purpose of the Project is to seismically retrofit, maintain, and operate Anderson Dam and Reservoir to meet FERC, California Department of Water Resources, Division of Safety of Dams (DSOD), and Valley Water safety requirements, thereby allowing Valley Water to maximize water supply and groundwater recharge capacity and benefits.

The Project consists of numerous project components that fall into five over-arching categories:

1. Seismic Retrofit Construction. Project components related to the Anderson Dam facility upgrades and improvements to stabilize and mitigate potential seismic risks and comply with current public safety requirements.
2. Conservation Measures Construction. Project components designed to avoid and minimize adverse environmental impacts, and in some cases provide environmental benefits. These project components would be implemented throughout Project construction and/or operation phases. These measures would reduce construction-related impacts and allow for managed aquifer recharge to support water supply requirements, while maintaining wetted habitat for fish, wildlife and other groundwater dependent habitats. Many of these Project components align with the Fish and Aquatic Habitat Collaborative Effort (FAHCE) Phase 1 non-flow measures, as described in the Fish Habitat Restoration Plan (FHRP), and would provide improved fish passage, steelhead spawning and rearing habitat, and restored hydrologic functions.
3. Construction Monitoring. Project components include habitat and species monitoring during construction to document project effects on the environment.
4. Post-Construction Operations and Maintenance. Project components that involve how proposed, permanent Project facilities would be operated, including Anderson Dam facilities and the implementation of conservation measures, following construction.
5. Post-Construction FAHCE Adaptive Management. The FAHCE Adaptive Management Program would guide post-construction adaptive management of Project flow operations and Conservation Measures that have met their specified success criteria, as defined through the regulatory permitting process. The Adaptive Management Program includes four key elements: measurable objectives, monitoring, adaptive actions, and reporting.

The components of the Project analysed in this analysis include the Seismic Retrofit Construction as well as construction of four conservation measures: Ogier Ponds Conservation Measure, and Phase 2 Coyote Percolation Dam Conservation Measure, and Sediment Augmentation Program. **Figure 1** shows the location of each of these Project components. **Table 1** shows proposed construction schedule for the Project, which has a duration of 15 years.

Due to evaluation under prior CEQA documents or the lack of high-emissions activities, the North Channel Extension and Maintenance of the Live Oak Restoration Reach Conservation Measures, Construction Monitoring, Post-Construction Operations and Maintenance, and Post-Construction FAHCE Adaptive Management were not evaluated in this assessment.

1.1.2.1 Seismic Retrofit Construction

Primary construction activities for the seismic retrofit include the following: site mobilization and preparation, including clearing and preparing staging and stockpile areas; reservoir dewatering and cofferdam construction; constructing the temporary water diversion system; dam excavation and fill (including excavation of embankment materials from borrow areas and disposal of excess materials at spoils disposal areas); constructing the new outlet works and spillway; construction other ancillary facilities; construction of the permanent bladder dam; decommissioning the hydroelectric facility; related fisheries improvements; and site restoration.

Seismic retrofit construction is planned over a seven-year duration. The following describes the generalized construction activities by year:

- Year 1: Site mobilization; full dewatering of the reservoir; preparation of staging areas, access and haul roads, in-reservoir stockpile areas, and borrow sites; and begin tunnelling for the low-level outlet works.
- Year 2: Full dewatering of the reservoir; cofferdam and extension pipe construction; conversion of existing Stage 1 Diversion System into Stage 2 Diversion System; dam excavation to interim dam with crest of elevation 565 feet (Stage 1a Dam Excavation), and tunnelling for high-level outlet works.
- Year 3: Dam excavation to interim dam with crest of elevation 556 feet (Stage 1b Dam Excavation); construction of high-level outlet works; and demolition of the existing spillway.
- Year 4: Dam excavation to a remnant core (Stage 2a Dam Excavation) and dam fill to interim dam with crest elevation 556 feet (Stage 2b Fill); and construction of the spillway.
- Year 5: Dam fill to interim dam with crest elevation 565 feet (Stage 3a Dam Fill); construction of the spillway; and construction of the low-level outlet works. Drilling and blasting would occur in Year 5 and Year 6 to enable efficient excavation.
- Year 6: Dam fill to new dam crest elevation 657 feet (Stage 3b Dam Fill); completion of low-level outlet works, including sloping intake structure and outlet structure; and completion of the spillway including the unlined chute, and refilling of the reservoir.
- Year 7: Permanent roadways and site restoration; and repaving of Cochrane Road.

Table 1 shows a summary of the expected construction schedule. **Figure 1** shows the general area in which seismic retrofit construction will be occurring. **Table 2** shows the phasing schedule for seismic retrofit construction.[1]

Following seismic retrofit construction, Anderson Reservoir capacity would be restored to its unrestricted capacity and allowed to withstand a normal operational range of water levels in the reservoir. Operations of the Project include flow regulation, and management and maintenance activities, which were not quantified.

1.1.2.2 Conservation Measures Construction

The Project includes conservation measures, which are components designed to avoid and minimize adverse environmental impacts, and in some cases provide environmental benefits. These project components would be implemented throughout Project construction and/or operation phases.

As part of the Project, Ramboll analyzed four conservation measures with the potential to have air quality and GHG impacts: Ogier Ponds Conservation Measure, Phase 2 Coyote Percolation Dam Conservation Measure, and Sediment Augmentation Program.

Ogier Ponds Conservation Measure

The Ogier Ponds area consists of six historic gravel mining ponds, both perennial to semi-perennial in nature, located within former quarry borrow pits. Ogier Ponds were created by quarry reclamation work between 1994-1997. Coyote Creek flows into Pond 1 and continues via surface hydraulic connections through Ponds 2, 3, 4, and 5 before returning to Coyote Creek downstream of the Ogier Ponds area. As a result of creek flows and groundwater seepage, Ponds 1, 2, 3, 4, and 5 are permanently wetted and Pond 6 is seasonally wetted.

The Ogier Ponds Conservation Measure would consist of reconstructing the pre-1997 creek channel to create a geomorphically stable creek reach with a connected floodplain, and adding habitat and biological features to the

[1] The first year of construction was modeled to occur in 2024, whereas construction will actually start in a later year. However, this is a conservative assumption for purposes of estimating emissions because emissions from construction equipment fleets will get cleaner over time due to regulatory requirements.

creek and floodplain. The Ogier Ponds Conservation Measure would entail filling Pond 1 and constructing a new section of creek channel at the area currently occupied by Pond 1. The new section of creek channel would start at Pond 1 and connect to the pre-1997 channel alignment located west of Ponds 2, 3, 4, and 5. The Ogier Ponds Conservation Measure would completely fill and remove Ponds 1 and 5, partially fill Ponds 2, and 4, and construct earthen berms to separate the unfilled portions of Ponds 2, 3, and 4 from the restored channel. No changes are proposed at Pond 6. This new channel alignment would separate Coyote Creek from the Ogier Ponds and reconnect the current Coyote Creek channel downstream of the Pond 4. The complete filling of Ponds 1 and 5, and partial filling of Ponds 2 and 4 would allow restoration of flow to the pre-1997 channel with a connected floodplain.

The Ogier Ponds Conservation Measure would result in ecological enhancements to the channel and floodplain, ameliorate the adverse water temperature, fish migration, and fish entrainment effects of the current hydraulic connection between the creek and the ponds, and integrate public access and interpretation of natural resources and historical features within and along a portion of Coyote Creek on County Parks property.

Phase 2 Coyote Percolation Dam Conservation Measure

As part of the FOCP, the Coyote Percolation Dam was replaced with an inflatable bladder dam (known as Phase 1 Coyote Percolation Dam), to accommodate releases from the Anderson Dam Tunnel Project. The Phase 2 Coyote Percolation Dam Conservation Measure conservation measure would consist of constructing downstream channel modifications to facilitate upstream and downstream fish passage over the deflated bladder dam over a range of flow conditions. The Phase 2 Coyote Percolation Dam Conservation Measure conservation measure area is located along Coyote Creek, approximately 10.5 miles downstream of Anderson Dam.

Sediment Augmentation Program

The Sediment Augmentation Program would consist of removing and stockpiling approximately 55,000 cubic yards (cy) of suitable sediment from the exposed reservoir between the Dunne Avenue Bridge and the Holiday Estates boat launch in Staging Area 6, throughout the duration of Project construction. Sediment would be washed and sorted prior to placing it in Coyote Creek. Short-term material stockpiling would occur at the creek injection site within Staging Area 1, Staging Area 6, or within an Ogier Ponds staging area.

1.2 Objective and Methodology

The purpose of the air quality and GHG analysis is to assess potential criteria air pollutant (CAP) and GHG emissions, as well as health risks and hazards that would result from the construction and operation of the Proposed Project consistent with guidelines and methodologies from air quality regulatory agencies, specifically, the BAAQMD, the California Air Resources Board (CARB), the California Office of Environmental Health Hazard Assessment (OEHHA), and the US Environmental Protection Agency (USEPA). The analysis in this report followed the BAAQMD 2022 CEQA Guidelines where appropriate. In addition to the evaluation of an individual project, the CEQA Guidelines recommend an analysis of cumulative impacts when the project's incremental effect is cumulatively considerable (14 Cal. Code Regs., § 15130, subd. (a)). For an air quality health risk assessment (HRA), the cumulative analysis is performed when a project is in an area that includes other air emissions sources within a "zone of influence" of 1,000 feet surrounding the project. This report evaluates the risks and hazards associated with Project construction activities on off-site receptors and the cumulative impact to off-site sensitive receptors from Project construction and surrounding sources.

1.2.1 Resources

Ramboll directly or indirectly relied on emissions estimation guidance from government sponsored organizations, government-commissioned studies of energy use patterns, Project-specific studies, and emissions estimation software as described below. In cases noted below, third-party studies were also relied upon to support analyses and assumptions made outside of the approach described above. Where Project-specific data estimates were available, they were used preferentially instead of model defaults. The methodology used to calculate this

emissions inventory is described in detail in the following sections, including citations to information used in this inventory.

1.2.1.1 CalEEMod

Ramboll primarily utilized the methodology from the California Emissions Estimator Model (CalEEMod) version 2022.1to assist in quantifying the criteria pollutant and GHG emissions in the inventories presented in this report for the Project. CalEEMod is a statewide program designed to calculate both criteria and GHG emissions from development projects in California. This model was originally developed under the auspices of the South Coast Air Quality Management District (SCAQMD) and received input from other California air districts. It is currently supported by numerous lead agencies for use in quantifying the emissions associated with development projects undergoing environmental review. CalEEMod utilizes widely accepted models for emission estimates combined with appropriate default data that can be used if site-specific information is not available.

CalEEMod provides a platform to calculate annual operational criteria pollutant emissions from a land use development project. Specifically, the model aids the user in estimating operational emissions associated with a fully built out land use development. This includes emissions from on-road mobile vehicle traffic associated with the land uses, emissions from landscaping equipment and other off-road mobile sources, emissions from natural gas usage in the buildings, emissions associated with electricity usage in the buildings and electricity usage associated with water usage. This also includes emissions associated with solid waste disposal.

CalEEMod uses sources such as the USEPA AP-42 emission factors (USEPA 2023a), CARB's approved on-road and off-road equipment emission models such as the Emission FACtor model (EMFAC) and In-Use Off-Road Equipment model (OFFROAD), and studies commissioned by California agencies such as the California Energy Commission and CalRecycle. OFFROAD is an emission factor model used to calculate emission rates from off-road mobile sources (e.g., construction equipment, agricultural equipment) (CARB 2021). The off-road diesel equipment emission factors used by CalEEMod are based on the CARB OFFROAD2017 program. EMFAC is an emission factor model used to calculate emissions rates from on-road vehicles (e.g., passenger vehicles) (CARB 2021). The emission factors used by CalEEMod for on-road vehicles are based on the CARB EMFAC2021 program. EMFAC2021 incorporates USEPA and CARB regulations and standards (e.g., Advanced Clean Trucks and the Heavy Duty Omnibus). EMFAC2021 was incorporated into this analysis.

In addition, CalEEMod contains default values and existing regulatory methodologies to use in each specific local air district or county. Appropriate state-wide default values can be utilized if regional default values are not defined. Ramboll used default factors for Santa Clara County for the emissions inventory, unless otherwise noted in the methodology descriptions below.

1.3 Thresholds for Evaluation

1.3.1 Criteria Pollutants and Precursors

Project construction emissions of CAPs and precursors were evaluated and compared with the BAAQMD's 2022 CEQA Guidelines thresholds of significance. Project construction emissions were compared to the average daily construction emission thresholds of 54 pounds per day of ROG, NO_X, and $PM_{2.5}$ and 82 pounds per day of PM_{10}. BAAQMD thresholds of significance for construction-related PM_{10} and $PM_{2.5}$ mass emissions apply to exhaust emissions only and do not include fugitive dust emissions, which are addressed through BAAQMD's BMPs.

CEQA also requires evaluation of whether the Project would conflict with or obstruct implementation of the applicable air quality plan. Analysis of the Project's consistency with the applicable air quality plan is shown in Draft Environmental Impact Report (EIR) Section 3.3, *Air Quality*.

1.3.2 Greenhouse Gases

BAAQMD's 2022 CEQA Guidelines recommend GHG thresholds of significance for land use plans and projects, but do not recommend GHG thresholds of significance directly relevant to the Project (i.e., for large construction

projects or for operation of water projects such as dams and reservoirs). Even though the 2022 CEQA Guidelines do not set a GHG threshold for construction projects, to minimize GHG and air pollutant emissions, the 2022 CEQA Guidelines recommend that projects incorporate 18 BMPs for reducing construction emissions.

Chapter 6 of BAAQMD's 2022 CEQA Guidelines outlines operational thresholds for land use development projects. To demonstrate that a project is doing its "fair share" of implementing the goal of carbon neutrality by 2045, a project must reflect one of two approaches: building and transportation design elements (Approach A), or consistency with a qualified GHG reduction strategy (Approach B). However, Approach A is geared toward traditional residential or commercial projects and not infrastructure projects, and are therefore not appropriate for use here.

CEQA also requires evaluation of a project's consistency with an applicable plan, policy or regulation adopted for the purpose of reducing environmental impacts, including plans adopted to reduce the emissions of GHGs. The analysis of the Project's consistency with applicable plans to reduce GHG emissions is shown in Draft EIR Section 3.9, *Greenhouse Gas Emissions*.

1.3.3 Health Risks and Hazards

The HRA evaluates the estimated cancer risk, non-cancer chronic and acute hazard index (HI), and fine particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) concentration associated with construction of the Project. The cumulative analysis estimates the total excess lifetime cancer risks, non-cancer HI, and $PM_{2.5}$ concentrations that are attributable to off-site rail, mobile, and stationary sources within the 1,000-foot "zone of influence" in addition to effects from the construction of the Project.

The HRA evaluates potential sensitive receptor locations including "people—children, adults, and seniors—occupying or residing in:

- residential dwellings, including apartments, houses, condominiums, single-room occupancy units, and residential hotels;
- places of business;
- schools, colleges, and universities;
- daycare centers;
- hospitals;
- temporary housing, shelters, or encampments;
- detention centers or correctional facilities and
- senior-care facilities." (BAAQMD 2022a)

To meet these objectives, this HRA was conducted consistent with the following guidance:

- Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2015a);
- May 2022 BAAQMD CEQA Guidelines (BAAQMD 2022a);
- BAAQMD Recommended Methods for Screening and Modeling Local Risks and Hazards (BAAQMD 2012); and
- BAAQMD Health Risk Assessment Modeling Protocol (BAAQMD 2020).

The results of the construction health risk analyses are compared with the BAAQMD 2022 CEQA significance thresholds for single sources. The thresholds are:

Single Source Impacts:

- An excess lifetime cancer risk level of more than 10 in one million;

- Non-cancer chronic and acute HIs greater than 1.0; and
- An incremental increase in the annual average $PM_{2.5}$ of greater than 0.3 micrograms per cubic meter ($\mu g/m^3$).

Cumulative Impacts:

- An excess lifetime cancer risk level of more than 100 in one million;
- A chronic non-cancer HI greater than 10.0; and
- An incremental increase in the annual average $PM_{2.5}$ concentration of greater than 0.8 $\mu g/m^3$.

As discussed in detail in **Sections 5 and 6**, health impacts from the Project are based on emissions of toxic air contaminants (TACs) from diesel and gasoline combustion, and speciated particulate matter from blasting activities. Diesel particulate matter (DPM) does not have an acute non-cancer toxicity value, so an acute HI from diesel exhaust is not estimated.

Despite emissions thresholds for particulate matter not requiring fugitive dust to be included, recent guidance from BAAQMD clarified that $PM_{2.5}$ from fugitive dust from earth movement activity during construction should be included in the comparison to the $PM_{2.5}$ concentration threshold. To be conservative, fugitive dust is included in this analysis. Additionally, resuspended road dust from Project construction traffic is included in this analysis.

1.3.4 Carbon Monoxide

The BAAQMD does not have thresholds of significance for construction-related carbon monoxide (CO) impacts. For project operations, BAAQMD has established localized CO concentration significance thresholds of 9.0 parts per million (ppm) based on an 8-hour average and 20.0 ppm based on a 1-hour average. The Project's potential impacts related to CO concentrations generated during operation would be minimal, as discussed in **Section 3**.

1.3.5 Odor

The BAAQMD does not have thresholds of significance for construction-related odor impacts. For project operations, BAAQMD has established a significance threshold of 5 confirmed odor complaints per year averaged over 3 years. The Project's potential impacts related to odor generation during operation would be minimal, as discussed in **Section 4**.

1.4 Document Organization

This Technical Report is divided into seven sections as follows:

Section 1.0 – Introduction: describes the purpose and scope of the air quality and GHG analysis, the objectives and methodology used, and outlines the document organization.

Section 2.0 – Criteria Air Pollutant, Toxic Air Contaminant, and Greenhouse Gas Emission Estimates: describes the methods used to estimate CAP, TAC, and GHG emissions from the Project, and includes the Project CAP and GHG emissions results and comparison to the applicable thresholds of significance.

Section 3.0 – Carbon Monoxide Analysis: discusses evaluation of potential carbon monoxide impacts.

Section 4.0 – Odor Analysis: discusses evaluation of potential odor impacts.

Section 5.0 – Estimated Air Concentrations: discusses the air dispersion modeling, the selection of the dispersion models, the data used in the dispersion models (e.g., terrain, meteorology, source characterization), and identifies receptor locations evaluated in the HRA.

Section 6.0 – Health Risk Assessment: provides an overview of the methodology for conducting the HRA, and includes the Project HRA results and comparison to the BAAQMD thresholds of significance.

Section 7.0 – Cumulative Analysis: summarizes the approach used in the cumulative analysis. The analysis of criteria air pollutants and GHG emissions is inherently cumulative.

Section 8.0 – References: includes a listing of all references cited in this report.

2. CRITERIA AIR POLLUTANT, TOXIC AIR CONTAMINANT, AND GREENHOUSE GAS EMISSION ESTIMATES

Project CAP, TAC, and GHG emissions from Proposed Project construction sources were estimated. Methodologies used to calculate CAP, TAC, and GHG emissions are summarized below.

2.1 Emission Calculation Methodologies and Results

2.1.1 Seismic Retrofit Construction

A detailed seismic retrofit construction equipment list, which includes the type, quantity, construction schedule and hours of operation anticipated for each piece of equipment for each construction activity, is summarized in **Table 3**. This data was used to estimate construction emissions using calculation methodologies consistent with CalEEMod 2022.1. It was assumed that all construction off-road equipment is diesel powered except for those specified as electric or gasoline powered. In addition to off-road equipment, seismic retrofit construction would also include on-road construction trips, on-site gasoline trucks, gasoline-powered dredging boats, fugitive dust, paving, and blasting activities involving ammonium nitrate/fuel oil. All diesel-fueled equipment emissions of PM_{10} were assumed to be DPM, which is a TAC.

As discussed in **Section 1.3.1**, BAAQMD thresholds for fugitive dust are compliance with its BMPs. As such, the seismic retrofit construction will include watering of exposed surfaces twice a day and street sweeping of paved surfaces once daily. Due to the unique and complex nature of seismic retrofit construction, a minor variance from the BAAQMD BMPs is necessary in certain situations and areas to make it feasible for the Project, as discussed in Section 2.1.1.4, *Fugitive Dust*. As discussed in **Section 1.3.3**, emissions from fugitive dust are included in the estimation of $PM_{2.5}$ concentration.

Additional mitigation measures were analyzed to determine the respective reduction in seismic retrofit construction CAP and TAC emissions. The following mitigation measures were analyzed under a mitigated seismic retrofit construction scenario:

- Use of USEPA or CARB Tier 4 Final engines for all diesel construction equipment;
- Use of wind screens to enclose the Project's blasting area; and
- Use of boats of model year 2010 or newer.[2]

These mitigations are discussed further in **Section 2.3**.

2.1.1.1 Construction Schedule and Phasing

Seismic retrofit construction is assumed to last seven years. A mix of construction equipment would operate over the course of any given day. **Table 2** shows a construction phasing schedule.

Construction activities would generally be conducted during a 10-hour shift per day, between 6:00 a.m. and 4:00 p.m., Monday through Saturday, with limited Sunday work. Sunday work would include up to 12 Sundays in Years 1 through 3, 40 Sundays in Year 4, and 12 Sundays in Years 5 through 7. Specific project components that would require modified construction hours include:

[2] Note: Draft EIR Mitigation Measure AQ-1 stipulates that on-road engines be model year 2010 or newer; however, for the purposes of modeling, an aggregate model year (i.e., all model years, including engines older than 2010) was assumed for both the unmitigated and mitigated emission factors. This approach results in a conservative assessment of the mitigated criteria pollutant emissions.

- Construction of the replacement dam and spillway, and conversion of existing Stage 1 Diversion System into Stage 2 Diversion System – two 10-hour shifts, with a 0.5 -hour lunch break (one shift between 6:00 a.m. and 4:30 p.m., and the second shift from 6:00 p.m. to 4:30 a.m., Monday through Saturday and certain Sundays);
- Blasting at the Basalt Hill Borrow Area (BHBA) – restricted hours of 8:00 a.m. to 5:00 p.m.;
- Cochrane Road – communication lines and repaving – construction may occur outside the work window of 6:00 a.m. and 4:00 p.m., including weekends on a limited basis up to 24-hours per day, 6 days per week.
- Delivery of materials (i.e., equipment, aggregate base, and drainage and filter material) – 7:00 a.m. to 8:00 p.m., Monday to Friday;
- Tunneling (e.g., use of a road header) required for the outlet works (e.g., construction of the high-level outlet works and low-level outlet works at the dam) – 24 hours per day (two 12-hour shifts), 6 days per week; and,
- Support production (e.g., concrete placement) – 24 hours per day (two 12-hour shifts), 6 days per week.

However, equipment engines would not be expected to run during this entire period. The equipment list for the seismic retrofit construction is shown in **Table 3**.

2.1.1.2 Diesel Construction Off-road Equipment

Emissions calculations associated with off-road construction equipment were based on the construction schedule and the type, size, fuel type, tier level, hours of operation and utilization factor for each piece of equipment. A Project-specific construction equipment list for the seismic retrofit is presented in **Table 3**. For diesel-powered off-road construction equipment, methodologies consistent with CalEEMod were used to estimate emissions. Where Project-specific equipment information was not available, CalEEMod default horsepower was used. Load factors for each piece of equipment were based on default factors from CalEEMod.

The CalEEMod methodology for off-road construction equipment emissions relied on the CARB In-Use Off-Road Equipment model (OFFROAD2017) as well as specific emission factors by engine tier.

Emissions are calculated outside of CalEEMod using the same methodologies and emission factors as CalEEMod. Emissions were calculated using the following formula, which is consistent with CalEEMod:

$$E_C = \sum (EF_C * HP * LF * Hr * Red * C)$$

Where:

E_C: off-road equipment exhaust emissions in pounds (lbs)

EF_C: emission factor (g/bhp-hr) (CalEEMod defaults)

HP: equipment horsepower (CalEEMod defaults or Project-specific)

LF: equipment load factor (CalEEMod defaults)

Hr: equipment operating hours

Red: reduction from diesel particulate filter (DPF), as applicable

C: unit conversion factor

Unmitigated emissions were based on fleetwide average emission factors from OFFROAD2017. For mitigated emissions, calculations assume emission factors from CalEEMod associated with Tier 4 final engines for all diesel construction equipment.

2.1.1.3 Electric Equipment

Electrical equipment for the seismic retrofit consists primarily of ventilation fans and small excavators. Electric equipment does not directly emit CAPs. The equipment is anticipated to make a negligible contribution to overall Project GHG emissions, and thus are not quantified in this report.

2.1.1.4 Fugitive Dust

Fugitive dust contributes to PM_{10} and $PM_{2.5}$ emissions and is generated by the various activities occurring at the Project site. The following subsections describe the methodology used to calculate fugitive dust emissions from Project activities.

Fugitive dust emissions are not included in the comparison to thresholds for criteria air pollutant emissions as these thresholds for construction are for exhaust only. However, to be conservative, fugitive dust emissions are included in the estimation of $PM_{2.5}$ concentration based on recent guidance provide by the BAAQMD.

Control of fugitive dust emissions through BAAQMD BMPs will be utilized for most Project activities, when feasible. The basic BMPs which were considered when developing fugitive dust emission rates include the following:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

2. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

3. All vehicle speeds on unpaved roads shall be limited to 15 mph.

The 15 mph speed limit would apply to all vehicles and equipment only in areas containing naturally occurring asbestos (NOA). Outside of these areas, a 25 mph speed limit would be observed for haul trucks on unpaved roads (light duty pick-up trucks would observe the 15 mph limit), such as the in-reservoir access roads to Stockpile Areas K and L. The fugitive dust emissions from haul trips outside areas of naturally occurring asbestos were estimated using vehicle speeds of 25 mph for the longer routes and 15 mph for the other routes. Ramboll qualitatively estimated the emissions impact if all haul truck speeds outside areas of naturally occurring asbestos are increased to 25 mph.[3]

Paved Road Dust

Fugitive dust emissions from paved road dust includes dust generated by construction which settles onto surrounding roadways and is re-entrained into the air. The emission factor for grading is calculated on a per-vehicle miles travelled (VMT) basis. Total VMT was determined using estimated worker, vendor, and hauling trip rates and default CalEEMod trip lengths. Emissions assume a 26% reduction due to street sweeping of arterial roads. The emission factor derivation for paved road dust is presented in **Table 4a**, and emissions from paved road dust are presented in **Table 5a**.

Unpaved Road Dust

Fugitive dust emissions from unpaved road dust includes dust which is kicked up by offroad vehicles during trips along on-site roadways. The emission factor for grading is calculated on a per-VMT basis. Total VMT was determined using estimated on-site trip rates as shown for each year in **Table 7b**. Emissions assume a 55%

[3] Ramboll estimated the amount that fugitive dust emissions are expected to increase if haul truck speeds are increased from 15 mph to 25 mph. At the maximally exposed individual receptor location for the Seismic Retrofit, the estimated $PM_{2.5}$ concentration from unpaved road dust emissions contributes to less than 0.01% of the total mitigated $PM_{2.5}$ concentration. Therefore, if a speed of 25 mph is used on all unpaved vehicle routes that do not have NOA, the increase in fugitive dust emissions and corresponding $PM_{2.5}$ concentrations is expected to be very small (i.e., less than the precision of the analysis) and was therefore not quantified in this report.

reduction due to watering two times per day. The emission factor derivation for unpaved road dust is presented in **Table 4b**, and emissions from unpaved road dust are presented in **Table 5b**.

Grading

Fugitive dust emissions from grading equipment (i.e., graders and scrapers) occur during the grading and utility phases. Grading emissions were estimated using CalEEMod methodology and assumptions. The emission factor for grading is calculated on a per-VMT basis. Equipment VMT was calculated using the maximum area disturbed per day, based on Project-specific data and CalEEMod default assumptions. Emissions assume a 55% reduction due to watering two times per day. Grading emissions are presented in **Table 5c**.

Material Loading

Fugitive dust from material loading activities includes the unloading of construction materials and loading of soil onto the haul trucks during the grading and excavation phases. Material loading fugitive dust emissions were estimated using CalEEMod methodology and assumptions. The emission factor for material loading is calculated on a per-ton basis. Material loaded in cubic yards is based on Project-specific data. Emissions assume a 55% reduction due to watering two times per day. Emissions from material loading are presented in **Table 5d**.

Bulldozing

Fugitive dust from bulldozing activities includes the movement and disturbance of soil by bulldozers during excavation phases. Bulldozing fugitive dust emissions were estimated using CalEEMod methodology and assumptions. The emission factor for bulldozing is calculated on a per-hour basis of dozer operation. Emissions assume a 55% reduction due to watering two times per day. Emissions from bulldozing are presented in **Table 5e**.

Demolition

Fugitive dust from demolition includes the dust generated by the demolition of existing dam structures. Demolition fugitive dust emissions were estimated using CalEEMod methodology and assumptions. The emission factor for demolition is calculated on a per-ton basis of building/demolition waste, which is based on Project-specific data. Emissions assume a 55% reduction due to watering two times per day. Emissions from demolition are presented in **Table 5h**.

Windblown dust

Fugitive emissions from windblown dust includes the dust naturally generated by stockpile areas during all phases of construction. Windblown fugitive dust emissions were estimated using CalEEMod methodology and assumptions. The emission factor for windblown dust is calculated on a per-acre basis. The maximum daily wind-erodible area was conservatively assumed for each stockpile to be the full extent of the storage or staging area where stockpiling would be occurring. Emissions assume a 90% reduction from a watering rate of storage piles at 1.4 gallons/hour-yard^2. Emissions from windblown dust are presented in **Tables 5f-5g**.

2.1.1.5 Paving

Reactive organic gas (ROG) emissions from paving includes the off-gassing emissions caused from pouring and setting of asphalt. Paving emissions were estimated using CalEEMod methodology and assumptions. The emission factor for material loading is calculated on a per-acre basis. The total area paved during construction, including the boat ramp parking area, dam toe parking area, Staging Area 3, and access roads. Emissions from paving are presented in **Table 6**.

2.1.1.6 On-road Construction Trips

Construction trip assumptions for workers, vendors, and haul trucks are shown for each year in **Table 7a**. Trip lengths are shown in **Table 7c**.

Emission factors from EMFAC2021,[4] the CARB Emission Factors model for on-road emissions, were used for emissions of CAPs and GHGs. The emission factors used for on-road construction trips cover the anticipated years of construction. EMFAC2021 incorporates the Pavley Clean Car Standards and the Advanced Clean Cars (ACC) program.

Running exhaust, running loss, tire wear, and brake wear emission factors were estimated with a gram/mile factor. These emissions were calculated as shown below:

$$E_M = \sum (EF_M * VMT)$$

Where:

VMT: Trip Length*Trip Number

EF_M: emission factor (gram/mile) from EMFAC2021

Emissions from vehicle idling exhaust, starting exhaust, and evaporative emissions were estimated with a gram/trip emission factor. Idling emission factors were only estimated for heavy duty trucks as idling emissions occur during extended idling events while the truck is operating but not traveling any significant distance (e.g., during loading and unloading). In EMFAC2021, an extended idling event is defined as "a continuous segment of vehicle activity that meets three criteria: all instantaneous vehicle speeds being lower than 5 mph, the total distance of less than 1 mile, and the total duration of more than 5 minutes" (CARB 2021). EMFAC takes account of idling emissions from light duty vehicles and other vehicle types in running emissions estimates. These emissions were estimated as shown below:

$$E_T = \sum (EF_T * Trip\ Number)$$

Where:

EF_T = emissions factor (g/trip) from EMFAC2021.

Trip Number = trips provided by Project

Idling time is modeled to be consistent with California Airborne Toxics Control Measure (ATCM) to limit diesel-fueled commercial motor vehicle idling (CARB 2016).

Road dust emissions are calculated using CARB methodology. The on-road entrained dust emission factor derivation is shown in **Table 4a**.

2.1.1.7 On-Site Gasoline Trucks

Most equipment on site will be powered by diesel, with the exception of boats and on-site gasoline trucks for transporting equipment, workers, and materials between staging areas. It was conservatively assumed that all on-site gasoline trucks correspond to EMFAC's LHDT2 category, which includes light-heavy duty trucks with a gross vehicle weight rating between 10,001-14,000 pounds. Trucks were conservatively assumed to travel at an average speed of 15 mph, consistent with BAAQMD basic construction mitigation measures (BAAQMD 2022a). Emissions from on-site gasoline truck trips were calculated using the same methodology as on-road construction trips in **Section 2.1.1.6** and summarized in **Tables 8 and 9**.

[4] CARB has published off-model adjustment factors to account for the "Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program" (SAFE 1) adopted by the USEPA and the National Highway Traffic Safety Administration (NHTSA). These adjustment factors will not be incorporated into this analysis as this regulation is currently under litigation and the USEPA and NHTSA have proposed rulemakings to repeal SAFE 1.

2.1.1.8 On-Site Boats

Emissions were estimated using emission factors and methodology from CARB's Pleasure Craft (PC) Model Database, matched to their respective gasoline-fueled boat classifications (CARB 2014). Exhaust emissions were calculated using the same methodology as the off-road equipment in **Section 2.1.1.2**. Evaporative emissions are the sum of hot soak, diurnal, resting loss, and running loss emissions, and were estimated using emission factors from the CARB PC Model Database and the provided construction schedule. Mitigated emissions assume model year 2010 or newer boats. Emissions from on-site boat activities are summarized in **Tables 10 through 12**.

2.1.1.9 Blasting

Emissions calculations associated with blasting activities were based on the number of blast holes drilled, type of explosives, and amounts of material shifted by blasting, as shown in **Tables 13 and 14a-14c**. Three types of emissions are associated with blasting activities: blast hole drilling, dust entrainment, and use of explosives. The total emissions associated with blasting are the addition of the emissions from the respective blasting activities associated with each phase.

For emissions from blast hole drilling and dust entrainment, and blasting criteria emissions, emissions were estimated using methods A, B, and C from the Mojave Desert AQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries (MDAQMD 1999). All three methods are equivalent to USEPA's AP-42 methodology found in Chapters 11.9 and 13.3 (USEPA 2010a, USEPA 2010b). When estimating hourly emissions from blasting, emissions assume one complete blast occurs in one hour of activity.

Blasting emissions were speciated using specific on-site soil composition profiles (Valley Water 2021). Yearly emissions were estimated using the median detected value of all soil samples, and hourly emissions were estimated using the 95% upper confidence level for all soil samples. Hexavalent chromium was estimated to make up 5% of all speciated chromium, consistent with guidance for aggregate piles provided by the San Joaquin Valley Air Pollution Control District (SJVAPCD 2017). Emissions of speciated metals from blasting are summarized in **Table 15**.

2.1.1.10 Construction CAP and GHG Emissions Summary for Seismic Retrofit Component

A summary of maximum annual average daily construction CAP emissions for the seismic retrofit is shown in **Summary Table A**. A full summary of unmitigated and mitigated construction CAP emissions from the seismic retrofit is provided in **Tables 16 and 17**, respectively. CAP emissions are reported in units of annual average daily emissions for each year of construction. The annual construction emissions for each year were averaged over the number of days construction is expected to occur in the respective year to evaluate average daily emissions in pounds per day.

A summary of the annual unmitigated and mitigated GHG emissions for seismic retrofit construction is shown in **Summary Table B**. A full summary is provided in **Tables 18 and 19**, respectively. GHG emissions are reported in total metric tons of carbon dioxide equivalents.

Summary Table A. Summary of Maximum Average Daily Construction CAP Emissions from the Seismic Retrofit

	ROG	**NO_X**	**PM_{10}**	**$PM_{2.5}$**
	lb/day			
BAAQMD Threshold of Significance	54	54	82	54
Unmitigated Emissions	398	1,015	41	32
Exceed Threshold?	***Yes***	***Yes***	*No*	*No*
Mitigated Emissions	67	262	37	28

	ROG	**NO_X**	**PM_{10}**	**$PM_{2.5}$**
	lb/day			
Exceed Threshold?	***Yes***	***Yes***	*No*	*No*
Source: Table 16, Table 17				

Summary Table B. Summary of Annual Construction GHG Emissions from the Seismic Retrofit

Year	**Total Unmitigated Project Construction GHG Emissions (MT of CO_2e)**	**Total Mitigated[1] Project Construction GHG Emissions (MT of CO_2e)**
Year 1	5,215	4,254
Year 2	26,322	26,322
Year 3	26,660	26,660
Year 4	34,475	34,475
Year 5	29,173	29,173
Year 6	29,710	29,710
Year 7	4,000	4,000
Total	**155,555**	**154,594**
Source: Table 18, Table 19		

[1] Given the type and duration of electrified equipment use is unknown at this time, to be conservative reductions from Mitigation Measure GHG-1 (Construction GHG Reduction Measures) were not quantified in this analysis. The mitigated GHG emissions only reflect the implementation of Mitigation Measure AQ-1's requirement that all boat engines used in construction be model year 2010 or newer. As such, this measure only reduces GHG emissions in Year 1.

2.1.2 Conservation Measures Construction

The emissions from the construction associated with the conservation measures were analyzed using similar methodologies as the seismic retrofit construction. Details on the differences in methodology are provided below.

For each conservation measure, detailed schedule assumptions are shown in **Table 20** (Ogier Ponds Conservation Measure), **Table 30** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Table 40** (Sediment Augmentation Program). Construction activities associated with the Ogier Ponds Conservation Measure would occur from Year 6 through Year 8, Sediment Augmentation Program would occur from Year 2 through Year 15, and Phase 2 Coyote Percolation Dam Conservation Measure would occur from Year 4 through Year 5. For all three of these conservation measures, construction activities would generally be conducted during a 12-hour shift per day, between 6:00 a.m. and 6:00 p.m., Monday through Friday. Equipment maintenance would occur on Saturdays, and no work would occur on Sundays. Select construction activities such as the operation of pumps and electric generators to control groundwater seepage may operate at any time on any day of the week. The equipment list for the construction of the conservation measures is shown in **Table 21** (Ogier Ponds Conservation Measure), **Table 31** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Table 41** (Sediment Augmentation Program). For the Sediment Augmentation Program, the augmentation process is anticipated to decrease in intensity over its lifetime. However, equipment was conservatively assumed to be used at the same intensity for all fourteen years of construction during this conservation measure.

Fugitive dust emissions are presented in **Tables 22a-22d** (Ogier Ponds Conservation Measure), **Table 32a-32d** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Table 42a-42d** (Sediment Augmentation Program).

Worker, vendor, and haul trips for each conservation measure were calculated based on CalEEMod defaults where project-specific data were not available. Although defaults for vendor trips are only available for the building construction phase, vendor trips were conservatively estimated to be 20% of worker trips for all phases. Construction trips and trip lengths are shown in **Tables 23a-23b** (Ogier Ponds Conservation Measure), **Table 33a-33b** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Table 43a-43b** (Sediment Augmentation Program).

Emissions from on-site gasoline truck trips associated with construction for each conservation measure are summarized in **Table 24-25** (Ogier Ponds Conservation Measure), **Table 34-35** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Table 44-45** (Sediment Augmentation Program).

Summaries of maximum annual average daily construction CAP emissions for Ogier Ponds Conservation Measure, Phase 2 Coyote Percolation Dam Conservation Measure, and Sediment Augmentation Program are shown in **Summary Tables C-E**, respectively. Summaries of the annual unmitigated and mitigated GHG emissions are shown in **Summary Table F-H**.

A full summary of unmitigated construction CAP emissions from the conservation measures is shown in **Tables 26** (Ogier Ponds Conservation Measure), **Table 36** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Table 46** (Sediment Augmentation Program). A full summary of mitigated construction CAP emissions from the conservation measures is shown in **Tables 27** (Ogier Ponds Conservation Measure), **Table 37** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Table 47** (Sediment Augmentation Program).

A full summary of unmitigated construction GHG emissions from the conservation measures is shown in **Tables 28** (Ogier Ponds Conservation Measure), **Table 38** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Table 48** (Sediment Augmentation Program). A full summary of mitigated construction GHG emissions from the conservation measures is shown in **Tables 29** (Ogier Ponds Conservation Measure), **Table 39** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Table 49** (Sediment Augmentation Program).

Summary Table C. Summary of Maximum Annual Average Daily Construction CAP Emissions from the Ogier Ponds Conservation Measure

	ROG	**NO_X**	**PM_{10}**	**$PM_{2.5}$**
	lb/day			
BAAQMD Threshold of Significance	54	54	82	54
Unmitigated Emissions	40	227	16	16
Exceed Threshold?	*No*	***Yes***	*No*	*No*
Mitigated Emissions	11	87	11	6.1
Exceed Threshold?	*No*	***Yes***	*No*	*No*
Source: Table 26, Table 27				

Summary Table D. Summary of Maximum Annual Average Daily Construction CAP Emissions from the Phase 2 Coyote Percolation Dam Conservation Measure

	ROG	NO_X	PM_{10}	$PM_{2.5}$
	lb/day			
BAAQMD Threshold of Significance	54	54	82	54
Unmitigated Emissions	4.5	35	5.9	2.8
Exceed Threshold?	*No*	*No*	*No*	*No*
Mitigated Emissions	1.3	12	4.8	1.8
Exceed Threshold?	*No*	*No*	*No*	*No*
Source: Table 36, Table 37				

Summary Table E. Summary of Maximum Annual Average Daily Construction CAP Emissions from the Sediment Augmentation Program

	ROG	NO_X	PM_{10}	$PM_{2.5}$
	lb/day			
BAAQMD Threshold of Significance	54	54	82	54
Unmitigated Emissions	35	291	26	14
Exceed Threshold?	*No*	***Yes***	*No*	*No*
Mitigated Emissions	9.4	72	19	7.2
Exceed Threshold?	*No*	***Yes***	*No*	*No*
Source: Table 46, Table 47				

Summary Table F. Summary of Annual Construction GHG Emissions from the Ogier Ponds Conservation Measure

Year	Total Unmitigated Project Construction GHG Emissions (MT of CO_2e)	Total Mitigated Project Construction GHG Emissions (MT of CO_2e)
Year 6	14,210	14,210
Year 7	9,384	9,384
Year 8	3,863	3,863
Total	**27,457**	**27,457**
Source: Table 28, Table 29		

Summary Table G. Summary of Annual Construction GHG Emissions from the Phase 2 Coyote Percolation Dam Conservation Measure

Year	Total Unmitigated Project Construction GHG Emissions (MT of CO_2e)	Total Mitigated Project Construction GHG Emissions (MT of CO_2e)
Year 4	353	353
Year 5	934	934

Year	Total Unmitigated Project Construction GHG Emissions (MT of CO_2e)	Total Mitigated Project Construction GHG Emissions (MT of CO_2e)
Total	**1,287**	**1,287**
Source: Table 38, Table 39		

Summary Table H. Summary of Annual Construction GHG Emissions from the Sediment Augmentation Program

Year	Total Unmitigated Project Construction GHG Emissions (MT of CO_2e)	Total Mitigated Project Construction GHG Emissions (MT of CO_2e)
Year 2	6,928	6,928
Year 3	6,434	6,434
Year 4	6,420	6,420
Year 5	6,316	6,316
Year 6	6,272	6,272
Year 7	6,242	6,242
Year 8	6,296	6,296
Year 9	6,373	6,373
Year 10	6,336	6,336
Year 11	6,267	6,267
Year 12	6,227	6,227
Year 13	6,264	6,264
Year 14	6,343	6,343
Year 15	6,373	6,373
Total	**89,091**	**89,091**
Source: Table 48, Table 49		

2.1.3 Overall Project Construction

The summary of maximum annual average daily construction CAP emissions for the overall Project construction is shown in **Summary Table I**. The summary of annual average GHG emissions for the overall Project construction is shown in **Summary Table J**.

Summary Table I. Summary of Maximum Annual Average Daily Construction CAP Emissions from the Overall Project Construction

	ROG	NO_X	PM_{10}	$PM_{2.5}$
	lb/day			
BAAQMD Threshold of Significance	54	54	82	54
Unmitigated Emissions	398	1,270	46	41
Exceed Threshold?	***Yes***	***Yes***	*No*	*No*
Mitigated Emissions	67	360	37	28
Exceed Threshold?	***Yes***	***Yes***	*No*	*No*
Source: Table 50, Table 51				

Summary Table J. Summary of Annual Construction GHG Emissions from the Overall Project Construction

Year	Total Unmitigated Project Construction GHG Emissions (MT of CO_2e)	Total Mitigated[1] Project Construction GHG Emissions (MT of CO_2e)
Year 1	5,215	4,254
Year 2	33,250	33,250
Year 3	33,093	33,093
Year 4	41,248	41,248
Year 5	36,423	36,423
Year 6	50,192	50,192
Year 7	19,627	19,627
Year 8	10,159	10,159
Year 9	6,373	6,373
Year 10	6,336	6,336
Year 11	6,267	6,267
Year 12	6,227	6,227
Year 13	6,264	6,264
Year 14	6,343	6,343
Year 15	6,373	6,373
Total	**273,390**	**272,429**
Source: Table 52, Table 53		

[1] Given the type and duration of electrified equipment use is unknown at this time, reductions from Mitigation Measure GHG-1 (Construction GHG Reduction Measures) were not quantified in this analysis. The mitigated GHG emissions only reflect the implementation of Mitigation Measure AQ-1's requirement that all boat engines used in construction be model year 2010 or newer. As such, this measure only reduces GHG emissions in Year 1.

2.2 Operational Emissions

Post-construction operations and maintenance of Anderson Dam and the Conservation Measures would involve minimal activities generating air pollutant emissions. Operation of Anderson Dam would remain essentially

unchanged from existing conditions. An emergency backup diesel generator will be installed to replace the existing generator at Anderson Dam; however, there is no expected change in the CAP, TAC, or GHG emissions as part of this replacement. Since no other new long-term operational sources would be added by the Project, operational emissions were not analyzed.

2.3 Proposed Mitigation Measures

Several mitigation measures were incorporated into the analysis as parts of Mitigation Measures AQ-1 (Construction CAP Reduction Measures) and AQ-2 (Construction Blasting Fugitive Dust Emissions Reduction Measure). The measures are summarized below.[5]

(AQ-1) Tier 4 Construction Equipment. Valley Water shall ensure all off-road construction equipment with greater than 25 hp and operating for more than 20 hours total over the entire duration of construction activities have engines that meet or exceed either USEPA or CARB Tier 4 Final offroad emission standards.

(AQ-1) Boat and On-Road Trucks Model Years of 2010 or Newer. To reduce exhaust emissions from dredging occurring at the dam toe, Valley Water shall ensure that all on-road trucks and boats used during construction are of model year 2010 or newer.

(AQ-2) Blasting Wind Screens. To reduce emissions of particulate matter from blasting activities at the Basalt Hill Borrow Area, Valley Water shall install three-sided wind screens. Wind screens should be made of a solid fabric or other material capable of catching at least 75% of particulate matter greater than 2.5 micrometers in diameter. Screens should be used in combination with watering of the blasting area.

5 Given the type and duration of electrified equipment use is unknown at this time, to be conservative reductions from Mitigation Measure GHG-1 (Construction GHG Reduction Measures) were not quantified in this analysis. The mitigated GHG emissions only reflect the implementation of Mitigation Measure AQ-1's, requirement that all boat engines used in construction be model year 2010 or newer. As such, this measure only reduces GHG emissions in Year 1.

3. CARBON MONOXIDE ANALYSIS

The BAAQMD does not have a significance threshold for construction-related CO impacts. CO impacts from operations are expected to be below significance levels if the following screening criteria is met:

1. Project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans.
2. The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
3. The project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway). (BAAQMD 2022a)

Operation of Anderson Dam following Project construction would remain essentially unchanged from existing conditions. The Project would not generate additional operational mobile trips compared to the existing conditions and is therefore not projected to produce more than 24,000 trips per hour. In addition, the Project is not expected to conflict with any applicable congestion management program because it would generate additional operational mobile trips. Therefore, additional analysis is not needed. As such, operational traffic is expected to be a minor contributor to CO concentrations in the vicinity of the Project site.

4. ODOR ANALYSIS

Although offensive odors rarely cause physical harm, they can be unpleasant, leading to considerable distress among the public. In addition, they often generate citizen complaints to local governments and air districts. Odor impacts on residential areas and other sensitive receptors, such as hospitals, daycare centers, and schools, warrant the closest scrutiny, but consideration should also be given to other land uses where people may congregate, such as recreational facilities, work sites, and commercial areas.

4.1 Regulation of Odors

According to BAAQMD's 2022 CEQA guidelines, examples of land uses that have the potential to generate considerable odors include, but are not limited to, wastewater treatment plants, landfills, confined animal facilities, composting stations, food manufacturing plants, refineries, and chemical plants. The Project is an infrastructure retrofit project, which is not a land use identified in BAAQMD's CEQA guidelines with an odor screening distance (BAAQMD 2022a).

BAAQMD Regulation 7 contains requirements on the discharge of odorous substances after the Air Pollution Control Officer (APCO) receives odor complaints from ten or more complainants within a 90-day period, alleging that a person has caused odors perceived at or beyond the property line of such person and deemed to be objectionable by the complainants in the normal course of their work, travel, or residence [BAAQMD 7-102] (BAAQMD 1982). The operations within the Project will be subject to this regulation and are expected to comply with the requirements if the regulation becomes applicable via BAAQMD 7-102, which is not anticipated.

4.2 Applicable Best Management Practices

The Santa Clara Valley Water District Best Management Practices Handbook (Valley Water 2014) contains the following BMP relevant to odor:

> **AQ-2**: Avoid Stockpiling Odorous Materials – Would avoid stockpiling odorous materials (for example, reservoir sediment containing high levels of hydrogen sulfide) within 1,000 feet of residential areas or other odor sensitive land uses, including recreational areas.

Implementation of BMP AQ-2 (Avoid Stockpiling Odorous Materials) would minimize odors from construction.

4.3 Project Odors

During Project construction, odors could be emitted from diesel exhaust generated by construction equipment and haul trucks. However, construction and hauling activities near existing receptors would be temporary, intermittent, and only during construction hours. Additionally, the diesel exhaust emissions and the associated odors would be diffusive in nature (i.e., spread out over several large work areas) and would not persist upon completion of construction.

When the reservoir and channels are fully dewatered during construction, odors could be emitted from exposed organic matter. However, the exposed organic matter is not anticipated to be a permanent odor source because the sediment would dry out or be removed during clearing and grubbing to allow for a clear construction site. Odors could be emitted from the short-term stockpiling of the sediment materials. However, through the implementation of BMP AQ-2 and the Sediment Augmentation Program conservation measure, the Project would avoid stockpiling odorous material nearby sensitive receptors and the removed sediment would be washed and sorted prior to being placed in Coyote Creek.

Project operations include managing stream flow and water depth of the reservoir, and managing sedimentation, deposition and/or erosion potential in several channels of Coyote Creek. During Project operation, odors could be emitted from exposed organic matter due to seasonal changes in water level, but such odors (if present) are not expected to be substantially different from existing conditions.

4.4 Evaluation of Odor Impacts

As discussed above, BAAQMD has not developed an odor screening distance for this Project land use type, which suggests that construction and operation of reservoirs/waterbodies are not common sources of odor. Sensitive receptors such as recreationists would be potentially near active construction work areas on a temporary basis and are unlikely to experience substantial or long-term odors from the Project. In addition to comparing to the odor screening distances, Ramboll also evaluated the location of nearby sensitive receptors relative to predominant winds. **Figure 2** shows a 5-year (2009-2014) wind rose from Reid-Hillview Airport (KRHV), which is located approximately 15 miles northwest of the Project site. As indicated by **Figure 2**, the predominant winds are from the north-northwest. While there are nearby residences to the south and southeast of the Project site (i.e., less than 1 mile), those locations would be potentially downwind of active construction work areas on a temporary basis and are unlikely to experience substantial or long-term odors from the Project.

BAAQMD is the agency responsible for investigating and controlling odor complaints in the area. BAAQMD enforces odor control by helping to document if a public nuisance exists. Upon receipt of a complaint, BAAQMD sends an investigator to interview the complainant and to locate the odor source, if possible. BAAQMD typically brings a public nuisance court action when there are a substantial number of confirmed odor events within a 24-hour period. Based on BAAQMD CEQA Guidelines (BAAQMD 2022a), an odor source with five or more confirmed complaints per year averaged over three years is considered to have a substantial effect on receptors. Based on data provided by BAAQMD through a public records request in which Ramboll requested all publicly available odor complaints in Morgan Hill, California, for the most recent and available three-year period (i.e., February 2020 through February 2023), BAAQMD has received zero confirmed odor complaints regarding odor associated with Anderson Dam (including Anderson Lake and associated recreational activities) (BAAQMD 2023a). Since the conservation measures' sites are smaller in size and scale than the seismic retrofit site, the number of odor complaints received for Anderson Dam is expected to be representative for the conservation measures. Thus, based on the odor complaint history, Anderson Dam is not considered a significant source of odors in the area.

5. ESTIMATED AIR CONCENTRATIONS

To evaluate the health risks and concentration of air toxics upon the surrounding community, BAAQMD recommends estimating concentrations using air pollution dispersion modeling. The methodologies used to evaluate emissions for the Proposed Project and cumulative HRA impacts are based on the most recent BAAQMD CEQA Guidelines (BAAQMD 2022a) and the most recent Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2015a).

5.1 Chemical Selection and Sources of Emissions

The Project would emit TACs from the combustion of gasoline and diesel fuels and blasting of soil at Basalt Hill. The cancer risk and chronic non-cancer analyses in the HRA for the Project were based on DPM concentrations from diesel combustion, total organic gases (TOG) concentrations from gasoline combustion, and site-specific soil speciation profile data for blasting.

Diesel exhaust, a complex mixture that includes hundreds of individual constituents, is identified by the State of California as a known carcinogen (California Environmental Protection Agency [Cal/EPA], OEHHA 1998). Under California regulatory guidelines, DPM is used as a surrogate measure of exposure for the mixture of chemicals that make up diesel exhaust as a whole. Cal/EPA and other proponents of using the surrogate approach to quantifying cancer risks and non-cancer chronic HI associated with the diesel mixture indicate that this method is preferable to use of a component-based approach. A component-based approach involves estimating risks for each of the individual components of a mixture. Critics of the component-based approach believe it will underestimate the risks and HI associated with diesel as a whole mixture because the identity of all chemicals in the mixture may not be known and/or exposure and health effects information for all chemicals identified within the mixture may not be available. Furthermore, Cal/EPA has concluded that "potential cancer risk from inhalation exposure to whole diesel exhaust will outweigh the multi-pathway cancer risk from the speciated components" (OEHHA 2015b). BAAQMD states "diesel exhaust particulate matter should be used as a surrogate for all TAC emissions from diesel-fueled compression-ignition internal combustion engines" (BAAQMD 2021). DPM emissions are assumed to be equal to exhaust PM_{10} from on- and off-road construction equipment.

The Cal/EPA-approved toxicity values for DPM were used to evaluate health impacts from construction and operational diesel fueled sources (Cal/EPA 2022).

Health effects from exhaust and evaporation from gasoline combustion were based on specific TAC emissions. Emissions of TOG from gasoline-fueled vehicles and boats were speciated using organic chemical profiles from BAAQMD (BAAQMD 2012).[6] The organic profile used for gasoline trucks can be found in **Table 9**, and was utilized for the seismic retrofit and conservation measures. The profile used for boat emissions is shown in **Table 12**. The Cal/EPA-approved toxicity values for each TAC were used to evaluate health impacts from operational gasoline fueled sources (Cal/EPA 2022).

Cancer risk and chronic and acute hazards from blasting activity are based on soil compositions provided in the Anderson Dam Seismic Retrofit Project Naturally Occurring Asbestos and Metals Evaluation Report (Valley Water 2021). Soil composition values utilized in emissions calculations and respective TAC emissions are shown in **Table 15**.

5.1.1 Assessment of Multi-Pathway Non-Inhalation Pathways

OEHHA Hot Spots Guidance (OEHHA 2015a) requires the evaluation of non-inhalation exposure pathways, referred to as a multi-pathway analysis, in risk assessments prepared to meet the BAAQMD CEQA Guidelines. Selection of

[6] Speciation profile is from BAAQMD's Recommended Methods for Screening and Modeling Local Risks and Hazards (BAAQMD 2012), Table 14, Toxic Speciation of TOG due to Tailpipe Emissions, and Table 15, Toxic Speciation of TOG due to Evaporative Losses.

the additional pathways for a multi-pathway analysis is specific to the chemical and land use designations in the area impacted by the project. As shown in **Table 15,** the chemicals that are emitted from Project blasting and must be evaluated in a multi-pathway analysis are: arsenic, beryllium, cadmium, chromium (VI), lead, and nickel. Emissions were estimated as described in **Section 2.1.1.9**, and CARB's HARP Air Dispersion Modeling and Risk Tool dated 22118 (CARB 2022) was used to estimate health risks, as described further in **Section 6.**

5.2 AERMOD Modeling

The American Meteorological Society/Environmental Protection Agency regulatory air dispersion model (AERMOD Version 22112) was used to evaluate ambient air concentrations at off-site receptors (USEPA 2022).[7] For each receptor location, the model generates air concentrations that result from emissions from multiple sources. In this case, air dispersion factors as unit emissions were modeled and air concentrations were calculated in a subsequent post-processing step.

Air dispersion models such as AERMOD require a variety of inputs such as source parameters, meteorological data, topographical data, and receptor parameters. When site-specific information is unknown, default parameter sets that are designed to produce conservative (i.e., overestimates of) air concentrations were used (USEPA 2022).

A copy of the AERMOD modeling files is included in **Appendix A**.

5.2.1 Meteorological Data

Air dispersion modeling applications require the use of meteorological data that ideally are spatially and temporally representative of conditions in the immediate vicinity of the site under consideration. For this analysis, meteorological data collected from the Reid-Hillview Airport (KRHV), located in Santa Clara County, for the years 2009-2014, were used. This data was downloaded from NOAA's National Climatic Data Center (NCDC) and was processed by BAAQMD with AERMET Version 14134 (BAAQMD 2023b).

5.2.2 Terrain and Land Use Considerations

Elevation and land use data were imported from the National Elevation Dataset (NED) maintained by the United States Geological Survey ([USGS] 2013) in NED 1/3 arc seconds.

An important consideration in an air dispersion modeling analysis is whether or not to model an area as urban. As the Project is surrounded by recreational and forested land, the default rural option was used in the modeling. The rural option tends to produce more conservative concentrations than the urban option due to the enhanced turbulence associated with urban environments due to the additional mixing associated with the heat island effect.

5.2.3 Emission Rates

Emissions were modeled using the χ/Q ("chi over q") method, such that each source has a unit emission rate (i.e., 1 gram per second [g/s]), and the model estimates dispersion factors (with units of micrograms per cubic meter (([$\mu g/m^3$])/[g/s]). Actual emission rates were multiplied by the dispersion factors to obtain concentrations.

5.2.3.1 Construction Emission Rates

For the construction phase, emitting activities were modeled to reflect the actual hours of the day that construction activity would occur. Two modeled scenarios were performed to account for varying construction hours by activity. In the first scenario, emissions were modeled as occurring between 7 AM and 5 PM, consistent with the expected construction hours for the Project (assuming the first hour of construction 6-7am would be used for site mobilization and safety meetings without heavy construction equipment in line with the City of Morgan Hill noise ordinance). The AERMOD EMISFACT option was used to limit emissions to this period. Emissions were also

[7] On October 12, 2023, USEPA released AERMOD Version 23132. However, AERMOD Version 22112 was the most recent version at the time of Draft EIR preparations, and the updates to the modeling software are minor and would not substantially affect results (USEPA 2023b).

modeled as occurring over 24 hours a day, given that several construction activities could occur over 20 and 24 hours per day.

In accordance with OEHHA guidance (OEHHA 2009), annual average concentrations were estimated and used to evaluate cancer risk, chronic non-cancer, and $PM_{2.5}$ impacts. Acute non-cancer impacts were estimated using the maximum 1-hour concentration.

For annual average ambient air concentrations over the construction phase, the estimated annual average dispersion factors were multiplied by the annual average emission rates. The emission rates would vary day to day, with some days having no emissions. To estimate an annual average, the model assumes a constant emission rate during the entire year. Thus, the average emission rates were calculated by taking the total mass of emissions and dividing by the hours considered in the model; equipment operating 10 hours per day was modeled at 10 hours, while equipment operating 20 or 24 hours per day was modeled at 24 hours.

For acute non-cancer hazard analyses, the estimated 1-hour maximum dispersion factors for each source group were used. These dispersion factors were multiplied by the maximum 1-hour emission rate to determine the maximum 1-hour concentration for a given source group. Note that because the maximum emissions for each group are not expected to occur during the same hour of the year, summing the maximum 1-hour concentrations across all source groups yields conservative (i.e., overestimates of) total air concentrations.

5.2.4 Source Parameters

5.2.4.1 Construction Sources

Source location and parameters are necessary to model the dispersion of air emissions. For construction, area sources were used to represent the on-site activity in AERMOD. The on-site construction exhaust sources were modeled as area sources with a release height of 5 meters (SCAQMD 2008) and an initial vertical dimension of 1.4 meters (SFDPH 2020). Fugitive dust sources from grading, demolition, and truck hauling during construction were modeled with a release height of 0 meters and an initial vertical dimension of 1 meter (SCAQMD 2008). Construction area source group locations are presented in **Figure 3** (Seismic Retrofit), **Figure 5** (Ogier Ponds Conservation Measure), **Figure 6** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Figure 7** (Sediment Augmentation Program).

Exhaust and fugitive dust emissions from heavy-duty haul and vendor trucks on roadways were modeled using volume sources. The modeled release height was 2.55 meters, the initial lateral dimension was the roadway width plus six meters divided by 2.15, and the initial vertical dimension was 2.37 meters, consistent with the USEPA haul road guidance (USEPA 2012). On-road construction worker trips would have negligible impact and therefore were not included in the HRA analysis for excess lifetime cancer risk and chronic HI. $PM_{2.5}$ emissions associated with on-road construction worker trips were included in the construction HRA analysis for $PM_{2.5}$ concentration modeling. Construction on-road source group locations are presented **Figure 3** (Seismic Retrofit), **Figure 5** (Ogier Ponds Conservation Measure), **Figure 6** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Figure 7** (Sediment Augmentation Program). Routes to the Sediment Augmentation Program for augmentation sites overlapping with Ogier Ponds Conservation Measure and the seismic retrofit were assumed to be the same routes used for each project component, respectively.

The Project generator used during seismic retrofit construction was modeled following the recommended default parameters specified in the BAAQMD CEQA Guidelines: as point sources with a release height of 3.7 meters above ground level, an exit temperature of 872 degrees Fahrenheit, an exit velocity of 45 meters per second, and an exit diameter of 0.18 meters (BAAQMD 2022a). Analysis assumes the generator would be located directly southeast of the dam.

5.2.5 Receptors

TAC concentrations were estimated at off-site sensitive receptor populations. As discussed in **Section 1.3.3**, sensitive receptors include areas with residents, schools, daycare centers, parks, hospitals and senior care facilities.

Residential areas were modeled as a grid with 20 meter (65.6 feet) spacing within 1,000 feet of the Project site and 50 meter spacing within 1,000 meters of the project site. Recreational areas and areas over water were modeled as a grid with 50 meter spacing.

Other sensitive receptor locations were identified using a report from Environmental Data Resources (EDR 2020). The EDR report identified schools, daycare centers, nursing homes and hospitals near the Project site. These locations were modeled as discrete locations.

Off-site receptors were modeled at the breathing height of 1.5 meters, consistent with BAAQMD Health Risk Assessment Protocol (BAAQMD 2020) and the BAAQMD CEQA Guidelines (BAAQMD 2022a).

Maximum average annual and 1-hour dispersion factors were estimated for each receptor location.

Receptor locations that were used in the HRA are depicted in **Figure 4** (Seismic Retrofit), **Figure 5** (Ogier Ponds Conservation Measure), **Figure 6** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Figure 7** (Sediment Augmentation Program).

5.2.6 Modeling for Conservation Measures

Concentrations of TACs associated with construction of the conservation measures were estimated using similar methodologies as the seismic retrofit construction. Details on the differences in methodology are provided below.

For the construction phase, emitting activities were modeled to reflect the actual hours of the day that construction activity would occur. Emissions from construction work areas were modeled as occurring between 6 AM and 6 PM, consistent with the expected construction hours for the conservation measures. The AERMOD EMISFACT option was used to limit emissions to this time period. The average emission rates were calculated by taking the total mass of emissions and dividing by the hours considered in the model (12 hours per day, 365 days per year).

TAC concentrations were estimated at off-site sensitive receptor populations. Residential areas were modeled as a grid with 20 meter (65.6 feet) spacing within 1,000 feet of the conservation measure sites. Routes were modeled within 1,000 feet of the conservation measure sites. **Figures 5, 6, and 7** include a map of receptor locations that were used in the HRA, for each conservation measure respectively.

6. HEALTH RISK ASSESSMENT

In February 2015, OEHHA released the updated Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015a), which combines information from previously released and adopted technical support documents to delineate OEHHA's revised risk assessment methodologies based on current science. The BAAQMD issued guidelines on adopting the OEHHA 2015 Guidance Manual (BAAQMD 2020) and has also incorporated the OEHHA Guidance into their CEQA Guidelines (BAAQMD 2022a). This evaluation utilizes the OEHHA 2015 methodology; details of which are discussed below.

6.1 Project Construction Sources Evaluated

Excess lifetime cancer risk, non-cancer chronic HI, and $PM_{2.5}$ concentration were evaluated for off-site sensitive receptor exposure to emissions from Proposed Project construction. Acute HI was evaluated for any off-site receptor which is accessible to the public. Construction source group locations are presented **Figure 3** (Seismic Retrofit), **Figure 5** (Ogier Ponds Conservation Measure), **Figure 6** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Figure 7** (Sediment Augmentation Program).

6.2 Exposure Assessment

Potentially Exposed Populations: This analysis evaluated off-site receptors potentially exposed to Project emissions from construction activities.

For cancer risk, chronic HI, and $PM_{2.5}$ concentration, impacts were evaluated at off-site sensitive receptors. All exposed populations were conservatively evaluated with residential exposure assumptions. In Ramboll's experience, residential receptors are conservative when analysing impacts at other non-residential locations, such as workplaces, due to the extended duration for which residents are exposed to air toxics.

Acute HI is evaluated based on the maximum hourly concentrations of acute toxicants estimated at off-site receptors. Because acute hazard requires only one hour of exposure, acute impacts were evaluated at any location which is anticipated to be accessible to the public.

Exposure Assumptions: The exposure parameters used to estimate excess lifetime cancer risks for all potentially exposed populations for the construction evaluation for this analysis were obtained using risk assessment guidelines from OEHHA (OEHHA 2015a) and BAAQMD (BAAQMD 2020). **Table 54** shows the proposed exposure parameters that were used for the HRA.

Calculation of Intake: The dose estimated for each exposure pathway is a function of the concentration of a chemical and the intake of that chemical. The intake factor for inhalation, IF_{inh}, can be calculated as follows:

$$IF_{inh} = \frac{DBR * FAH * EF * ED * CF}{AT}$$

Where:

IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
DBR	=	Daily Breathing Rate (L/kg-day)
FAH	=	Frequency of Time at Home (unitless)
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
AT	=	Averaging Time (days)
CF	=	Conversion Factor, 0.001 (m^3/L)

The chemical intake or dose was estimated by multiplying the inhalation intake factor, IF_{inh}, by the chemical concentration in air, C_i. When coupled with the chemical concentration, this calculation is mathematically equivalent to the dose algorithm given in the current OEHHA Hot Spots guidance (OEHHA 2015a).

6.2.1 Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure. For purposes of calculating exposure criteria to be used in risk assessments, adverse health effects are classified into two broad categories – cancer and non-cancer endpoints. Toxicity values that are used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the toxicity assessment component of a risk assessment.

Toxicity values for all TACs are consistent with OEHHA-approved values found in the HARP Air Dispersion Modeling and Risk Tool (CARB 2022).

6.2.2 Age Sensitivity Factors

The estimated excess lifetime cancer risks for a resident were adjusted using age sensitivity factors (ASFs) that account for an "anticipated special sensitivity to carcinogens" of infants and children as recommended in the OEHHA Technical Support Document (OEHHA 2009) and OEHHA 2015 Guidance (2015a). Cancer risk estimates were weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to two years of age and by a factor of three for exposures that occur from two years through 15 years of age. No weighting factor (i.e., an ASF of one, which is equivalent to no adjustment) was applied to ages 16 and older. **Table 55** presents the age sensitivity weighted intake factors by year and age bin by exposure scenario.

6.3 Risk Characterization

6.3.1 Estimation of Cancer Risks

Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF).

The equation that was used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

$$Risk_{inh} = C_i \times CF \times IF_{inh} \times CPF \times ASF$$

Where:

$Risk_{inh}$ = Cancer risk; the incremental probability of an individual developing cancer as a result of inhalation exposure to a particular potential carcinogen (unitless)

C_i = Annual average air concentration for $chemical_i$ ($\mu g/m^3$)

CF = Conversion factor ($mg/\mu g$)

IF_{inh} = Intake factor for inhalation (m^3/kg-day)

CPF_i = Cancer potency factor for $chemical_i$ (mg chemical/kg body weight-day)$^{-1}$

6.3.2 Estimation of Chronic Noncancer Hazard Indices

The potential for exposure to result in adverse chronic noncancer effects was evaluated by comparing the estimated annual average air concentration (which is equivalent to the average daily air concentration) to the

noncancer chronic reference exposure level (cREL) for each chemical. When calculated for a single chemical, the comparison yields a ratio termed a hazard quotient (HQ). To evaluate the chronic health effects from annual exposure to multiple chemicals, the chronic HQs for all chemicals are summed, yielding a chronic HI.

$$HQ_i = C_i / cREL$$

Where:

HQ_i = Chronic hazard quotient for chemical i

C_i = Annual average concentration of chemical i ($\mu g/m^3$)

$cREL_i$ = Chronic noncancer reference exposure level for chemical i ($\mu g/m^3$)

6.3.3 Estimation of Acute Noncancer Hazard Indices

The potential for exposure to result in adverse acute effects is evaluated by comparing the estimated one-hour maximum air concentration of chemical to the acute reference exposure level (aREL) for each chemical evaluated in this analysis. When calculated for a single chemical, the comparison yields an HQ. To evaluate the potential for adverse acute health effects from simultaneous exposure to multiple chemicals, the acute HQs for all chemicals are summed, yielding an acute HI.

$$HQ_i = C_i / aREL$$

Where:

HQ_i = Acute hazard quotient for chemical i

C_i = One-hour maximum concentration of chemical i ($\mu g/m^3$)

$aREL_i$ = Acute reference exposure level for chemical i ($\mu g/m^3$)

6.4 Comparison to CEQA Thresholds

Health impacts from the construction of each Project component (i.e., Seismic Retrofit, Ogier Ponds Conservation Measure, Sediment Augmentation Program, and Phase 2 Coyote Percolation Dam Conservation Measure) were compared to the BAAQMD CEQA thresholds discussed in **Section 1.3.3**. In addition, the combined health impacts from all Project components were also compared to the BAAQMD CEQA thresholds.

6.5 Health Risk Assessment Results

6.5.1 Impacts from the Project

HRA results are summarized in **Summary Tables K-O**. A breakdown of excess lifetime cancer risk, chronic HI, acute HI, and $PM_{2.5}$ concentration from Project construction is shown in **Table 56** (Seismic Retrofit), **Table 57** (Ogier Ponds Conservation Measure), **Table 58** (Phase 2 Coyote Percolation Dam Conservation Measure), and **Table 59** (Sediment Augmentation Program). These tables also show the year for which the maximum impact occurs for non-cancer chronic HI, acute HI, and $PM_{2.5}$ concentrations. Project maximally exposed individuals (MEI) are shown in **Figure 8**.

Summary Table K. Summary of Health Risk Assessment Results from the Seismic Retrofit

	Excess Lifetime Cancer Risk	**Chronic HI**	**Acute HI**	**$PM_{2.5}$ Concentration**
	(in a million)	(unitless)	(unitless)	($\mu g/m^3$)
BAAQMD Threshold of Significance	10	1	1	0.3
Unmitigated Risks	81	0.081	15	1.7[8]
Exceed Threshold?	**Yes**	No	**Yes**	**Yes**
Mitigated Risks	17	0.017	3.7	0.58
Exceed Threshold?	**Yes**	No	**Yes**	**Yes**
Source: Table 56				

Summary Table L. Summary of Health Risk Assessment Results from the Ogier Ponds Conservation Measure

	Excess Lifetime Cancer Risk	**Chronic HI**	**Acute HI**	**$PM_{2.5}$ Concentration**
	(in a million)	(unitless)	(unitless)	($\mu g/m^3$)
BAAQMD Threshold of Significance	10	1	1	0.3
Unmitigated Risks	2.8	0.012	0.0039	0.19
Exceed Threshold?	No	No	No	No
Mitigated Risks	0.8	0.0037	0.0039	0.065
Exceed Threshold?	No	No	No	No
Source: Table 57				

Summary Table M. Summary of Health Risk Assessment Results from the Phase 2 Coyote Percolation Dam Conservation Measure

	Excess Lifetime Cancer Risk	**Chronic HI**	**Acute HI**	**$PM_{2.5}$ Concentration**
	(in a million)	(unitless)	(unitless)	($\mu g/m^3$)
BAAQMD Threshold of Significance	10	1	1	0.3
Unmitigated Risks	0.26	0.0013	0.017	0.039
Exceed Threshold?	No	No	No	No
Mitigated Risks	0.064	0.00032	0.017	0.016
Exceed Threshold?	No	No	No	No
Source: Table 58				

[8] The unmitigated $PM_{2.5}$ concentration for the seismic retrofit construction was overestimated in the Draft EIR as 16 $\mu g/m^3$, as it was erroneously calculated using the maximum hourly emission rates. Had there not been this error, the concentration presented in the Draft EIR would have been 1.7 $\mu g/m^3$. Since $PM_{2.5}$ concentration is an annual standard, it has been corrected in this analysis to be calculated using average annual emission rates.

Summary Table N. Summary of Health Risk Assessment Results from the Sediment Augmentation Program

	Excess Lifetime Cancer Risk	Chronic HI	Acute HI	$PM_{2.5}$ Concentration
	(in a million)	(unitless)	(unitless)	($\mu g/m^3$)
BAAQMD Threshold of Significance	10	1	1	0.3
Unmitigated Risks	38	0.015	0.0064	0.304
Exceed Threshold?	**Yes**	No	No	**Yes**
Mitigated Risks	12	0.0039	0.0064	0.12
Exceed Threshold?	**Yes**	No	No	No
Source: Table 59				

Summary Table O. Summary of Health Risk Assessment Results from Overall Project Construction

	Excess Lifetime Cancer Risk	Chronic HI	Acute HI	$PM_{2.5}$ Concentration
	(in a million)	(unitless)	(unitless)	($\mu g/m^3$)
BAAQMD Threshold of Significance	10	1	1	0.3
Unmitigated Risks	82	0.094	15	1.7[9]
Exceed Threshold?	**Yes**	No	**Yes**	**Yes**
Mitigated Risks	21	0.021	3.7	0.64
Exceed Threshold?	**Yes**	No	**Yes**	**Yes**
Source: Table 60				

BAAQMD CEQA Guidelines establish a project-level incremental $PM_{2.5}$ concentration CEQA significance level of 0.3 micrograms per cubic meter ($\mu g/m^3$), based on an annual average. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) for also exist for $PM_{2.5}$. The $PM_{2.5}$ NAAQS include an annual average concentration of 12 $\mu g/m^3$ (based on the annual mean) and a 24-hour average concentration of 35 $\mu g/m^3$ (based on the 8th highest concentration for that averaging time).[10] The $PM_{2.5}$ CAAQS include an annual average concentration of 12 $\mu g/m^3$, but the State has not established a 24-hour average $PM_{2.5}$ CAAQS. Cumulative $PM_{2.5}$ concentrations due to seismic retrofit construction activities at the Project MEI are shown in **Summary Table P**; the concentrations associated with mitigated emissions from the seismic retrofit represent a small fraction of background and a small fraction of the NAAQS and CAAQS, which provides additional context of the fine particulate matter impacts.

[9] The unmitigated $PM_{2.5}$ concentration for the overall Project construction was overestimated in the Draft EIR as 16 $\mu g/m^3$, as it was erroneously calculated using the maximum hourly emission rates. Had there not been this error, the concentration presented in the Draft EIR would have been 1.7 $\mu g/m^3$. Since $PM_{2.5}$ concentration is an annual standard, it has been corrected in this analysis to be calculated using average annual emission rates.

[10] On February 7, 2024, USEPA lowered the NAAQS for fine particle pollution ($PM_{2.5}$) by revising the level of the primary (health-based) annual $PM_{2.5}$ standard to 9.0 $\mu g/m^3$. The effective date of the new standard was May 6, 2024. However, the 12.0 $\mu g/m^3$ standard was the standard at the time of Draft EIR preparation.

Summary Table P. Background Fine Particulate Matter Concentrations in the Project Area

Pollutant	Averaging Period	AAQS (µg/m³)	Form of Standard	Background Concentration[1] (µg/m³)	Unmitigated Seismic Retrofit Contribution at Project $PM_{2.5}$ MEI[2] (µg/m³)	Mitigated Seismic Retrofit Contribution at Project $PM_{2.5}$ MEI[2,3] (µg/m³)
$PM_{2.5}$	24-Hour	35 (NAAQS)	8th Highest Maximum Concentration	32	10.3	1.32
$PM_{2.5}$	Annual	12.0 (NAAQS CAAQS)	Annual Mean	10.3	1.0	0.48

[1] Background concentrations are USEPA design values from 2019-2021 for the monitor located at San Jose – Knox, the closest $PM_{2.5}$ monitor to the Project area.

[2] Emission rates modeled as emissions in lb/year converted to g/s for 365 days (for comparison to the annual NAAQS) and for a typical day in Year 4 (the seismic retrofit construction year of maximum mitigated $PM_{2.5}$ emissions) and Year 6 (the seismic retrofit construction year of maximum unmitigated $PM_{2.5}$ emissions). Emission rates conservatively include fugitive $PM_{2.5}$. The seismic retrofit construction contribution was evaluated at the Project $PM_{2.5}$ MEI.

[3] Due to the Project changes, the seismic retrofit construction year of maximum mitigated PM2.5 emissions has changed from Year 6 in the Draft EIR to Year 4 in this analysis. PM2.5 concentrations are not only dependent on emissions, but also the source locations and activities for a given year. Therefore, even though the total emissions increased compared to the Draft EIR, the mitigated 24-hour 8th highest maximum PM2.5 concentration decreased due to the other factors (i.e., geographical distribution and magnitude of emissions in a given year) associated with the change in the year of maximum emissions.

7. CUMULATIVE ANALYSIS

Consistent with the BAAQMD CEQA guidelines, the combined impacts from off-site sources were evaluated within the "zone of influence" of the Project. Off-site sources include BAAQMD permitted stationary sources, roadways, and railways.

The cumulative impact for the HRA was evaluated at the MEI for Project construction, which includes seismic retrofit, Ogier Ponds Conservation Measure, Phase 2 Coyote Percolation Dam Conservation Measure, and Sediment Augmentation Program. The MEI is the receptor with the highest incremental cancer risk, chronic HQ, and $PM_{2.5}$ concentration from the Project across all populations and exposure scenarios.

Health impacts from all identified sources within 1,000 feet of the Project MEI were evaluated at this single location and added to the results from the Project's impacts. The sources that were considered in this analysis are described below.

Results at the MEI were compared to the significance thresholds for cumulative impacts:

- An excess lifetime cancer risk level of more than 100 in one million;
- A chronic non-cancer HI greater than 10; and
- An incremental increase in the annual average $PM_{2.5}$ concentration of greater than 0.8 µg/m^3.

7.1 Stationary Sources

BAAQMD provides a stationary source GIS map tool to use to evaluate the impacts of off-site stationary sources (BAAQMD 2023c). Consistent with BAAQMD guidance, a request was sent to BAAQMD to provide the emissions from nearby stationary sources within 1,000 feet of the Project boundary. No stationary sources were found within 1,000 feet of any maximally impacted receptors.

7.2 Roadway Sources

To evaluate potential health risk impacts from existing traffic on major roadways and highways, BAAQMD provides raster files of health impacts (BAAQMD 2022b). Ramboll pulled the corresponding excess lifetime cancer risk, chronic HI, and $PM_{2.5}$ concentration values for the MEI from the raster file. The BAAQMD tool represents the impact from the background traffic on the roadways. These tools were used to estimate cancer risk, chronic HI, and $PM_{2.5}$ concentrations from vehicle travel on major roadways and highways surrounding the Project. The tools developed by BAAQMD are based on EMFAC2021, traffic data from 2019, and an operational start year of 2022. They represent a conservative estimate of health impacts, largely due to the reduction in emissions of the vehicle fleet between 2022 and when project construction will occur. The primary roadway source near the Project is Interstate 101.

7.3 Railway Sources

BAAMQD provides raster files with health impacts from railways (BAAQMD 2022b).[11] Caltrain is over 1,000 feet from the Project. The health impacts from the raster file were used to estimate the potential impact from railways at the MEIs, and it was determined that railway emissions do not contribute to health risks at the MEIs.

7.4 Cumulative Summary

As described above, nearby relevant cumulative sources include highways, streets, and railways. Impacts from these cumulative sources are combined with Project construction impacts at the off-site Project MEI. A summary of

[11] These include diesel locomotives used to transport freight along Class I rail lines, to transport people along commuter/passenger rail lines, and for goods movements at railyards in West Oakland and Richmond/North Richmond/San Pablo.

cumulative impacts at the Project MEI is shown in **Summary Table Q** below. Additional details can be found in **Table 61**.

Summary Table Q. Summary of Cumulative Health Risk Assessment Results

	BAAQMD Threshold of Significance	Mitigated	
		MEI	*Exceed Threshold?*
Excess Lifetime Cancer Risk (in a million)	100	21	*No*
Chronic HI	10	0.022	*No*
$PM_{2.5}$ Concentration ($\mu g/m^3$)	0.8	0.65	*No*
Source: Table 61			

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TABLES

Table 1
Construction Years
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Calendar Year[1]	Project Year
2024	Year 1
2025	Year 2
2026	Year 3
2027	Year 4
2028	Year 5
2029	Year 6
2030	Year 7
2031	Year 8
2032	Year 9
2033	Year 10
2034	Year 11
2035	Year 12
2036	Year 13
2037	Year 14
2038	Year 15

Notes:

1. The calendar years listed are subject to change and may not be representative of the final project. Estimating emissions from these calendar years is conservative, as fleet emissions will become cleaner in later years.

Table 2
Construction Phasing Schedule
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Year	Construction Activity	Start Date	End Date	Calendar Year	Number of Days[2]
Year 1	Miscellaneous Activities	3/4/2024	12/31/2024	2024	272
	Construction of the Haul Roads and Preparation of Stockpile Areas	3/4/2024	7/4/2024	2024	118
	Dredging at Dam Toe	3/4/2024	7/31/2024	2024	141
	Upstream Shaft excavation	4/1/2024	8/30/2024	2024	143
	Excavate upstream portal	6/23/2024	8/30/2024	2024	69
	Tunnel excavation	9/2/2024	12/20/2024	2024	107
	Tunnel lining	11/4/2024	11/29/2024	2024	26
Year 2 (Stage 1a)	Miscellaneous Activities	1/1/2025	12/31/2025	2025	325
	Construct cofferdam	1/1/2025	2/1/2025	2025	32
	Construct bypass pump system and diversion extension pipe	1/1/2025	3/16/2025	2025	75
	Conveying bypass flows to the Stage 1 Diversion Systems	1/1/2025	8/1/2025	2025	195
	Excavate downstream portal	1/1/2025	5/1/2025	2025	116
	Installation and operating the Water Treatment System	1/1/2025	12/31/2025	2025	325
	Stage 1a excavation (incl. work at stockpile areas & reservoir disposal)	1/1/2025	7/1/2025	2025	168
	Tunnel excavation	1/1/2025	3/1/2025	2025	60
	Tunnel lining	1/1/2025	2/16/2025	2025	47
	Construction of intake structure following LLOT lining	1/1/2025	3/1/2025	2025	60
	Demolish accl bld, inst., dam crest paving, exst intake&outlet struct	1/1/2025	4/16/2025	2025	103
Year 3 (Stage 1b)	Miscellaneous Activities	1/1/2026	12/31/2026	2026	325
	Stage 1b excavation (incl. work at stockpile areas & reservoir disposal)	1/1/2026	8/1/2026	2026	195
	Construction of the tie-back wall at Cochrane Road	1/1/2026	3/16/2026	2026	75
	Demolish existing spillway	1/1/2026	10/1/2026	2026	247
	Excavation and foundation preparation	1/1/2026	4/1/2026	2026	90
	HLOW and Access Adit portal excavation	1/1/2026	7/1/2026	2026	168
	HLOW Tunnel and Access Adit Tunnel excavation	1/1/2026	7/1/2026	2026	168
	HLOW Tunnel and Access Adit lining	1/1/2026	6/1/2026	2026	142
	Construction of intake structure, concrete encasement	1/1/2026	5/1/2026	2026	116
	Gate Shaft excavation	1/1/2026	3/1/2026	2026	60
	Gate Shaft lining	1/1/2026	3/16/2026	2026	75
	Installation and operating the Water Treatment System	1/1/2026	12/31/2026	2026	325
Year 4	Miscellaneous Activities	1/1/2027	12/31/2027	2027	353
	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	1/1/2027	11/1/2027	2027	301
	Stage 2a excavation (incl. work at stockpile areas & reservoir disposal)	1/1/2027	4/16/2027	2027	106
	Stage 2b Fill (incl. work at stockpile areas & reservoir disposal)	1/1/2027	6/16/2027	2027	167
	Excavation and foundation preparation	1/1/2027	12/31/2027	2027	353
	Construction of spillway structure	1/1/2027	10/1/2027	2027	274
	Pipe, mechanical and electrical installation	1/1/2027	5/1/2027	2027	121
	Installation and operating the Water Treatment System	1/1/2027	12/31/2027	2027	353
Year 5 (Stage 3a)	Miscellaneous Activities	1/1/2028	12/31/2028	2028	325
	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	1/1/2028	11/1/2028	2028	274
	Stage 3a Fill (incl. work at stockpile areas & reservoir disposal)	1/1/2028	7/1/2028	2028	169
	Preparation, excavation, blasting, and hauling of material	1/1/2028	12/1/2028	2028	300
	Strip sediment, excavate test trenches	1/1/2028	2/16/2028	2028	47
	Construction of spillway structure	1/1/2028	10/1/2028	2028	247
	Excavate sloping intake structure (upper half)	1/1/2028	2/16/2028	2028	47
	Construction of sloping intake structure (upper half)	1/1/2028	6/1/2028	2028	143
	Construction of CIP tunnel and outlet structure	1/1/2028	7/1/2028	2028	169
	Excavate downstream portal trench and outlet structure foundation	1/1/2028	4/1/2028	2028	91
	Pipe, mechanical and electrical installation	1/1/2028	3/16/2028	2028	76
	Connection of the Pipeline and Force Main to the LLOW outlet structure	1/1/2028	2/16/2028	2028	47
	Installation and operating the Water Treatment System	1/1/2028	12/31/2028	2028	325
Year 6 (Stage 3b)	Miscellaneous Activities	1/1/2029	12/31/2029	2029	325
	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	1/1/2029	11/1/2029	2029	274
	Construct bypass pump system	1/1/2029	2/1/2029	2029	32
	Conveying bypass flows to the Stage 1 Diversion Systems	1/1/2029	8/1/2029	2029	195
	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	1/1/2029	7/1/2029	2029	168
	Excavation, blasting, and hauling of material	1/1/2029	5/1/2029	2029	116
	Excavation, hauling & moisture conditioning	1/1/2029	5/1/2029	2029	116
	Excavate sloping intake structure (lower half)	1/1/2029	2/1/2029	2029	32
	Construction of sloping intake structure (lower half)	1/1/2029	4/1/2029	2029	90
	Pipe, mechanical and electrical installation	1/1/2029	5/1/2029	2029	116
	Demolish diversion intake structure	1/1/2029	2/1/2029	2029	32
	Construct pipe supports, lining at Diversion Tunnel/LLOT intersection	1/1/2029	3/1/2029	2029	60
	Pipe, mechanical and electrical installation	1/1/2029	5/1/2029	2029	116
	Excavation and foundation preparation	1/1/2029	4/1/2029	2029	90
	Installation and operating the Water Treatment System	1/1/2029	12/31/2029	2029	325
Year 7	Miscellaneous Activities	1/1/2030	11/25/2030	2030	294
	Construction of concrete lined channel	1/1/2030	10/1/2030	2030	247
	Restoring parking areas and construction of permanent access roads	1/1/2030	10/1/2030	2030	247
	Allowance - scope to be determined	1/1/2030	10/1/2030	2030	247

Notes:

1. Construction schedule and phasing information were provided by Valley Water.

2. Project construction will generally occur on Mondays through Saturdays between the hours of 7 AM and 5 PM. Additional construction workdays are included for up to 12 Sundays each year for all years except for Year 4. Year 4 construction activity includes up to 40 Sundays.

Table 3
Construction Equipment List
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Project Component	Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Miscellaneous Activities	Miscellaneous Activities	Year 1	9	Medium excavator	Diesel	0.5	1	172	10
		Year 1	9	Loader	Diesel	0.5	1	298	10
		Year 1	9	Light truck - Forman	Gasoline	1	1	290	10
		Year 1	9	Light truck - Crew	Gasoline	1	1	290	10
Haul Roads and Stockpile Area preparations	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	5	Medium Bulldozer	Diesel	0.9	2	354	10
		Year 1	5	Medium excavator	Diesel	0.9	2	273	10
		Year 1	5	Motor grader	Diesel	0.9	1	290	10
		Year 1	5	Track drill rig	Diesel	0.9	2	201	10
		Year 1	5	Light truck - Forman	Gasoline	0.9	3	290	10
		Year 1	5	Light truck - Crew	Gasoline	0.9	1	290	10
		Year 1	5	Articulated dump truck	Diesel	0.9	2	496	10
		Year 1	5	Water truck	Diesel	0.9	2	330	10
		Year 1	5	Pump for water trucks	Diesel	1	1	74	10
		Year 1	5	Loader	Diesel	0.9	1	298	10
Dam Foundation Excavation	Dredging at Dam Toe	Year 1	5	Light truck - Personnel	Gasoline	0.9	3	290	10
		Year 1	5	Boat - 30' Work Boat	Gasoline	0.9	1	400	10
		Year 1	5	Boat - 16' Whaler	Gasoline	0.9	1	115	10
		Year 1	5	Boat - 16' Skiff	Gasoline	0.9	1	40	10
		Year 1	5	Crane - 275t	Diesel	0.9	1	228	10
		Year 1	5	Crane - 70t	Diesel	0.9	1	160	10
		Year 1	5	Modular Barge	N/A	0.9	9	0	10
		Year 1	5	Modular Barge	N/A	0.9	2	0	10
		Year 1	5	Dredge Pump	Diesel	0.9	1	150	10
LLOW	Upstream Shaft excavation	Year 1	4	Crane 150t	Diesel	0.7	1	300	20
		Year 1	4	Small backhoe	Diesel	0.7	1	70	20
		Year 1	4	Jacklegs	Air	0.7	2	-	20
		Year 1	4	Track drill rig	Diesel	0.7	1	201	10
		Year 1	4	Compressor	Diesel	0.7	1	173	20
		Year 1	4	Shotcrete batch plant	Diesel	0.7	1	75	20
		Year 1	4	Loader	Diesel	0.7	1	298	20
		Year 1	4	Telehandler	Diesel	0.7	1	110	20
		Year 1	4	Pump	Diesel	1	1	17	24
		Year 1	4	Ventilation fan	Electrical	1	1	-	24
		Year 1	4	Generator (80 kW)	Diesel	1	1	152	24
		Year 1	4	Articulated dump truck	Diesel	0.7	1	496	20
		Year 1	4	Light truck - Forman	Gasoline	1	1	290	20
		Year 1	4	Light truck - Crew	Gasoline	1	1	290	20
		Year 1	4	No Equipment - Crew	-	1	-	-	20
	Excavate upstream portal	Year 1	2	Large excavator	Diesel	0.9	1	410	10
		Year 1	2	Track drill rig	Diesel	0.7	1	201	10
		Year 1	2	Compressor	Diesel	0.7	1	173	10
		Year 1	2	Loader	Diesel	0.7	1	298	10
		Year 1	2	Manlift	Diesel	0.7	1	67	10
		Year 1	2	Pump	Diesel	1	1	17	10
		Year 1	2	Generator (80 kW)	Diesel	1	1	152	24
		Year 1	2	Articulated dump truck	Diesel	0.9	2	496	10
		Year 1	2	Light truck - Forman	Gasoline	1	1	290	10
		Year 1	2	Light truck - Crew	Gasoline	1	1	290	10
		Year 1	2	No Equipment - Crew	-	1	-	-	10
	Tunnel excavation	Year 1	3	Compressor	Diesel	0.7	1	173	20
		Year 1	3	Bobcat	Diesel	0.7	1	68	20
		Year 1	3	Shotcrete batch plant	Diesel	0.7	1	50	20
		Year 1	3	Loader	Diesel	0.7	1	298	20
		Year 1	3	Telehandler	Diesel	0.7	1	110	20
		Year 1	3	Pump	Diesel	1	1	17	24
		Year 1	3	Ventilation fan	Electrical	1	1	-	24
		Year 1	3	Road-header	Electrical	0.7	1	-	20
		Year 1	3	Robotic shotcrete machine	Diesel	0.7	1	27	20
		Year 1	3	Scooptrams	Diesel	0.7	1	250	20
		Year 1	3	Generator (80 kW)	Diesel	1	1	152	24
		Year 1	3	Articulated dump truck	Diesel	0.7	1	496	20
		Year 1	3	Light truck - Forman	Gasoline	1	1	290	20
		Year 1	3	Light truck - Crew	Gasoline	1	1	290	20
		Year 1	3	No Equipment - Crew	-	1	-	-	20
	Tunnel lining	Year 1	1	Concrete pump truck	Diesel	0.7	1	500	20
		Year 1	1	Compressor	Diesel	0.7	1	173	20
		Year 1	1	Bobcat	Diesel	0.7	1	68	20
		Year 1	1	Loader	Diesel	0.5	1	298	20
		Year 1	1	Telehandler	Diesel	0.7	1	110	20
		Year 1	1	Pump	Diesel	1	1	17	24
		Year 1	1	Ventilation fan	Electrical	1	1	-	20
		Year 1	1	Welder	Diesel	0.7	1	66	20
		Year 1	1	Concrete vibrator	Gasoline	0.7	2	6.5	20
		Year 1	1	Generator (80 kW)	Diesel	1	1	152	24
		Year 1	1	Light truck - Forman	Gasoline	1	1	290	20
		Year 1	1	Light truck - Crew	Gasoline	1	2	290	20
		Year 1	1	No Equipment - Crew	-	0.7	-	-	20

Table 3
Construction Equipment List
Anderson Dam Seismic Retrofit
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Project Component	Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Miscellaneous Activities	Miscellaneous Activities	Year 2	12	Medium excavator	Diesel	0.5	1	172	10
		Year 2	12	Loader	Diesel	0.5	1	298	10
		Year 2	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 2	12	Light truck - Crew	Gasoline	1	1	290	10
Cofferdam	Construct Cofferdam	Year 2	1	Long-reach excavator	Diesel	0.8	1	424	20
		Year 2	1	Track drill rig	Diesel	0.3	1	201	20
		Year 2	1	Crane 150t	Diesel	0.3	1	300	20
		Year 2	1	Vibratory sheetpile driver	Diesel	0.3	1	654	20
		Year 2	1	Welder	Diesel	0.3	1	66	20
		Year 2	1	Concrete vibrator	Gasoline	0.3	2	6.5	20
		Year 2	1	Generator (80 kW)	Diesel	1	1	152	20
		Year 2	1	Concrete pump truck	Diesel	0.3	1	500	20
		Year 2	1	Light truck - Forman	Gasoline	1	1	290	20
		Year 2	1	Light truck - Crew	Gasoline	1	1	290	20
Bypass Pump System and Extension Pipe	Construct bypass pump system and diversion extension pipe	Year 2	2.5	Medium excavator	Diesel	1	1	273	10
		Year 2	2.5	Loader	Diesel	0.3	1	298	10
		Year 2	2.5	Vibratory plate	Diesel	0.3	1	15.7	10
		Year 2	2.5	Tamper	Gasoline	0.3	1	3.5	10
		Year 2	2.5	Welder	Diesel	0.5	1	66	10
		Year 2	2.5	Pump	Diesel	1	1	17	10
		Year 2	2.5	Generator (80 kW)	Diesel	1	1	152	10
		Year 2	2.5	Articulated dump truck	Diesel	0.5	1	496	10
		Year 2	2.5	Light truck - Forman	Gasoline	1	1	290	10
		Year 2	2.5	Light truck - Crew	Gasoline	1	1	290	10
Bypass Pump System	Conveying bypass flows to the Stage 1 Diversion Systems	Year 2	7	15 cfs capacity pump	Diesel	1	2	900	24
		Year 2	7	Backup 15 cfs capacity pump	Diesel	0	2	900	24
		Year 2	7	Site generator (2,000 kW)	Diesel	0	1	2700	24
HLOW	Excavate downstream portal	Year 2	4	Large excavator	Diesel	0.9	1	410	10
		Year 2	4	Track drill rig	Diesel	0.7	1	201	10
		Year 2	4	Compressor	Diesel	0.7	1	173	10
		Year 2	4	Loader	Diesel	0.7	1	298	10
		Year 2	4	Manlift	Diesel	0.7	1	67	10
		Year 2	4	Pump	Diesel	1	1	17	10
		Year 2	4	Generator (80 kW)	Diesel	1	1	152	10
		Year 2	4	Articulated dump truck	Diesel	0.9	2	496	10
		Year 2	4	Light truck - Forman	Gasoline	1	1	290	10
		Year 2	4	Light truck - Crew	Gasoline	1	1	290	10
Water Treatment System	Installation and operating the Water Treatment System	Year 2	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 2	12	Light truck - Crew	Gasoline	1	1	290	10
Dam	Stage 1a excavation (incl. work at stockpile areas & reservoir disposal)	Year 2	6	Large excavator	Diesel	1	1	810	20
		Year 2	6	Large excavator	Diesel	1	1	410	20
		Year 2	6	Medium excavator	Diesel	1	2	273	20
		Year 2	6	Motor grader	Diesel	1	1	290	20
		Year 2	6	Loader	Diesel	1	2	298	20
		Year 2	6	Bulldozer	Diesel	1	1	722	20
		Year 2	6	Bulldozer w/discs	Diesel	1	3	354	20
		Year 2	6	Bulldozer	Diesel	1	4	354	20
		Year 2	6	Bulldozer	Diesel	1	2	215	20
		Year 2	6	Grizzly to screen transition	Diesel	1	1	200	20
		Year 2	6	Generator (80 kW)	Diesel	1	1	152	20
		Year 2	6	Large rigid-body dump truck	Diesel	1	6	719	20
		Year 2	6	Articulated dump truck	Diesel	1	9	496	20
		Year 2	6	Water truck	Diesel	1	5	330	20
		Year 2	6	Pump for water trucks	Diesel	1	1	74	10
		Year 2	6	Light plant for night work	Diesel	0.5	14	25	20
		Year 2	6	Light truck - Forman	Gasoline	1	5	290	20
		Year 2	6	Light truck - Crew	Gasoline	1	2	290	20
LLOW	Tunnel excavation	Year 2	2	Compressor	Diesel	0.7	1	173	20
		Year 2	2	Bobcat	Diesel	0.7	1	68	20
		Year 2	2	Loader	Diesel	0.7	1	298	20
		Year 2	2	Telehandler	Diesel	0.7	1	110	20
		Year 2	2	Pump	Diesel	1	1	17	24
		Year 2	2	Ventilation fan	Electrical	1	1	-	24
		Year 2	2	Road-header	Electrical	0.7	1	-	20
		Year 2	2	Scooptrams	Diesel	0.7	1	250	20
		Year 2	2	Generator (80 kW)	Diesel	1	1	152	24
		Year 2	2	Articulated dump truck	Diesel	0.7	1	496	20
		Year 2	2	Light truck - Forman	Gasoline	1	1	290	20
		Year 2	2	Light truck - Crew	Gasoline	1	1	290	20
		Year 2	2	No Equipment - Crew	-	1	-	-	20
	Tunnel lining	Year 2	1.5	Concrete pump truck	Diesel	0.7	1	500	20
		Year 2	1.5	Compressor	Diesel	0.7	1	173	20
		Year 2	1.5	Bobcat	Diesel	0.7	1	68	20
		Year 2	1.5	Loader	Diesel	0.5	1	298	20
		Year 2	1.5	Telehandler	Diesel	0.7	1	110	20
		Year 2	1.5	Pump	Diesel	1	1	17	24
		Year 2	1.5	Ventilation fan	Electrical	1	1	-	20
		Year 2	1.5	Welder	Diesel	0.7	1	66	20
		Year 2	1.5	Concrete vibrator	Gasoline	0.7	2	6.5	20
		Year 2	1.5	Generator (80 kW)	Diesel	1	1	152	24
		Year 2	1.5	Light truck - Forman	Gasoline	1	1	290	20
		Year 2	1.5	Light truck - Crew	Gasoline	1	2	290	20

Table 3
Construction Equipment List
Anderson Dam Seismic Retrofit
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Project Component	Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Diversion Intake Structure	Construction of intake structure following LLOT lining	Year 2	2	Concrete pump truck	Diesel	0.7	1	500	10
		Year 2	2	Compressor	Diesel	0.7	1	173	10
		Year 2	2	Bobcat	Diesel	0.7	1	68	10
		Year 2	2	Loader	Diesel	0.7	1	298	10
		Year 2	2	Manlift	Diesel	0.7	1	67	10
		Year 2	2	Crane 150t	Diesel	0.7	1	300	10
		Year 2	2	Welder	Diesel	0.7	1	66	10
		Year 2	2	Concrete vibrator	Gasoline	0.7	2	6.5	10
		Year 2	2	Generator (80 kW)	Diesel	1	1	152	10
		Year 2	2	Light truck - Forman	Gasoline	1	1	290	10
		Year 2	2	Light truck - Crew	Gasoline	1	1	290	10
Year 2 Demolition	Demolish accl bld, inst., dam crest paving, exst intake&outlet struct	Year 2	3.5	Medium excavator	Diesel	0.7	2	273	10
		Year 2	3.5	Bulldozer	Diesel	0.5	1	354	10
		Year 2	3.5	Loader	Diesel	1	1	298	10
		Year 2	3.5	Compressor	Diesel	0.7	2	173	10
		Year 2	3.5	Jackhammer	gasoline	0.7	2	2.4	10
		Year 2	3.5	Generator (80 kW)	Diesel	1	1	152	10
		Year 2	3.5	Water truck	Diesel	0.7	1	330	10
		Year 2	3.5	Light truck - Forman	Gasoline	1	1	290	10
		Year 2	3.5	Light truck - Crew	Gasoline	1	1	290	10
Miscellaneous Activities	Miscellaneous Activities	Year 3	12	Medium excavator	Diesel	0.5	1	172	10
		Year 3	12	Loader	Diesel	0.5	1	298	10
		Year 3	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 3	12	Light truck - Crew	Gasoline	1	1	290	10
Dam	Stage 1b excavation (incl. work at stockpile areas & reservoir disposal)	Year 3	7	Large excavator	Diesel	1	1	810	20
		Year 3	7	Large excavator	Diesel	1	1	410	20
		Year 3	7	Medium excavator	Diesel	1	2	273	20
		Year 3	7	Motor grader	Diesel	1	1	290	20
		Year 3	7	Loader	Diesel	1	2	298	20
		Year 3	7	Bulldozer	Diesel	1	1	722	20
		Year 3	2	Bulldozer w/discs	Diesel	1	2	354	20
		Year 3	7	Bulldozer	Diesel	1	4	354	20
		Year 3	7	Bulldozer	Diesel	1	2	215	20
		Year 3	-	Grizzly to screen transition	Diesel	-	1	200	20
		Year 3	7	Generator (80 kW)	Diesel	1	1	152	20
		Year 3	7	Pump	Diesel	0.5	2	17	24
		Year 3	7	Large rigid-body dump truck	Diesel	1	6	719	20
		Year 3	7	Articulated dump truck	Diesel	1	6	496	20
		Year 3	2	Padfoot roller	Diesel	1	2	174	20
		Year 3	2	Tamping foot roller	Diesel	1	1	405	20
		Year 3	7	Water truck	Diesel	1	5	330	20
		Year 3	7	Pump for water trucks	Diesel	1	1	74	10
		Year 3	7	Light plant for night work	Diesel	0.5	9	25	20
		Year 3	7	Light truck - Forman	Gasoline	1	4	290	20
		Year 3	7	Light truck - Crew	Gasoline	1	2	290	20
Tie-back Wall at Cochrane Road	Construction of the tie-back wall at Cochrane Road	Year 3	2.5	Medium excavator	Diesel	0.5	2	410	10
		Year 3	2.5	Track drill rig	Diesel	0.5	2	201	10
		Year 3	2.5	Compressor	Diesel	0.5	1	173	10
		Year 3	2.5	Shotcrete batch plant	-	0.5	-	-	10
		Year 3	2.5	Concrete pump truck	Diesel	0.5	1	500	10
		Year 3	2.5	Manlift	Diesel	0.5	1	67	10
		Year 3	2.5	Generator (80 kW)	Diesel	1	1	152	10
		Year 3	2.5	Articulated dump truck	-	0.5	-	-	10
		Year 3	2.5	Light truck - Forman	Gasoline	1	1	290	10
		Year 3	2.5	Light truck - Crew	Gasoline	1	1	290	10
Spillway	Demolish existing spillway	Year 3	9	Excavator-mounted hoe-ram	Diesel	0.5	1	273	10
		Year 3	9	Medium excavator	Diesel	0.9	1	273	10
		Year 3	9	Loader	Diesel	0.5	1	298	10
		Year 3	9	Compressor	Diesel	0.9	2	173	10
		Year 3	9	Jackhammer	gasoline	0.9	2	2.4	10
		Year 3	9	Generator (80 kW)	Diesel	0.9	1	152	10
		Year 3	9	Water truck	Diesel	0.9	1	330	10
		Year 3	9	Light truck - Forman	Gasoline	1	1	290	10
		Year 3	9	Light truck - Crew	Gasoline	1	1	290	10
	Excavation and foundation preparation	Year 3	3	Articulated dump truck	Diesel	0.25	1	496	10
		Year 3	3	Medium excavator	Diesel	0.7	1	273	10
		Year 3	3	Mini excavator	Diesel	0.7	1	45	10
		Year 3	3	Track drill rig	Diesel	0.7	2	201	10
		Year 3	3	Compressor	Diesel	0.7	1	173	10
		Year 3	3	Loader	Diesel	0.7	1	298	10
		Year 3	3	Pump	Diesel	1	1	17	10
		Year 3	3	Generator (80 kW)	Diesel	1	1	152	10
		Year 3	3	Water truck	Diesel	0.5	1	330	10
		Year 3	3	Light truck - Forman	Gasoline	1	1	290	10
		Year 3	3	Light truck - Crew	Gasoline	1	1	290	10

Table 3
Construction Equipment List
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Project Component	Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
HLOW	HLOW and Access Adit portal excavation	Year 3	6	Large excavator	Diesel	0.9	1	410	10
		Year 3	6	Track drill rig	Diesel	0.7	2	201	10
		Year 3	6	Compressor	Diesel	0.7	1	173	10
		Year 3	6	Loader	Diesel	0.7	1	298	10
		Year 3	6	Manlift	Diesel	0.7	1	67	10
		Year 3	6	Pump	Diesel	1	1	17	10
		Year 3	6	Generator (80 kW)	Diesel	1	1	152	10
		Year 3	6	Articulated dump truck	Diesel	0.9	2	496	10
		Year 3	6	Light truck - Forman	Gasoline	1	1	290	10
		Year 3	6	Light truck - Crew	Gasoline	1	1	290	10
	HLOW Tunnel and Access Adit Tunnel excavation	Year 3	6	Compressor	Diesel	0.7	1	173	20
		Year 3	6	Bobcat	Diesel	0.7	1	68	20
		Year 3	6	Shotcrete batch plant	Diesel	0.7	1	50	20
		Year 3	6	Loader	Diesel	0.7	1	298	20
		Year 3	6	Telehandler	Diesel	0.7	1	110	20
		Year 3	6	Pump	Diesel	1	1	17	24
		Year 3	6	Ventilation fan	Electrical	1	1	-	24
		Year 3	6	Road-header	Electrical	0.7	1	-	20
		Year 3	6	Robotic shotcrete machine	Diesel	0.7	1	27	20
		Year 3	6	Scooptrams	Diesel	0.7	1	250	20
		Year 3	6	Generator (80 kW)	Diesel	1	1	152	24
		Year 3	6	Articulated dump truck	Diesel	0.7	1	496	20
		Year 3	6	Light truck - Forman	Gasoline	1	1	290	20
		Year 3	6	Light truck - Crew	Gasoline	1	1	290	20
	HLOW Tunnel and Access Adit lining	Year 3	5	Concrete pump truck	Diesel	0.7	1	500	20
		Year 3	5	Compressor	Diesel	0.7	1	173	20
		Year 3	5	Bobcat	Diesel	0.7	1	68	20
		Year 3	5	Loader	Diesel	0.5	1	298	20
		Year 3	5	Telehandler	Diesel	0.7	1	110	20
		Year 3	5	Pump	Diesel	1	1	17	24
		Year 3	5	Ventilation fan	Electrical	1	1	-	20
		Year 3	5	Welder	Diesel	0.7	1	66	20
		Year 3	5	Concrete vibrator	Gasoline	0.7	2	6.5	20
		Year 3	5	Generator (80 kW)	Diesel	1	1	152	24
		Year 3	5	Light truck - Forman	Gasoline	1	1	290	20
		Year 3	5	Light truck - Crew	Gasoline	1	2	290	20
	Construction of intake structure, concrete encasement	Year 3	4	Concrete pump truck	Diesel	0.7	1	500	10
		Year 3	4	Compressor	Diesel	0.7	1	173	10
		Year 3	4	Bobcat	Diesel	0.7	1	68	10
		Year 3	4	Loader	Diesel	0.7	1	298	10
		Year 3	4	Manlift	Diesel	0.7	1	67	10
		Year 3	4	Crane 150t	Diesel	0.7	1	300	10
		Year 3	4	Welder	Diesel	0.7	1	66	10
		Year 3	4	Concrete vibrator	Gasoline	0.7	2	6.5	10
		Year 3	4	Generator (80 kW)	Diesel	1	1	152	10
		Year 3	4	Light truck - Forman	Gasoline	1	1	290	10
		Year 3	4	Light truck - Crew	Gasoline	1	2	290	10
	Gate Shaft excavation	Year 3	2	Crane 150t	Diesel	0.7	1	300	20
		Year 3	2	Small backhoe	Diesel	0.7	1	70	20
		Year 3	2	Jacklegs	Air	0.7	2	-	20
		Year 3	2	Compressor	Diesel	0.7	1	173	20
		Year 3	2	Shotcrete batch plant	Diesel	0.7	1	75	20
		Year 3	2	Loader	Diesel	0.7	1	298	20
		Year 3	2	Telehandler	Diesel	0.7	1	110	20
		Year 3	2	Pump	Diesel	1	1	17	24
		Year 3	2	Ventilation fan	Electrical	1	1	-	24
		Year 3	2	Generator (80 kW)	Diesel	1	1	152	24
		Year 3	2	Articulated dump truck	Diesel	0.7	1	496	20
		Year 3	2	Light truck - Forman	Gasoline	1	1	290	20
		Year 3	2	Light truck - Crew	Gasoline	1	1	290	20
		Year 3	2	No Equipment - Crew	-	1	-	-	20
	Gate Shaft lining	Year 3	2.5	Concrete pump truck	Diesel	0.7	1	500	10
		Year 3	2.5	Crane 150t	Diesel	0.7	1	300	10
		Year 3	2.5	Compressor	Diesel	0.7	1	173	10
		Year 3	2.5	Loader	Diesel	0.7	1	298	10
		Year 3	2.5	Manlift	Diesel	0.7	1	67	10
		Year 3	2.5	Pump	Diesel	0.5	1	17	24
		Year 3	2.5	Ventilation fan	Electrical	1	1	-	24
		Year 3	2.5	Welder	Diesel	0.7	1	66	10
		Year 3	2.5	Concrete vibrator	Gasoline	0.7	2	6.5	10
		Year 3	2.5	Generator (80 kW)	Diesel	1	1	152	24
		Year 3	2.5	Light truck - Forman	Gasoline	1	1	290	10
		Year 3	2.5	Light truck - Crew	Gasoline	1	1	290	10

Table 3
Construction Equipment List
Anderson Dam Seismic Retrofit
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Project Component	Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Water Treatment System	Installation and operating the Water Treatment System	Year 3	12	3,000 gpm treatment system	Diesel	1	1	800	24
		Year 3	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 3	12	Light truck - Crew	Gasoline	1	1	290	10
Miscellaneous Activities	Miscellaneous Activities	Year 4	12	Medium excavator	Diesel	0.5	1	172	10
		Year 4	12	Loader	Diesel	0.5	1	298	10
		Year 4	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 4	12	Light truck - Crew	Gasoline	1	1	290	10
Import Filter and Drain Material	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	Year 4	10	Bulldozer	Diesel	0.5	1	215	10
		Year 4	10	Loader	Diesel	0.5	1	298	10
		Year 4	10	Highway dump truck	Diesel	1	11	500	10
		Year 4	10	Light truck - Forman	Gasoline	1	1	290	10
Dam	Stage 2a excavation (incl. work at stockpile areas & reservoir disposal)	Year 4	3.5	Large excavator	Diesel	1	2	1000	20
		Year 4	3.5	Large excavator	Diesel	1	1	410	20
		Year 4	3.5	Medium excavator	Diesel	1	2	273	20
		Year 4	3.5	Small backhoe	Diesel	1	1	70	20
		Year 4	3.5	Motor grader	Diesel	1	1	290	20
		Year 4	3.5	Loader	Diesel	-	2	298	20
		Year 4	3.5	Bulldozer	Diesel	1	1	722	20
		Year 4	3.5	Bulldozer w/discs	Diesel	1	2	354	20
		Year 4	3.5	Bulldozer	Diesel	1	1	354	20
		Year 4	3.5	Bulldozer	Diesel	1	2	215	20
		Year 4	3.5	Grizzly to screen transition	Diesel	-	1	200	20
		Year 4	3.5	Generator (80 kW)	Diesel	1	1	152	20
		Year 4	3.5	Pump	Diesel	1	2	17	24
		Year 4	3.5	Large rigid-body dump truck	Diesel	1	7	719	20
		Year 4	3.5	Articulated dump truck	Diesel	1	5	496	20
		Year 4	3.5	Water truck	Diesel	1	4	330	20
		Year 4	3.5	Pump for water trucks	Diesel	1	1	74	10
		Year 4	3.5	Light plant for night work	Diesel	0.5	11	25	20
		Year 4	3.5	Light truck - Forman	Gasoline	1	6	290	20
		Year 4	3.5	Light truck - Crew	Gasoline	1	3	290	20
	Stage 2b Fill (incl. work at stockpile areas & reservoir disposal)	Year 4	5.5	Large excavator	Diesel	1	2	1000	20
		Year 4	5.5	Medium excavator	Diesel	1	2	273	20
		Year 4	5.5	Small backhoe	Diesel	1	1	70	20
		Year 4	5.5	Loader	Diesel	1	1	298	20
		Year 4	5.5	Motor grader	Diesel	1	1	290	20
		Year 4	5.5	Bulldozer	Diesel	1	4	722	20
		Year 4	5.5	Bulldozer w/discs	Diesel	1	2	354	20
		Year 4	5.5	Bulldozer	Diesel	1	4	354	20
		Year 4	5.5	Bulldozer	Diesel	1	1	215	20
		Year 4	5.5	Vibratory smooth drum roller	Diesel	1	2	174	20
		Year 4	5.5	Padfoot roller	Diesel	1	2	174	20
		Year 4	5.5	Tamping foot roller	Diesel	1	3	405	20
		Year 4	5.5	Compressor	Diesel	1	1	173	20
		Year 4	5.5	Pump	Diesel	1	2	17	24
		Year 4	5.5	Generator (80 kW)	Diesel	1	1	152	24
		Year 4	5.5	Large rigid-body dump truck	Diesel	1	7	719	20
		Year 4	5.5	Articulated dump truck	Diesel	1	4	496	20
		Year 4	5.5	Water truck	Diesel	1	5	330	20
		Year 4	5.5	Pump for water trucks	Diesel	1	1	74	10
		Year 4	5.5	Light plant for night work	Diesel	0.5	10	25	20
		Year 4	5.5	Light truck - Forman	Gasoline	1	6	290	20
		Year 4	5.5	Light truck - Crew	Gasoline	1	4	290	20
Spillway	Excavation and foundation preparation	Year 4	12	Articulated dump truck	Diesel	0.25	1	496	10
		Year 4	12	Medium excavator	Diesel	0.7	1	273	10
		Year 4	12	Mini excavator	Diesel	0.7	1	45	10
		Year 4	12	Track drill rig	Diesel	0.7	2	201	10
		Year 4	12	Compressor	Diesel	0.7	1	173	10
		Year 4	12	Loader	Diesel	0.7	1	298	10
		Year 4	12	Pump	Diesel	1	2	17	24
		Year 4	12	Generator (80 kW)	Diesel	1	1	152	10
		Year 4	12	Water truck	Diesel	0.5	1	330	10
		Year 4	12	Pump for water trucks	Diesel	1	1	74	10
		Year 4	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 4	12	Light truck - Crew	Gasoline	1	1	290	10
	Construction of spillway structure	Year 4	9	Concrete pump truck	Diesel	0.7	1	500	10
		Year 4	9	Compressor	Diesel	0.7	1	173	10
		Year 4	9	Bobcat	Diesel	0.7	1	68	10
		Year 4	9	Loader	Diesel	0.7	1	298	10
		Year 4	9	Manlift	Diesel	0.7	2	67	10
		Year 4	9	Crane 150t	Diesel	0.7	1	300	10
		Year 4	9	Pump	Diesel	1	2	17	24
		Year 4	9	Welder	Diesel	0.7	2	66	10
		Year 4	9	Concrete vibrator	Gasoline	0.7	4	6.5	10
		Year 4	9	Generator (80 kW)	Diesel	1	1	152	24
		Year 4	9	Light truck - Forman	Gasoline	1	2	290	10
		Year 4	9	Light truck - Crew	Gasoline	1	1	290	10
		Year 4	9	Light truck - Carpenters	Gasoline	1	2	290	10

Table 3
Construction Equipment List
Anderson Dam Seismic Retrofit
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Project Component	Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
HLOW	Pipe, mechanical and electrical installation	Year 4	4	Crane 150t	Diesel	0.8	1	300	10
		Year 4	4	Manlift	Diesel	0.8	1	67	10
		Year 4	4	Welder	Diesel	0.8	1	66	10
		Year 4	4	Loader	Diesel	0.8	1	298	10
		Year 4	4	Generator (80 kW)	Diesel	1	1	152	10
		Year 4	4	Light truck - Forman	Gasoline	1	2	290	10
		Year 4	4	Light truck - Crew	Gasoline	1	2	290	10
Water Treatment System	Installation and operating the Water Treatment System	Year 4	12	3,000 gpm treatment system	Diesel	1	1	800	24
		Year 4	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 4	12	Light truck - Crew	Gasoline	1	1	290	10
Miscellaneous Activities	Miscellaneous Activities	Year 5	12	Medium excavator	Diesel	0.5	1	172	10
		Year 5	12	Loader	Diesel	0.5	1	298	10
		Year 5	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 5	12	Light truck - Crew	Gasoline	1	1	290	10
Import Filter and Drain Material	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	Year 5	10	Bulldozer	Diesel	0.5	1	215	10
		Year 5	10	Loader	Diesel	0.5	1	298	10
		Year 5	10	Highway dump truck	Diesel	1	9	500	10
		Year 5	10	Light truck - Forman	Gasoline	1	1	290	10
Dam	Stage 3a Fill (incl. work at stockpile areas & reservoir disposal)	Year 5	6	Large excavator	Diesel	1	1	810	20
		Year 5	6	Medium excavator	Diesel	1	1	410	20
		Year 5	6	Medium excavator	Diesel	1	2	273	20
		Year 5	6	Small backhoe	Diesel	1	1	70	20
		Year 5	6	Loader	Diesel	1	1	298	20
		Year 5	6	Motor grader	Diesel	1	1	290	20
		Year 5	6	Bulldozer	Diesel	1	2	722	20
		Year 5	6	Bulldozer w/discs	Diesel	0.5	2	354	20
		Year 5	6	Bulldozer	Diesel	1	3	354	20
		Year 5	6	Bulldozer	Diesel	1	1	215	20
		Year 5	6	Vibratory smooth drum roller	Diesel	1	2	174	20
		Year 5	6	Padfoot roller	Diesel	1	4	174	20
		Year 5	6	Tamping foot roller	Diesel	1	3	405	20
		Year 5	6	Compressor	Diesel	1	1	173	20
		Year 5	6	Pump	Diesel	1	1	17	24
		Year 5	6	Generator (80 kW)	Diesel	1	1	152	24
		Year 5	6	Large rigid-body dump truck	Diesel	1	6	719	20
		Year 5	6	Articulated dump truck	Diesel	1	6	496	20
		Year 5	6	Water truck	Diesel	1	7	330	20
		Year 5	6	Pump for water trucks	Diesel	1	1	74	10
		Year 5	6	Light plant for night work	Diesel	0.5	12	25	20
		Year 5	6	Light truck - Forman	Gasoline	1	8	290	20
		Year 5	6	Light truck - Crew	Gasoline	1	4	290	20
Develop BHBA	Preparation, excavation, blasting, and hauling of material	Year 5	11	Articulated dump truck	Diesel	0.5	2	496	10
		Year 5	11	Large excavator	Diesel	1	1	410	10
		Year 5	11	Bulldozers w/riper	Diesel	1	1	957	10
		Year 5	11	Track drill rig	Diesel	0.2	2	201	10
		Year 5	11	Explosives truck	Diesel	0.2	1	500	10
		Year 5	11	Compressor	Diesel	0.3	2	173	10
		Year 5	11	Loader	Diesel	1	1	298	10
		Year 5	11	Manlift	Diesel	0.3	1	67	10
		Year 5	11	Light truck - Forman	Gasoline	1	1	290	10
		Year 5	11	Light truck - Crew	Gasoline	1	1	290	10
Develop PGBP	Strip sediment, excavate test trenches	Year 5	1.5	Articulated dump truck	Diesel	0.5	2	496	10
		Year 5	1.5	Large excavator	Diesel	1	1	410	10
		Year 5	1.5	Bulldozer	Diesel	1	1	354	10
		Year 5	1.5	Bulldozer w/discs	Diesel	1	4	354	10
		Year 5	1.5	Light truck - Forman	Gasoline	1	1	290	10
		Year 5	1.5	Light truck - Crew	Gasoline	1	-	290	10
Spillway	Construction of spillway structure	Year 5	5	Concrete pump truck	Diesel	0.7	1	500	10
		Year 5	5	Compressor	Diesel	0.7	1	173	10
		Year 5	5	Bobcat	Diesel	0.7	1	68	10
		Year 5	5	Loader	Diesel	0.7	1	298	10
		Year 5	5	Manlift	Diesel	0.7	2	67	10
		Year 5	5	Crane 150t	Diesel	0.7	1	300	10
		Year 5	5	Pump	Diesel	1	1	17	24
		Year 5	5	Welder	Diesel	0.7	2	66	10
		Year 5	5	Concrete vibrator	Gasoline	0.7	4	6.5	10
		Year 5	5	Generator (80 kW)	Diesel	1	1	152	24
		Year 5	5	Light truck - Forman	Gasoline	1	2	290	10
		Year 5	5	Light truck - Crew	Gasoline	1	1	290	10
		Year 5	5	Light truck - Carpenters	Gasoline	1	2	290	10

Table 3
Construction Equipment List
Anderson Dam Seismic Retrofit
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Project Component	Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
LLOW - Sloping Intake	Excavate sloping intake structure (upper half)	Year 5	1.5	Large excavator	Diesel	0.9	1	410	10
		Year 5	1.5	Track drill rig	Diesel	0.7	1	201	10
		Year 5	1.5	Compressor	Diesel	0.7	1	173	10
		Year 5	1.5	Loader	Diesel	0.7	1	298	10
		Year 5	1.5	Manlift	Diesel	0.7	1	67	10
		Year 5	1.5	Pump	Diesel	1	2	17	10
		Year 5	1.5	Generator (80 kW)	Diesel	1	1	152	10
		Year 5	1.5	Articulated dump truck	Diesel	0.9	2	496	10
		Year 5	1.5	Light truck - Forman	Gasoline	1	1	290	10
		Year 5	1.5	Light truck - Crew	Gasoline	1	1	290	10
	Construction of sloping intake structure (upper half)	Year 5	5	Concrete pump truck	Diesel	0.7	1	500	10
		Year 5	5	Compressor	Diesel	0.7	1	173	10
		Year 5	5	Bobcat	Diesel	0.7	1	68	10
		Year 5	5	Loader	Diesel	0.7	1	298	10
		Year 5	5	Manlift	Diesel	0.7	1	67	10
		Year 5	5	Crane 150t	Diesel	0.7	1	300	10
		Year 5	5	Welder	Diesel	0.7	1	66	10
		Year 5	5	Concrete vibrator	Gasoline	0.7	2	6.5	10
		Year 5	5	Generator (80 kW)	Diesel	1	1	152	10
		Year 5	5	Light truck - Forman	Gasoline	1	1	290	10
		Year 5	5	Light truck - Crew	Gasoline	1	1	290	10
		Year 5	5	Light truck - Carpenters	Gasoline	0.8	2	290	10
LLOW - CIP Tunnel/Outlet Structure	Construction of CIP tunnel and outlet structure	Year 5	6	Concrete pump truck	Diesel	0.7	1	500	10
		Year 5	6	Compressor	Diesel	0.7	1	173	10
		Year 5	6	Bobcat	Diesel	0.7	1	68	10
		Year 5	6	Loader	Diesel	0.7	1	298	10
		Year 5	6	Manlift	Diesel	0.7	2	67	10
		Year 5	6	Crane 150t	Diesel	0.7	1	300	10
		Year 5	6	Pump	Diesel	1	1	17	24
		Year 5	6	Welder	Diesel	0.7	2	66	10
		Year 5	6	Concrete vibrator	Gasoline	0.7	4	6.5	10
		Year 5	6	Generator (80 kW)	Diesel	1	1	152	24
		Year 5	6	Light truck - Forman	Gasoline	1	2	290	10
		Year 5	6	Light truck - Crew	Gasoline	1	1	290	10
		Year 5	6	Light truck - Carpenters	Gasoline	1	2	290	10
	Excavate downstream portal trench and outlet structure foundation	Year 5	3	Large excavator	Diesel	0.9	1	410	10
		Year 5	3	Track drill rig	Diesel	0.5	2	201	10
		Year 5	3	Compressor	Diesel	0.5	1	173	10
		Year 5	3	Loader	Diesel	0.5	1	298	10
		Year 5	3	Manlift	Diesel	0.5	1	67	10
		Year 5	3	Pump	Diesel	1	1	17	24
		Year 5	3	Generator (80 kW)	Diesel	1	1	152	24
		Year 5	3	Articulated dump truck	Diesel	0.9	2	496	10
		Year 5	3	Light truck - Forman	Gasoline	1	1	290	10
		Year 5	3	Light truck - Crew	Gasoline	1	1	290	10
LLOW - Outlet Structure	Pipe, mechanical and electrical installation	Year 5	2.5	Crane 150t	Diesel	0.8	1	300	10
		Year 5	2.5	Telehandler	Diesel	0.8	1	110	10
		Year 5	2.5	Welder	Diesel	0.8	1	66	10
		Year 5	2.5	Loader	Diesel	0.8	1	298	10
		Year 5	2.5	Generator (80 kW)	Diesel	1	1	152	10
		Year 5	2.5	Light truck - Forman	Gasoline	1	2	290	10
		Year 5	2.5	Light truck - Crew	Gasoline	1	2	290	10
Main Avenue Pipeline, Anderson Force Main	Connection of the Pipeline and Force Main to the LLOW outlet structure	Year 5	1.5	Medium excavator	Diesel	0.7	1	273	10
		Year 5	1.5	Loader	Diesel		1	298	10
		Year 5	1.5	Vibratory smooth drum roller	Diesel	0.3	1	174	10
		Year 5	1.5	Vibratory plate	Diesel	0.3	1	15.7	10
		Year 5	1.5	Tamper	Gasoline	0.3	1	3.5	10
		Year 5	1.5	Welder	Diesel	0.5	1	66	10
		Year 5	1.5	Pump	Diesel	1	1	17	10
		Year 5	1.5	Generator (80 kW)	Diesel	1	1	152	10
		Year 5	1.5	Light truck - Forman	Gasoline	1	1	290	10
		Year 5	1.5	Light truck - Crew	Gasoline	1	1	290	10

Table 3
Construction Equipment List
Anderson Dam Seismic Retrofit
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Project Component	Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Water Treatment System	Installation and operating the Water Treatment System	Year 5	12	3,000 gpm treatment system	Diesel	1	1	800	24
		Year 5	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 5	12	Light truck - Crew	Gasoline	1	1	290	10
Miscellaneous Activities	Miscellaneous Activities	Year 6	12	Medium excavator	Diesel	0.5	1	172	10
		Year 6	12	Loader	Diesel	0.5	1	298	10
		Year 6	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	12	Light truck - Crew	Gasoline	1	1	290	10
Import Filter and Drain Material	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	Year 6	10	Bulldozer	Diesel	0.5	1	215	10
		Year 6	10	Loader	Diesel	0.5	1	298	10
		Year 6	10	Highway dump truck	Diesel	1	12	500	10
		Year 6	10	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	10	No Equipment - Crew	-	1	-	-	10
Bypass Pump System	Construct bypass pump system	Year 6	1	Medium excavator	Diesel	1	1	273	10
		Year 6	1	Loader	Diesel	0.3	1	298	10
		Year 6	1	Vibratory plate	Diesel	0.3	1	15.7	10
		Year 6	1	Tamper	Gasoline	0.3	1	3.5	10
		Year 6	1	Welder	Diesel	0.5	1	66	10
		Year 6	1	Pump	Diesel	1	1	17	10
		Year 6	1	Generator (80 kW)	Diesel	1	1	152	10
		Year 6	1	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	1	Light truck - Crew	Gasoline	1	1	290	10
	Conveying bypass flows to the Stage 1 Diversion Systems	Year 6	7	15 cfs capacity pump	Diesel	1	2	900	24
		Year 6	7	Backup 15 cfs capacity pump	Diesel	0	2	900	24
		Year 6	7	Site generator (2,000 kW)	Diesel	0	1	2700	24
Dam	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6	6	Large excavator	Diesel	1	1	810	20
		Year 6	6	Medium excavator	Diesel	1	1	410	20
		Year 6	6	Medium excavator	Diesel	1	2	273	20
		Year 6	6	Small backhoe	Diesel	1	2	70	20
		Year 6	6	Loader	Diesel	1	1	298	20
		Year 6	6	Motor grader	Diesel	1	1	290	20
		Year 6	6	Bulldozer	Diesel	1	1	722	20
		Year 6	6	Bulldozer w/discs	Diesel	1	2	354	20
		Year 6	6	Bulldozer	Diesel	1	2	354	20
		Year 6	6	Bulldozer	Diesel	1	1	215	20
		Year 6	6	Vibratory smooth drum roller	Diesel	1	2	174	20
		Year 6	6	Padfoot roller	Diesel	1	4	174	20
		Year 6	6	Tamping foot roller	Diesel	1	4	405	20
		Year 6	6	Compressor	Diesel	1	2	173	20
		Year 6	6	Generator (80 kW)	Diesel	1	2	152	20
		Year 6	6	Large rigid-body dump truck	Diesel	1	3	719	20
		Year 6	6	Articulated dump truck	Diesel	1	5	496	20
		Year 6	6	Water truck	Diesel	1	6	330	20
		Year 6	6	Pump for water trucks	Diesel	1	1	74	10
		Year 6	6	Light plant for night work	Diesel	0.5	10	25	20
		Year 6	6	Light truck - Forman	Gasoline	1	6	290	20
		Year 6	6	Light truck - Crew	Gasoline	1	2	290	20
Develop BHBA	Excavation, blasting, and hauling of material	Year 6	4	Articulated dump truck	Diesel	0.9	2	496	10
		Year 6	4	Large excavator	Diesel	0.9	1	810	10
		Year 6	4	Bulldozers w/riper	Diesel	0.9	1	957	10
		Year 6	4	Loader	Diesel	0.7	1	298	10
		Year 6	4	Track drill rig	Diesel	0.2	2	201	10
		Year 6	4	Explosives truck	Diesel	0.2	1	500	10
		Year 6	4	Compressor	Diesel	0.2	2	173	10
		Year 6	4	Manlift	Diesel	0.2	1	67	10
		Year 6	4	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	4	Light truck - Crew	Gasoline	0.2	1	290	10
Develop PGBP	Excavation, hauling & moisture conditioning	Year 6	4	Articulated dump truck	Diesel	0.7	2	496	10
		Year 6	4	Large excavator	Diesel	1	1	410	10
		Year 6	4	Bulldozer	Diesel	1	4	354	10
		Year 6	4	Bulldozer w/discs	Diesel	1	2	354	10
		Year 6	4	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	4	Light truck - Crew	Gasoline	1	-	290	10

Table 3
Construction Equipment List
Anderson Dam Seismic Retrofit
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Project Component	Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
LLOW - Sloping Intake	Excavate sloping intake structure (lower half)	Year 6	1	Large excavator	Diesel	0.9	1	410	10
		Year 6	1	Track drill rig	Diesel	0.7	1	201	10
		Year 6	1	Compressor	Diesel	0.7	1	173	10
		Year 6	1	Loader	Diesel	0.7	1	298	10
		Year 6	1	Manlift	Diesel	0.7	1	67	10
		Year 6	1	Pump	Diesel	1	1	17	24
		Year 6	1	Generator (80 kW)	Diesel	1	1	152	24
		Year 6	1	Articulated dump truck	Diesel	0.9	2	496	10
		Year 6	1	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	1	Light truck - Crew	Gasoline	1	1	290	10
	Construction of sloping intake structure (lower half)	Year 6	3	Concrete pump truck	Diesel	0.7	1	500	10
		Year 6	3	Compressor	Diesel	0.7	1	173	10
		Year 6	3	Bobcat	Diesel	0.7	1	68	10
		Year 6	3	Loader	Diesel	0.7	1	298	10
		Year 6	3	Manlift	Diesel	0.7	1	67	10
		Year 6	3	Crane 150t	Diesel	0.7	1	300	10
		Year 6	3	Welder	Diesel	0.7	1	66	10
		Year 6	3	Concrete vibrator	Gasoline	0.7	2	6.5	10
		Year 6	3	Pump	Diesel	1	1	17	24
		Year 6	3	Generator (80 kW)	Diesel	1	1	152	24
		Year 6	3	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	3	Light truck - Crew	Gasoline	1	1	290	10
		Year 6	3	Light truck - Carpenters	Gasoline	0.8	2	290	10
	Pipe, mechanical and electrical installation	Year 6	2	Crane 150t	Diesel	0.8	1	300	10
		Year 6	2	Manlift	Diesel	0.8	1	67	10
		Year 6	2	Welder	Diesel	0.8	1	66	10
		Year 6	2	Loader	Diesel	0.8	1	298	10
		Year 6	2	Generator (80 kW)	Diesel	1	1	152	10
		Year 6	2	Light truck - Forman	Gasoline	1	2	290	10
		Year 6	2	Light truck - Crew	Gasoline	1	2	290	10
LLOW-LLOT	Demolish diversion intake structure	Year 6	1	Excavator-mounted hoe-ram	Diesel	0.5	1	273	10
		Year 6	1	Medium excavator	Diesel	0.9	1	273	10
		Year 6	1	Loader	Diesel	0.5	1	298	10
		Year 6	1	Compressor	Diesel	0.9	2	173	10
		Year 6	1	Jackhammer	gasoline	0.9	2	2.4	10
		Year 6	1	Generator (80 kW)	Diesel	0.9	1	152	10
		Year 6	1	Water truck	Diesel	0.9	1	330	10
		Year 6	1	Pump for water trucks	Diesel	1	1	74	10
		Year 6	1	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	1	Light truck - Crew	Gasoline	1	1	290	10
LLOW - LLOT	Construct pipe supports, lining at Diversion Tunnel/LLOT intersection	Year 6	2	Concrete pump truck	Diesel	0.7	1	500	10
		Year 6	2	Compressor	Diesel	0.7	1	173	10
		Year 6	2	Bobcat	Diesel	0.7	1	68	10
		Year 6	2	Loader	Diesel	0.5	1	298	10
		Year 6	2	Telehandler	Diesel	0.7	1	110	10
		Year 6	2	Jackhammer	Air	0.25	2	-	10
		Year 6	2	Pump	Diesel	1	1	17	10
		Year 6	2	Ventilation fan	Electrical	1	1	-	10
		Year 6	2	Welder	Diesel	0.7	1	66	10
		Year 6	2	Concrete vibrator	Gasoline	0.7	2	6.5	10
		Year 6	2	Generator (80 kW)	Diesel	1	1	152	10
		Year 6	2	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	2	Light truck - Crew	Gasoline	1	2	290	10
LLOW - LLOT/CIP Tunnel	Pipe, mechanical and electrical installation	Year 6	4	Crane 150t	Diesel	0.8	1	300	10
		Year 6	4	Telehandler	Diesel	0.8	1	110	10
		Year 6	4	Welder	Diesel	0.8	1	66	10
		Year 6	4	Loader	Diesel	0.8	1	298	10
		Year 6	4	Ventilation fan	Electrical	1	1	-	10
		Year 6	4	Generator (80 kW)	Diesel	1	1	152	10
		Year 6	4	Light truck - Forman	Gasoline	1	2	290	10
		Year 6	4	Light truck - Crew	Gasoline	1	2	290	10
Unlined Spillway Channel	Excavation and foundation preparation	Year 6	3	Large excavator	Diesel	0.9	1	410	10
		Year 6	3	Track drill rig	Diesel	0.7	2	201	10
		Year 6	3	Compressor	Diesel	0.7	1	173	10
		Year 6	3	Loader	Diesel	0.7	1	298	10
		Year 6	3	Pump	Diesel	1	1	17	24
		Year 6	3	Generator (80 kW)	Diesel	1	1	152	24
		Year 6	3	Articulated dump truck	Diesel	0.9	3	496	10
		Year 6	3	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	3	Light truck - Crew	Gasoline	1	1	290	10
Water Treatment System	Installation and operating the Water Treatment System	Year 6	12	3,000 gpm treatment system	Diesel	1	1	800	24
		Year 6	12	Light truck - Forman	Gasoline	1	1	290	10
		Year 6	12	Light truck - Crew	Gasoline	1	1	290	10
Miscellaneous Activities	Miscellaneous Activities	Year 7	9	Medium excavator	Diesel	0.5	1	172	10
		Year 7	9	Loader	Diesel	0.5	1	298	10
		Year 7	9	Light truck - Forman	Gasoline	1	1	290	10
		Year 7	9	Light truck - Crew	Gasoline	1	1	290	10

Table 3
Construction Equipment List
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Project Component	Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Unlined Spillway Channel	Construction of concrete lined channel	Year 7	9	Concrete pump truck	Diesel	0.7	1	500	10
		Year 7	9	Compressor	Diesel	0.7	1	173	10
		Year 7	9	Bobcat	Diesel	0.7	1	68	10
		Year 7	9	Loader	Diesel	0.7	1	298	10
		Year 7	9	Manlift	Diesel	0.7	1	67	10
		Year 7	9	Crane 150t	Diesel	0.7	1	300	10
		Year 7	9	Welder	Diesel	0.7	1	66	10
		Year 7	9	Concrete vibrator	Gasoline	0.7	2	6.5	10
		Year 7	9	Pump	Diesel	1	1	17	24
		Year 7	9	Generator (80 kW)	Diesel	1	1	152	24
		Year 7	9	Light truck - Forman	Gasoline	1	2	290	10
		Year 7	9	Light truck - Crew	Gasoline	1	1	290	10
		Year 7	9	Light truck - Carpenters	Gasoline	0.8	2	290	10
Permanent Access Roads	Restoring parking areas and construction of permanent access roads	Year 7	9	Concrete pump truck	Diesel	0.25	1	500	10
		Year 7	9	Articulated dump truck	Diesel	0.7	2	496	10
		Year 7	9	Medium excavator	Diesel	0.7	1	273	10
		Year 7	9	Bulldozer	Diesel	0.7	1	354	10
		Year 7	3	Track drill rig	Diesel	0.7	1	201	10
		Year 7	3	Compressor	Diesel	0.7	1	173	10
		Year 7	9	Loader	Diesel	1	1	298	10
		Year 7	3	Manlift	Diesel	0.7	1	67	10
		Year 7	9	Motor grader	Diesel	0.7	1	290	10
		Year 7	9	Padfoot roller	Diesel	0.3	1	174	10
		Year 7	9	Tamping foot roller	Diesel	0.3	1	405	10
		Year 7	9	Vibratory smooth drum roller	Diesel	0.3	1	174	10
		Year 7	9	Asphalt paving machine	Diesel	0.7	1	225	10
		Year 7	9	Asphalt compactor	Diesel	0.7	1	100	10
		Year 7	9	Water truck	Diesel	0.5	1	330	10
		Year 7	9	Pump for water trucks	Diesel	1	1	74	10
		Year 7	9	Concrete vibrator	Gasoline	0.5	2	6.5	10
		Year 7	9	Generator (80 kW)	Diesel	1	1	152	10
		Year 7	9	Light truck - Forman	Gasoline	1	2	290	10
		Year 7	9	Light truck - Crew	Gasoline	1	2	290	10
Restoration	Allowance	Year 7	9	Articulated dump truck	Diesel	0.5	2	496	10
		Year 7	9	Medium excavator	Diesel	1	1	273	10
		Year 7	9	Bulldozer	Diesel	0.5	1	354	10
		Year 7	9	Loader	Diesel	1	1	298	10
		Year 7	9	Water truck	Diesel	0.5	1	330	10
		Year 7	9	Generator (80 kW)	Diesel	1	1	152	10
		Year 7	9	Light truck - Forman	Gasoline	1	1	290	10
		Year 7	9	Light truck - Crew	Gasoline	1	1	290	10
Dam Excavation[1]	Stage 1a	Year 2	12	Site generator (2,000 kW)	Diesel	0.75	1	2700	24
	Stage 1b	Year 3	12	Site generator (2,000 kW)	Diesel	0.75	1	2700	24
Excavation and Fill[1]	Stage 2a	Year 4	12	Site generator (2,000 kW)	Diesel	0.75	1	2700	24
	Stage 2b	Year 4	12	Site generator (2,000 kW)	Diesel	0.75	1	2700	24
Dam Fill[1]	Stage 3a	Year 5	12	Site generator (2,000 kW)	Diesel	0.75	1	2700	24
	Stage 3b	Year 6	12	Site generator (2,000 kW)	Diesel	0.75	1	2700	24

Notes:

[1.] Use of the construction site generator was provided by the Valley Water from years 2 through 6. The generator will be operated 24/7, and will not be operational during winter months.

Abbreviations:

cfs - cubic foot per second
HP - horsepower
kW - kilowatts

Table 4-a
Paved Road Fugitive Dust Emission Factors
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Paved Road Dust Equation[1]

E [lb/VMT] = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)

Parameter	Value
k = particle size multiplier for PM_{10} [lb/VMT]	0.0022
sL = roadway silt loading [grams per square meter - g/m^2]	0.032
W = average weight of vehicles traveling the road [tons]	2.4
P = number of "wet" days in county with at least 0.01 in of precipitation during the annual averaging period	64
N = number of days in the averaging period	365
PM_{10} speciation profile fraction	0.46
$PM_{2.5}$ speciation profile fraction	0.069
E = Fugitive PM_{10} Emission Factor [g/VMT]	**0.10**
E = Fugitive $PM_{2.5}$ Emission Factor [g/VMT][2]	**0.015**
E = Fugitive PM_{10} Emission Factor with Street Sweeping Reduction [g/VMT][3]	**0.075**
E = Fugitive $PM_{2.5}$ Emission Factor with Street Sweeping Reduction [g/VMT][3]	**0.011**

Notes:

1. Road dust equation is based on the U.S. EPA AP-42 Chapter 13.2.1: Paved Roads. Parameter values were obtained from the 2016 California ARB Paved Entrained Road Dust methodology using major roadways silt loading, annual Santa Clara county "wet" days, and statewide average vehicle fleet weight.

2. $PM_{2.5}$ emission factor was scaled from the PM_{10} value based on the ARB's guidance.

3. A 26% reduction in the PM_{10} emission factor was taken for street sweeping of arterial/collector streets, based on SCAQMD's Fugitive Dust Table XI-C. The $PM_{2.5}$ emissions factor was scaled from the PM_{10} value based on the ARB's guidance.

Abbreviations:

ARB - Air Resources Board
lb - pounds
g - grams
m^2 - square meters
PM - particulate matter
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter
PM_{10} - particulate matter less than 10 microns in diameter
SCAQMD - South Coast Air Quality Management District
USEPA - United States Environmental Protection Agency
VMT - vehicle miles traveled

References:

USEPA. 2011. AP 42. Compilation of Air Pollutant Emission Factors, Volume 1. Fifth Edition. Chapter 13.2.1, Paved Roads. Available online at: https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0201.pdf

California ARB. 2018. Miscellaneous Processes Methodologies - Paved Entrained Road Dust. Available online at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/full7-9_2018.pdf

SCAQMD. 2007. Table XI-C Mitigation Measure Examples:
Dust From Paved Roads. Available online at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

Table 4-b
Unpaved Road Fugitive Dust Emission Factors
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Unpaved Road Dust Equation[1]

E [lb/VMT] = (k*(s/12)*(S/30)^0.5/(M/0.5)^0.2 - C) * (1-P/365)

Parameter	Value
k = particle size multiplier for PM_{10} [lb/VMT]	1.8
s = surface material silt content (%)	8.5
S = mean vehicle speed (mph)	15
S_2 = secondary mean vehicle speed (mph)[3]	25
M = surface material moisture content (%)	0.50
C = emission factor for 1980's vehicle fleet exhaust, brake wear & tire wear	4.7E-04
P = number of "wet" days in county with at least 0.01 in of precipitation during the annual averaging period	64
N = number of days in the averaging period	365
PM_{10} speciation profile fraction	0.46
$PM_{2.5}$ speciation profile fraction	0.069
Reduction from watering 2x daily	0.55
E = Fugitive PM_{10} Emission Factor [g/VMT]	**0.74**
E = Fugitive $PM_{2.5}$ Emission Factor [g/VMT][2]	**0.11**
E_2 = Fugitive PM_{10} Emission Factor at 25 mph [g/VMT]	**1.0**
E_2 = Fugitive $PM_{2.5}$ Emission Factor at 25 mph [g/VMT][2]	**0.14**

Notes:

1. Road dust equation is based on the U.S. EPA AP-42 Chapter 13.2.2: Unpaved Roads. Parameter values were obtained from the 2016 California ARB Paved Entrained Road Dust methodology using major roadways silt loading, annual Santa Clara county "wet" days, and statewide average vehicle fleet weight.
2. $PM_{2.5}$ emission factor was scaled from the PM_{10} value based on the ARB's guidance.
3. Valley Water anticipates that a speed of 25 mph will be required to reach stockpiles L, K-North, and K-South in reasonable time.

Abbreviations:

ARB - Air Resources Board
lb - pounds
g - grams
m^2 - square meters
PM - particulate matter
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter
PM_{10} - particulate matter less than 10 microns in diameter
SCAQMD - South Coast Air Quality Management District
USEPA - United States Environmental Protection Agency
VMT - vehicle miles traveled

References:

USEPA. 2011. AP 42. Compilation of Air Pollutant Emission Factors, Volume 1. Fifth Edition. Chapter 13.2.2, Unpaved Roads. Available online at: https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0201.pdf

California ARB. 2018. Miscellaneous Processes Methodologies - Paved Entrained Road Dust. Available online at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/full7-9_2018.pdf

SCAQMD. 2007. Table XI-C Mitigation Measure Examples:
Dust From Paved Roads. Available online at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

Table 5-a
Fugitive Dust Emissions from Paved Road Dust
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Year	# Days	Total Trips[1]			Emissions (lb/yr)[2,3]	
		Worker	Vendor	Hauling	PM_{10}	$PM_{2.5}$
Year 1	272	20,400	1,632	4,500	53	8.0
Year 2	325	47,125	1,950	3,500	98	15
Year 3	325	50,375	1,950	7,500	117	18
Year 4	353	47,655	2,118	7,850	114	17
Year 5	325	61,750	1,950	7,850	139	21
Year 6	325	55,250	1,950	13,000	144	22
Year 7	294	48,510	1,764	16,900	145	22

Notes:

1. Construction trip rates were provided by Valley Water for each subphase.
2. Emissions from paved road dust were calculated using the total trips provided by Valley Water, calculated unpaved road emission factors, and trip lengths provided in Table 7-c.
3. A 26% reduction in the PM_{10} emission factor was taken for street sweeping of arterial/collector streets, based on SCAQMD's Fugitive Dust Table XI-C.

Abbreviations:

lb - pounds
PM - particulate matter
yr - year
SCAQMD - South Coast Air Quality Management District

References:

SCAQMD. 2007. Table XI-C Mitigation Measure Examples:
Dust From Paved Roads. Available online at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

Table 5-b
Fugitive Dust Emissions from Unpaved Road Dust
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Year	Trip Route	Route Length (mi)	# Days	Emissions (lb/yr)	
				PM_{10}	$PM_{2.5}$
Year 1	Dam to L	3.2	110	1.5	0.23
	Dam to Staging Area 1	0.66	110	0.049	0.0073
	C to K North	2.9	110	1.1	0.17
Year 2	Dam to Staging Area 1	3.2	130	20	3.0
	Dam to C	0.57	130	4.7	0.70
	Dam to Staging Area 1	0.66	130	2.1	0.32
	Dam to K South	2.4	130	21	3.1
	Dam to RDA	0.68	130	1.9	0.28
	C to K North	2.9	130	36	5.4
	C to L	2.7	130	8.3	1.2
	B to RDA	0.76	130	4.0	0.60
Year 3	Dam to H	1.6	165	21	3.2
	Dam to L	3.2	165	13	1.9
	Dam to C	0.57	165	1.5	0.22
	Dam to K North	2.4	165	4.3	0.64
	Dam to K South	2.4	165	12	1.8
	Dam to RDA	0.68	165	6.0	0.91
	Dam to C	0.57	25	1.5	0.22
Year 4	Dam to C	0.57	75	3.9	0.58
	Dam to D	1.6	75	17	2.5
	Dam to RDA	0.68	75	0.75	0.11
	Dam to K North	2.4	75	7.7	1.1
	Dam to K South	0.47	15	0.035	0.0052
	Dam to C	0.57	90	4.1	0.61
	Dam to H	1.6	90	4.5	0.68
	Dam to D	0.68	90	6.9	1.0
	Dam to K North	2.4	90	7.2	1.1
	Dam to Staging Area 1	2.4	90	9.0	1.4
Year 5	Dam to H	1.6	150	17	2.5
	Dam to L	3.2	150	42	6.3
	Dam to K North	2.4	150	13	1.9
	Dam to B	0.38	150	2.6	0.39
	Dam to K South	2.4	150	10	1.6
	Dam to K North	2.4	150	10	1.5
	Dam to Staging Area 1	0.47	150	0.91	0.14
	Basalt Hill to Packwood Gravel	0.57	150	1.6	0.24
	Basalt Hill to RDA	0.95	150	8.9	1.3
Year 6	Dam to Basalt Hill	0.38	140	7.4	1.1
	Dam to K South	2.4	140	22	3.3
	Dam to E	0.66	140	2.1	0.31
	Dam to Packwood Gravel	0.95	140	3.4	0.50
	Dam to K North	2.4	140	12	1.9
	Dam to Staging Area 1	0.66	140	2.0	0.29

Table 5-b
Fugitive Dust Emissions from Unpaved Road Dust
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Notes:

1. Route lengths and days of use were provided by Valley Water for each year.
2. All trips less than 2 miles assume vehicle speeds of 15 mph. Per request by Valley Water, trips farther than 2 miles assume vehicle speeds of 25 mph.
3. A 55% reduction in the PM emission factor was taken for watering of unpaved roads twice per day, based on SCAQMD's Fugitive Dust Table XI-D.

Abbreviations:

mi - miles
lb - pounds
yr - year
PM - particulate matter
SCAQMD - South Coast Air Quality Management District

References:

SCAQMD. 2007. Table XI-D Mitigation Measure Examples:
Dust From Paved Roads. Available online at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

Table 5-c
Fugitive Dust Emissions from Grading Activity
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Year	Construction Activity	Total Work Days	Maximum Area Disturbed[1]	VMT[2]	Uncontrolled PM_{10} Emission Factor[3]	Uncontrolled $PM_{2.5}$ Emission Factor[4]	Emissions[5]			
							PM_{10}		$PM_{2.5}$	
		Days	acre/day	mile/day	lb/VMT	lb/VMT	lb/day	lb/yr	lb/day	lb/yr
Year 1	Construction of the Haul Roads and Preparation of Stockpile Areas	118	1.3	0.86	1.5	0.17	0.60	70	0.064	7.6
Year 2	Stage 1a excavation (incl. work at stockpile areas & reservoir disposal)	168	3.1	2.1	1.5	0.17	1.5	251	0.16	27
Year 2	Demolish accl bld, inst., dam crest paving, exst intake&outlet struct	103	0.63	0.43	1.5	0.17	0.30	31	0.032	3.3
Year 3	Stage 1b excavation (incl. work at stockpile areas & reservoir disposal)	195	3.1	2.1	1.5	0.17	1.5	291	0.16	31
Year 4	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	301	0.63	0.43	1.5	0.17	0.30	90	0.032	10
Year 4	Stage 2a excavation (incl. work at stockpile areas & reservoir disposal)	106	3.1	2.1	1.5	0.17	1.5	158	0.16	17
Year 4	Stage 2b Fill (incl. work at stockpile areas & reservoir disposal)	167	3.1	2.1	1.5	0.17	1.5	249	0.16	27
Year 5	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	274	0.63	0.43	1.5	0.17	0.30	82	0.032	8.8
Year 5	Stage 3a Fill (incl. work at stockpile areas & reservoir disposal)	169	3.1	2.1	1.5	0.17	1.5	252	0.16	27
Year 5	Preparation, excavation, blasting, and hauling of material	300	0.63	0.43	1.5	0.17	0.30	89	0.032	10
Year 5	Strip sediment, excavate test trenches	47	0.63	0.43	1.5	0.17	0.30	14	0.032	1.5
Year 6	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	274	0.63	0.43	1.5	0.17	0.30	82	0.032	8.8
Year 6	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	168	3.1	2.1	1.5	0.17	1.5	251	0.16	27
Year 6	Excavation, blasting, and hauling of material	116	0.63	0.43	1.5	0.17	0.30	35	0.032	3.7
Year 6	Excavation, hauling & moisture conditioning	116	0.63	0.43	1.5	0.17	0.30	35	0.032	3.7
Year 7	Restoring parking areas and construction of permanent access roads	247	1.3	0.86	1.5	0.17	0.60	147	0.064	16
Year 7	Allowance - scope to be determined	247	0.63	0.43	1.5	0.17	0.30	74	0.032	8.0

Notes:

1. Maximum graded area is based on the number of crawler tractors, graders, rubber tired dozers, and scrapers used for each construction activity, as outlined in CalEEMod® User's Guide.
2. VMT per day calculated following guidance in the CalEEMod® User's Guide, which is based on AP-42, Section 11.9 for grading equipment. The equation is: $VMT = A_S/W_b \times (43{,}560\ sqft/acre)/(5{,}280\ ft/mile)$, where:
   $A_S = A_S$, acres graded per day (varies by sub-activity)
   $12 = W_b$, blade width of grading equipment (CalEEMod® default)
3. Emission factor calculated following guidance in the CalEEMod® User's Guide, which is based on AP-42, Section 11.9 for grading equipment. The equation is: $EF_{PM10} = 0.051 \times (S)^{2.0} \times F_{PM10}$, where:
   7.1 = S, mean vehicle speed (mph) (AP-42 default)
   $0.6 = F_{PM10}$, PM_{10} scaling factor (AP-42 default)
4. Emission factor calculated following guidance in the CalEEMod® User's Guide which is based on AP-42, Section 11.9 for grading equipment. The equation is: $EF_{PM2.5} = 0.04 \times (S)^{2.5} \times F_{PM2.5}$, where:
   7.1 = S, mean vehicle speed (mph) (AP-42 default)
   $0.031 = F_{PM2.5}$, $PM_{2.5}$ scaling factor (AP-42 default)
5. Fugitive $PM_{2.5}$ emissions from grading will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
yr - year
VMT - vehicle miles traveled
PM - particulate matter
lb - pounds

References:

CalEEMod® User's Guide:
Available online at: https://www.caleemod.com/user-guide

Table 5-d
Fugitive Dust Emissions from Truck Loading Activity
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Subphase	Haul Trips	Material Loaded	Uncontrolled Emission Factor[1]		Annual Emissions[2]	
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
	# trips	ton	lb/ton material		ton/yr	ton/yr
Year 1	4,500	90,000	8.93E-05	1.35E-05	1.81E-03	2.7E-04
Year 2 (Stage 1a)	3,500	70,000			1.41E-03	2.1E-04
Year 3 (Stage 1b)	7,500	150,000			3.01E-03	4.6E-04
Year 4 (Stage 2a)	7,850	157,000			3.15E-03	4.8E-04
Year 4 (Stage 2b)	7,850	157,000			3.15E-03	4.8E-04
Year 5 (Stage 3a)	13,000	260,000			5.22E-03	7.9E-04
Year 6 (Stage 3b)	16,900	338,000			6.79E-03	1.0E-03
Year 7	6,500	130,000			2.61E-03	4.0E-04

Notes:

1. Emission factor calculated following guidance in the CalEEMod® User's Guide, which is based on AP-42, Section 13.2.4 for aggregate handling. The equation is:

   $EF = k \times (0.0032) \times (U/5)^{1.3} / (M/2)^{1.4}$, where the following default values are used:

   0.35 = k_{PM10}, PM_{10} particle size multiplier
   0.053 = $k_{PM2.5}$, $PM_{2.5}$ particle size multiplier
   2.2 = mean wind speed (U), meters per second
   4.9 = mean wind speed (U), miles per hour
   12 = material moisture content (M), %

2. Fugitive $PM_{2.5}$ emissions from truck loading will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
lb - pounds
yr - year
VMT - vehicle miles traveled
PM - particulate matter

References:

CalEEMod® User's Guide:
Available online at: https://www.caleemod.com/user-guide

Table 5-e
Fugitive Dust Emissions from Bulldozing Activity
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Year	Construction Subphase	Equipment Work Hours[1]	Uncontrolled PM_{10} Emission Factor[2]	Uncontrolled $PM_{2.5}$ Emission Factor[3]	Annual Emissions[4]	
					PM_{10}	$PM_{2.5}$
		hr/day	lb/hr	lb/hr	ton/yr	ton/yr
Year 1	Construction of the Haul Roads and Preparation of Stockpile Areas	9.0			0.18	0.10
Year 2 (Stage 1a)	Stage 1a excavation (incl. work at stockpile areas & reservoir disposal)	80.0			2.3	1.3
Year 2 (Stage 1a)	Demolish accl bld, inst., dam crest paving, exst intake&outlet struct	5.0			0.087	0.048
Year 3 (Stage 1b)	Stage 1b excavation (incl. work at stockpile areas & reservoir disposal)	80.0			2.6	1.5
Year 4	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	5.0			0.25	0.14
Year 4	Stage 2a excavation (incl. work at stockpile areas & reservoir disposal)	80.0			1.4	0.79
Year 4	Stage 2b Fill (incl. work at stockpile areas & reservoir disposal)	80.0			2.3	1.2
Year 5 (Stage 3a)	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	5.0			0.23	0.13
Year 5 (Stage 3a)	Stage 3a Fill (incl. work at stockpile areas & reservoir disposal)	70.0	0.75	0.41	2.0	1.1
Year 5 (Stage 3a)	Preparation, excavation, blasting, and hauling of material	2.0			0.10	0.056
Year 5 (Stage 3a)	Strip sediment, excavate test trenches	10.0			0.080	0.044
Year 6 (Stage 3b)	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	5.0			0.23	0.13
Year 6 (Stage 3b)	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	80.0			2.3	1.3
Year 6 (Stage 3b)	Excavation, blasting, and hauling of material	2.0			0.039	0.022
Year 6 (Stage 3b)	Excavation, hauling & moisture conditioning	10.0			0.20	0.11
Year 7	Restoring parking areas and construction of permanent access roads	7.0			0.29	0.16
Year 7	Allowance - scope to be determined	5.0			0.21	0.11

Notes:

1. Construction schedule is based on Project-specific estimate. Includes planned hours for all tracked dozers to be used during the given phase.

2. Emission factors were calculated following guidance in the CalEEMod® User's Guide, which is based on AP-42, Section 11.9 for bulldozing equipment. The equation is:
   $EF_{PM10} = C_{PM15} \times s^{1.5} / M^{1.4} \times F_{PM10}$, where the following default values are used:
   - 1.0 = C_{PM15}, arbitrary coefficient
   - 6.9 = s, material silt content (%)
   - 7.9 = M, material moisture content (%)
   - 0.75 = F_{PM10}, PM_{10} scaling factor

3. Emission factor calculated following guidance in the CalEEMod® User's Guide, which is based on AP-42, Section 11.9 for bulldozing equipment. The equation is:
   $EF_{PM2.5} = C_{TSP} \times s^{1.2} / M^{1.3} \times F_{PM2.5}$, where the following default values are used:
   - 5.7 = C_{TSP}, arbitrary coefficient
   - 6.9 = s, material silt content (%)
   - 7.9 = M, material moisture content (%)
   - 0.105 = $F_{PM2.5}$, $PM_{2.5}$ scaling factor

4. Fugitive $PM_{2.5}$ emissions from bulldozing will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
lbs - pounds
PM_{10} - particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in aerodynamic diameter
VMT - vehicle miles traveled

References:

CalEEMod® User's Guide:
Available online at: https://www.caleemod.com/user-guide

Table 5-f
Fugitive Wind-Blown Dust from Stockpile Areas
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Source Name	Maximum Daily Wind Erodible Area[1]	Control Efficiency[3]	Emissions[2]	
			PM_{10}	$PM_{2.5}$
	acres		lb/day	lb/day
Stockpile H	14.37	90%	2.4	0.37
Stockpile I	2.19	90%	0.37	0.056
Stockpile J	6.58	90%	1.1	0.17
Stockpile K (North)	11.68	90%	2.0	0.30
Stockpile K (South)	16.73	90%	2.8	0.43
Stockpile B	8.09	90%	1.4	0.21
Stockpile C	9.29	90%	1.6	0.24
Stockpile D	25.32	90%	4.3	0.65
Stockpile E	4.10	90%	0.70	0.10
Stockpile L	23.06	90%	3.9	0.59

Notes:

1. The maximum daily erodible area for each stockpile was conservatively taken to be the full area of the stockpile.
2. An emission factor of 1.7 lb/acre/day for stockpile erosion was taken from the BAAQMD Permit Handbook, per AP-42 Section 8.19. The $PM_{2.5}$ emissions factor was scaled from the PM_{10} value based on the ARB's guidance.
3. A 90% reduction in the PM emission factor was taken for watering of storage piles are at a rate of 1.4 gallons/hour-yard^2, based on SCAQMD's Fugitive Dust Table XI-D.

Abbreviations:

ARB - Air Resources Board
BAAQMD - Bay Area Air Quality Management District
lb - pounds
PM - particulate matter
SCAQMD - South Coast Air Quality Management District
yr - year

References:

SCAQMD. 2007. Table XI-D Mitigation Measure Examples:
Dust From Paved Roads. Available online at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

BAAQMD Permit Handbook:
https://www.baaqmd.gov/permits/permitting-manuals/permit-handbook

Table 5-g
Fugitive Dust Emissions from Wind-Blown Dust
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Phase	Subphase	Emissions (lb/yr)[1,2,3]	
		PM_{10}	$PM_{2.5}$
Site Mobilization	Year 1	5,209	782
Stage 1 Dam Excavation	Year 2 (Stage 1a)	4,030	605
Stage 1 Dam Excavation	Year 3 (Stage 1b)	4,151	623
Stage 2 Excavation and Fill	Year 4 (Stage 2a)	1,907	286
Stage 2 Excavation and Fill	Year 4 (Stage 2b)	2,302	345
Stage 3 Dam Fill	Year 5 (Stage 3a)	4,085	613
Stage 3 Dam Fill	Year 6 (Stage 3b)	2,243	337
Site Restoration	Year 7	0	0

Notes:

1. The annual emissions from wind-blown dust were determined by summing over emissions for all stockpiles that are active for a given year.
2. An emission factor of 1.7 lb/acre/day for stockpile erosion was taken from the BAAQMD Permit Handbook, per AP-42 Section 8.19. The $PM_{2.5}$ emissions factor was scaled from the PM_{10} value based on the ARB's guidance.
3. A 90% reduction in the PM emission factor was taken for watering of storage piles at a rate of 1.4 gallons/hour-yard^2, based on SCAQMD's Fugitive Dust Table XI-D.

Abbreviations:

ARB - Air Resources Board
BAAQMD - Bay Area Air Quality Management District
PM - particulate matter
SCAQMD - South Coast Air Quality Management District
lb - pounds
yr - year

References:

SCAQMD. 2007. Table XI-D Mitigation Measure Examples:
Dust From Paved Roads. Available online at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

BAAQMD Permit Handbook:
https://www.baaqmd.gov/permits/permitting-manuals/permit-handbook

Table 5-h
Fugitive Dust Emissions from Demolition Waste
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Activity Phase	Construction Activity	Number of Days	Total Waste[1]		Emission Factor - Mechanical or Explosive Dismemberment[2]		Emission Factor - Debris Loading[3]		Annual Emissions[4]	
					PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
		days	cy	ton	lb/ton		lb/ton		ton/yr	ton/yr
Year 2 (Stage 1a)	Demolish accl bld, inst., dam crest paving, exst intake&outlet struct	103	1,500	1,896	0.0011	1.7E-04	0.020	0.0031	0.0091	0.0014
Year 3 (Stage 1b)	Demolish existing spillway	247	12,500	15,802					0.076	0.012
Year 3 (Stage 1b)	Stage 1b excavation (incl. work at stockpile areas & reservoir disposal)	195	400	506					0.0024	3.7E-04
Year 6 (Stage 3b)	Construct pipe supports, lining at Diversion Tunnel/LLOT intersection	60	400	506					0.0024	3.7E-04
Year 6 (Stage 3b)	Demolish diversion intake structure	32	550	695					0.0033	5.1E-04
Year 7	Restoring parking areas and construction of permanent access roads	247	665	841					0.0049	6.1E-04

Notes:

1. Conversion of building waste to tons assumes an average soil density of 1.5 grams per cubic centimeter, per the CalEEMod® User's Guide, Truck Loading.
2. Emission factor calculated following guidance in the CalEEMod® User's Guide, Mechanical or Explosive Dismemberment, which is based on AP 42 Section 13.2.4.3 for batch drop operations. The equation is:
   0.053 = $k_{PM2.5}$ Particle size multiplier (dimensionless)
   4.92 = U, mean wind speed (mph)
   2 = M, material moisture content (%)
3. Emission factor calculated following guidance in the CalEEMod® User's Guide Debris Loading, which is based on AP 42 Section 13.2. The equation is:
   0.35 = k_{PM10} Particle size multiplier (dimensionless)
   0.053 = $k_{PM2.5}$ Particle size multiplier (dimensionless)
   0.058 = $EF_{L\text{-}TSP}$, lb/ton
4. Fugitive $PM_{2.5}$ emissions from demolition will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
cy - cubic yards
EF - emission factor
PM - particulate matter
yr - years
lb - pounds

References:

CalEEMod® User's Guide:
Available online at: https://www.caleemod.com/user-guide

Table 6
Construction Asphalt Paving Off-Gassing Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Year	Construction Subphase	Land Use	Roadway Length (m)	Asphalt-Paved Area[1]	Asphalt Paving ROG Off-Gassing Emission Factor[2]	ROG Off-Gassing Emissions
				acre	lb/acre	lb/subphase
Year 7	Restoring Parking Areas and Construction of Permanent Access Roads	Boat Ramp Parking Area	-	5.9	2.6	16
Year 7	Restoring Parking Areas and Construction of Permanent Access Roads	Dam Toe Parking Area	-	0.27	2.6	0.70
Year 7	Restoring Parking Areas and Construction of Permanent Access Roads	Staging Area 3	-	0.83	2.6	2.2
Year 7	Restoring Parking Areas and Construction of Permanent Access Roads	Year 7 Access Roads	7,970	24	2.6	62
					Total Year 7	**80**

Notes:

1. Asphalt-paved parking area was provided by Valley Water. For paved roads, roadway distance was provided by Valley Water, and paved roadway width was assumed to be 12 meters.
2. An VOC off-gassing emission factor of 2.62 lb/acre is taken from CalEEMod® User's Guide. VOC is assumed to be equivalent to ROG.

Abbreviations:

lb - pound
ROG - reactive organic gas
VOC - volatile organic compound

References:

CalEEMod® User's Guide:
Available online at: https://www.caleemod.com/user-guide

Table 7-a
Onroad Construction Trips
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Subphase	Construction Subphase Lookup	Year	Number of Work Days	Construction Roundtrips[1]			
				Total Worker Trips[2]	Total Vendor Trips[2]	Total Haul Trips[2]	Total Shuttle Trips[3]
				(trips/day)	(trips/day)	(trips)	(trips)
Year 1	Site Mobilization	2024	272	75	6	4,500	15
Year 2 (Stage 1a)	Stage 1a	2025	325	145	6	3,500	25
Year 3 (Stage 1b)	Stage 1b	2026	325	155	6	7,500	25
Year 4 (Stage 2a)	Stage 2a	2027	178	135	6	7,850	25
Year 4 (Stage 2b)	Stage 2b	2027	175	190	6	7,850	25
Year 5 (Stage 3a)	Stage 3a	2028	325	170	6	13,000	30
Year 6 (Stage 3b)	Stage 3b	2029	325	165	6	16,900	30
Year 7	Site Restoration	2030	294	55	6	6,500	10

Notes:

1. Construction trip rates were provided by Valley Water for each subphase.
2. CalEEMod® default fleet mixes were used for Worker (LD_Mix), Vendor (MHDT/HHDT), and Hauling (HHDT) trips. LD_Mix was assumed to be 100% gasoline vehicles and MHDT/HHDT and HHDT were assumed to be 100% diesel vehicles.
3. Shuttle trips are provided by Valley Water from designated parking areas to the construction site. Total round-trip rates for shuttles were provided by Valley Water for each subphase.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
HHDT - heavy-heavy duty trucks
LD_Mix - light duty mix
MHDT - medium-heavy duty trucks
VMT - vehicle miles traveled

References:

CalEEMod® User's Guide:
Available online at: https://www.caleemod.com/user-guide

Table 7-b
Offroad Construction Trips
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Phase	Construction Subphase	Road	Total Hauling Trips[1] (trips)
Site Mobilization	Site Mobilization	Dam to SA-L (Zone 1/4)	500
		Dam to SA-1/SA-E (Zone 2/3)	100
		SA-C to SA-K(N) (Zone 5a)	400
Dam Excavation	Year 2 (Stage 1a)	Dam to SA-L (Zone 1/4)	6,500
		Dam to SA-C (Zone 1/4)	11,200
		Dam to SA-1/SA-E (Zone 2/3)	4,300
		Dam to SA-K(S) (Zone 2/3)	9,200
		Dam to RDA (waste)	3,700
		SA-C to SA-K(N) (Zone 5a)	12,900
		SA-C to SA-L (Zone 5)	3,300
		SA-B to RDA (waste)	7,200
	Year 3 (Stage 1b)	Dam to SA-H (Zone 1/4)	17,700
		Dam to SA-L (Zone 1/4)	4,100
		Dam to SA-C (Zone 1/4)	3,500
		Dam to SA-K(N) (LFF)	1,900
		Dam to SA-K(S) (Zone 2/3)	5,400
		Dam to RDA (waste)	12,000
	Year 3 (Stage 1b Fill)	From SA-C to u/s dam (shell/soil)	3,500
Excavation and Fill	Year 4 (Stage 2a)	Dam to SA-C (Zone 1/4)	9,200
		Dam to SA-D (Zone 2/3)	14,200
		Dam to RDA (waste)	1,500
		Dam to SA-K(N) (LFF)	3,400
		Dam to SA-K(S) (Zone 2/3)	100
	Year 4 (Stage 2b)	SA-C to Dam (Zone 5)	9,700
		SA-H to Dam (Zone 5)	3,800
		SA-D to Dam (Zone 7)	13,800
		SA-K(N) to Dam (Zone 5a)	3,200
		SA-1 to Dam (Zone 8/9)	4,000

Table 7-b
Offroad Construction Trips
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Phase	Construction Subphase	Road	Total Hauling Trips[1] (trips)
Dam Fill	Year 5 (Stage 3a)	SA-H to Dam (Zone 5)	14,200
		SA-L to Dam (Zone 5)	13,800
		SA-K(N) to Dam (Zone 5)	5,700
		SA-B to Dam (Zone 5)	9,400
		SA-K(S) to Dam (Zone 7)	4,600
		SA-K(N) to Dam (Zone 5a)	4,500
		SA-1 to Dam (Zone 8/9)	2,600
		BHBA to PGBP Access	3,800
		BHBA to RDA	12,700
	Year 6 (Stage 3b)	BHBA to Dam (Zone 5)	26,500
		SA-K(S) to Dam (Zone 7)	9,700
		SA-E to Dam (Zone 7)	4,200
		PGBP to Dam (Zone 7)	4,800
		SA-K(N) to Dam (Zone 5a)	5,500
		SA-1 to Dam (Zone 8/9)	4,000

Notes:

[1.] Construction trip rates were provided by Valley Water for each subphase.

Table 7-c
Construction Trip Lengths
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Trip Type	One-Way Trip Length (mi)
Worker[1]	10.8
Vendor[2]	6.6
Haul[3]	20.0

Notes:

1. Consistent with CalEEMod® methodology, worker trip length is based on the default Home-to-Work trip length for Santa Clara County as reported in the CalEEMod® user guide, Appendix D.
2. Consistent with CalEEMod® methodology, vendor trip length is based on the default Commercial-to-Nonwork trip length for Santa Clara County as reported in the CalEEMod® user guide, Appendix D.
3. Consistent with CalEEMod® methodology, haul trip length is based on the default length of 20 miles as reported in the CalEEMod® user guide, Appendix A.

Abbreviations:

CalEEMod® - California Emissions Estimator Model

mi - mile

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

CalEEMod® User's Guide, Appendix D:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-d2020-4-0-full-merge.pdf?sfvrsn=12

Table 8
Construction Gasoline Truck Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Phase	Construction Subphase	Year	Onsite Truck Use[1]		Onsite Truck Emissions[2,3]									
			(hours/year)	(vehicles/year)	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
					(lbs)						(MT)			
Year 1	Miscellaneous Activities	2024	2,520	6.0	6.0	19	117	1.0	8.4	3.0	48	4.3E-04	5.4E-04	48
	Construction of the Haul Roads and Preparation of Stockpile Areas	2024	2,800	8.0	6.6	21	130	1.2	9.4	3.3	53	4.7E-04	6.0E-04	53
	Dredging at Dam Toe	2024	2,100	3.0	5.0	16	98	0.86	7.0	2.5	40	3.5E-04	4.5E-04	40
	Upstream Shaft excavation	2024	2,240	6.0	5.3	17	104	0.92	7.5	2.6	42	3.8E-04	4.8E-04	42
	Excavate upstream portal	2024	560	4.0	1.3	4.2	26	0.23	1.9	0.66	11	9.5E-05	1.2E-04	11
	Tunnel excavation	2024	1,680	5.0	4.0	13	78	0.69	5.6	2.0	32	2.8E-04	3.6E-04	32
	Tunnel lining	2024	840	9.0	2.0	6.3	39	0.35	2.8	1.0	16	1.4E-04	1.8E-04	16
Year 2	Miscellaneous Activities	2025	3,360	6.0	7.2	23	150	1.4	11	4.0	63	5.1E-04	6.6E-04	63
	Construct cofferdam	2025	560	6.0	1.2	3.8	25	0.23	1.9	0.66	10	8.5E-05	1.1E-04	10
	Construct bypass pump system and diversion extension pipe	2025	700	4.0	1.5	4.7	31	0.28	2.3	0.83	13	1.1E-04	1.4E-04	13
	Conveying bypass flows to the Stage 1 Diversion Systems	2025	0	0	0	0	0	0	0	0	0	0	0	0
	Excavate downstream portal	2025	1,120	4.0	2.4	7.5	50	0.45	3.7	1.3	21	1.7E-04	2.2E-04	21
	Installation and operating the Water Treatment System	2025	3,360	2.0	7.2	23	150	1.4	11	4.0	63	5.1E-04	6.6E-04	63
	Stage 1a excavation (incl. work at stockpile areas & reservoir disposal)	2025	11,760	12	25	79	525	4.8	39	14	219	0.0018	0.0023	220
	Tunnel excavation	2025	1,120	5.0	2.4	7.5	50	0.45	3.7	1.3	21	1.7E-04	2.2E-04	21
	Tunnel lining	2025	1,260	9.0	2.8	8.5	56	0.51	4.2	1.5	23	1.9E-04	2.5E-04	24
	Construction of intake structure following LLOT lining	2025	560	6.0	1.2	3.8	25	0.23	1.9	0.66	10	8.5E-05	1.1E-04	10
	Demolish accl bld, inst., dam crest paving, exst intake&outlet struct	2025	980	6.0	2.1	6.6	44	0.40	3.3	1.2	18	1.5E-04	1.9E-04	18
	Miscellaneous Activities	2026	3,360	6.0	6.4	20	141	1.3	11	4.0	62	4.4E-04	6.0E-04	62
Year 3	Stage 1b excavation (incl. work at stockpile areas & reservoir disposal)	2026	11,760	11	22	71	494	4.7	39	14	216	0.0015	0.0021	217
	Construction of the tie-back wall at Cochrane Road	2026	700	5.0	1.3	4.2	29	0.28	2.3	0.82	13	9.2E-05	1.2E-04	13
	Demolish existing spillway	2026	2,520	6.0	4.8	15	106	1.0	8.4	3.0	46	3.3E-04	4.5E-04	46
	Excavation and foundation preparation	2026	840	6.0	1.6	5.0	35	0.34	2.8	1.0	15	1.1E-04	1.5E-04	15
	HLOW and Access Adit portal excavation	2026	1,680	4.0	3.2	10	71	0.67	5.6	2.0	31	2.2E-04	3.0E-04	31
	HLOW Tunnel and Access Adit Tunnel excavation	2026	3,360	6.0	6.4	20	141	1.3	11	4.0	62	4.4E-04	6.0E-04	62
	HLOW Tunnel and Access Adit lining	2026	4,200	9.0	8.0	25	176	1.7	14	4.9	77	5.5E-04	7.5E-04	77
	Construction of intake structure, concrete encasement	2026	1,680	9.0	3.2	10	71	0.67	5.6	2.0	31	2.2E-04	3.0E-04	31
	Gate Shaft excavation	2026	1,120	6.0	2.1	6.7	47	0.45	3.7	1.3	21	1.5E-04	2.0E-04	21
	Gate Shaft lining	2026	700	6.0	1.4	4.2	29	0.28	2.3	0.82	13	9.2E-05	1.2E-04	13
	Installation and operating the Water Treatment System	2026	3,360	1.0	6.3	20	141	1.3	11	4.0	62	4.4E-04	6.0E-04	62
	Miscellaneous Activities	2027	3,360	6.0	5.8	18	136	1.3	11	3.9	61	3.9E-04	5.5E-04	61
Year 4	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	2027	1,400	1.0	2.4	7.5	57	0.55	4.7	1.6	25	1.6E-04	2.3E-04	25
	Stage 2a excavation (incl. work at stockpile areas & reservoir disposal)	2027	8,820	16	15	47	358	3.5	29	10	160	0.0010	0.0014	160
	Stage 2b Fill (incl. work at stockpile areas & reservoir disposal)	2027	15,400	22	26	83	625	6.1	51	18	279	0.0018	0.0025	280
	Excavation and foundation preparation	2027	3,360	6.0	5.8	18	136	1.3	11	3.9	61	3.9E-04	5.5E-04	61
	Construction of spillway structure	2027	6,300	14	11	34	256	2.5	21	7.4	114	7.4E-04	0.0010	115
	Pipe, mechanical and electrical installation	2027	2,240	8.0	3.9	12	91	0.88	7.5	2.6	41	2.6E-04	3.7E-04	41
	Installation and operating the Water Treatment System	2027	3,360	1.0	5.7	18	136	1.3	11	3.9	61	3.9E-04	5.5E-04	61
	Miscellaneous Activities	2028	3,360	6.0	5.3	16	132	1.3	11	3.9	60	3.5E-04	5.0E-04	60
Year 5	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	2028	1,400	1.0	2.2	6.8	55	0.55	4.7	1.6	25	1.5E-04	2.1E-04	25
	Stage 3a Fill (incl. work at stockpile areas & reservoir disposal)	2028	20,160	24	31	97	791	7.9	67	24	362	0.0021	0.0030	363
	Preparation, excavation, blasting, and hauling of material	2028	3,080	6.0	4.8	15	121	1.2	10	3.6	55	3.2E-04	4.6E-04	55
	Strip sediment, excavate test trenches	2028	210	1.0	0.33	1.0	8.2	0.082	0.70	0.25	3.8	2.2E-05	3.1E-05	3.8
	Construction of spillway structure	2028	3,500	14	5.5	17	137	1.4	12	4.1	63	3.7E-04	5.2E-04	63
	Excavate sloping intake structure (upper half)	2028	420	4.0	0.68	2.5	17	0.16	1.4	0.49	7.5	4.4E-05	6.3E-05	7.6
	Construction of sloping intake structure (upper half)	2028	2,800	9.0	4.4	16	110	1.1	9.3	3.3	50	2.9E-04	4.2E-04	50
	Construction of CIP tunnel and outlet structure	2028	4,200	14	6.6	24	165	1.6	14	4.9	75	4.4E-04	6.3E-04	76
	Excavate downstream portal trench and outlet structure foundation	2028	840	4.0	1.3	4.9	33	0.33	2.8	1.0	15	8.9E-05	1.3E-04	15
	Pipe, mechanical and electrical installation	2028	1,400	10	2.2	8.3	55	0.55	4.7	1.6	25	1.5E-04	2.1E-04	25
	Connection of the Pipeline and Force Main to the LLOW outlet structure	2028	420	5.0	0.68	2.5	17	0.16	1.4	0.49	7.5	4.5E-05	6.3E-05	7.6
	Installation and operating the Water Treatment System	2028	3,360	1.0	5.2	19	132	1.3	11	3.9	60	3.5E-04	5.0E-04	60
	Miscellaneous Activities	2029	3,360	6.0	4.8	18	128	1.3	11	3.9	60	3.2E-04	4.6E-04	60

Table 8
Construction Gasoline Truck Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Phase	Construction Subphase	Year	Onsite Truck Use[1]		Onsite Truck Emissions[2,3]									
			(hours/year)	(vehicles/year)	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
					(lbs)						(MT)			
Year 6	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	2029	1,400	1.0	2.0	7.3	53	0.54	4.7	1.6	25	1.3E-04	1.9E-04	25
	Construct bypass pump system	2029	280	4.0	0.42	1.6	11	0.11	0.93	0.33	5.0	2.7E-05	3.9E-05	5.0
	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	2029	13,440	14	19	71	512	5.2	45	16	239	0.0013	0.0019	240
	Excavation, blasting, and hauling of material	2029	1,120	6.0	1.6	6.0	43	0.43	3.7	1.3	20	1.1E-04	1.5E-04	20
	Excavation, hauling & moisture conditioning	2029	560	1.0	0.79	3.0	21	0.22	1.9	0.66	10	5.3E-05	7.7E-05	10
	Excavate sloping intake structure (lower half)	2029	280	4.0	0.42	1.6	11	0.11	0.93	0.33	5.0	2.7E-05	3.9E-05	5.0
	Construction of sloping intake structure (lower half)	2029	1,680	9.0	2.4	9.0	64	0.65	5.6	2.0	30	1.6E-04	2.3E-04	30
	Pipe, mechanical and electrical installation	2029	1,120	8.0	1.6	6.1	43	0.43	3.7	1.3	20	1.1E-04	1.5E-04	20
	Demolish diversion intake structure	2029	280	6.0	0.43	1.6	11	0.11	0.93	0.33	5.0	2.7E-05	3.9E-05	5.0
	Construct pipe supports, lining at Diversion Tunnel/LLOT intersection	2029	840	9.0	1.2	4.6	32	0.33	2.8	1.0	15	8.0E-05	1.2E-04	15
	Pipe, mechanical and electrical installation	2029	2,240	10	3.2	12	85	0.87	7.5	2.6	40	2.1E-04	3.1E-04	40
	Excavation and foundation preparation	2029	840	5.0	1.2	4.5	32	0.33	2.8	1.0	15	8.0E-05	1.2E-04	15
	Installation and operating the Water Treatment System	2029	3,360	1.0	4.7	18	128	1.3	11	3.9	60	3.2E-04	4.6E-04	60
Year 7	Miscellaneous Activities	2030	2,520	6.0	3.3	12	94	1.0	8.4	3.0	44	2.2E-04	3.2E-04	45
	Construction of concrete lined channel	2030	6,300	10	8.3	31	236	2.4	21	7.4	111	5.5E-04	8.1E-04	111
	Restoring parking areas and construction of permanent access roads	2030	5,040	10	6.6	25	189	1.9	17	5.9	89	4.4E-04	6.5E-04	89
	Allowance - scope to be determined	2030	2,520	5.0	3.3	12	94	1.0	8.4	3.0	44	2.2E-04	3.2E-04	45

Notes:

1. The number of gasoline vehicles and schedule were provided by Valley Water.
2. Work trucks are assumed to be similar to light-heavy duty trucks (LHDT2) as defined in EMFAC2021. Emission factors are from EMFAC2021 ("Emission Rates" mode) for LHDT2 gasoline vehicles (aggregated model year) in Santa Clara County. RUNEX emission factors are specific to vehicle speed of 15 mph. All other emission factor types are for aggregated speed. Emission factors were multiplied by the appropriate usage parameter based on the units. Emission factors in units of g/trip, g/mi, and g/vehicle/day, were multiplied by trips, miles, and total vehicles, respectively, in order to obtain mass emissions.
3. Global warming potentials used in the calculation of CO_2e are 1, 25, and 298 for CO_2, CH_4, and N_2O, respectively.

Abbreviations:

CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalents
lb - pound
MT - metric tonne
N_2O - nitrous oxide
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Resources Board. EMFAC2021. Available online at: https://arb.ca.gov/emfac/emissions-inventory

Table 9
Construction Gasoline Truck TOG-Speciated Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Year	Construction Activity	Emission (ton/yr)[1]															
		1,3-Butadiene	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	n-hexane	Methanol	Methyl Ethyl Ketone	Naphthalene	Propene	Styrene	Toluene	Xylenes	DPM	$PM_{2.5}$
Year 1	Miscellaneous Activities	3.3E-02	1.7E-02	7.8E-03	1.5E-01	6.5E-02	9.5E-02	1.2E-01	7.2E-03	1.2E-03	3.0E-03	1.8E-01	7.2E-03	3.7E-01	3.0E-01	8.4E+00	3.0E+00
Year 1	Construction of the Haul Roads and Preparation of Stockpile Areas	3.7E-02	1.9E-02	8.7E-03	1.7E-01	7.3E-02	1.1E-01	1.3E-01	8.0E-03	1.3E-03	3.4E-03	2.1E-01	8.0E-03	4.2E-01	3.3E-01	9.4E+00	3.3E+00
Year 1	Dredging at Dam Toe	2.8E-02	1.4E-02	6.5E-03	1.3E-01	5.4E-02	7.9E-02	1.0E-01	6.0E-03	1.0E-03	2.5E-03	1.5E-01	6.0E-03	3.1E-01	2.5E-01	7.0E+00	2.5E+00
Year 1	Upstream Shaft excavation	3.0E-02	1.5E-02	7.0E-03	1.4E-01	5.8E-02	8.5E-02	1.1E-01	6.4E-03	1.1E-03	2.7E-03	1.6E-01	6.4E-03	3.3E-01	2.7E-01	7.5E+00	2.6E+00
Year 1	Excavate upstream portal	7.4E-03	3.8E-03	1.7E-03	3.5E-02	1.5E-02	2.1E-02	2.7E-02	1.6E-03	2.7E-04	6.7E-04	4.1E-02	1.6E-03	8.4E-02	6.7E-02	1.9E+00	6.6E-01
Year 1	Tunnel excavation	2.2E-02	1.1E-02	5.2E-03	1.0E-01	4.4E-02	6.4E-02	8.1E-02	4.8E-03	8.1E-04	2.0E-03	1.2E-01	4.8E-03	2.5E-01	2.0E-01	5.6E+00	2.0E+00
Year 1	Tunnel lining	1.1E-02	5.7E-03	2.6E-03	5.2E-02	2.2E-02	3.2E-02	4.1E-02	2.4E-03	4.0E-04	1.0E-03	6.2E-02	2.4E-03	1.3E-01	1.0E-01	2.8E+00	9.9E-01
Year 2	Miscellaneous Activities	3.9E-02	2.0E-02	9.3E-03	1.8E-01	7.8E-02	1.1E-01	1.5E-01	8.6E-03	1.4E-03	3.6E-03	2.2E-01	8.6E-03	4.5E-01	3.6E-01	1.1E+01	4.0E+00
Year 2	Construct cofferdam	6.6E-03	3.4E-03	1.6E-03	3.1E-02	1.3E-02	1.9E-02	2.5E-02	1.4E-03	2.4E-04	6.0E-04	3.7E-02	1.4E-03	7.5E-02	6.0E-02	1.9E+00	6.6E-01
Year 2	Construct bypass pump system and diversion extension pipe	8.2E-03	4.2E-03	1.9E-03	3.9E-02	1.6E-02	2.4E-02	3.1E-02	1.8E-03	3.0E-04	7.5E-04	4.6E-02	1.8E-03	9.4E-02	7.4E-02	2.3E+00	8.3E-01
Year 2	Excavate downstream portal	1.3E-02	6.7E-03	3.1E-03	6.2E-02	2.6E-02	3.8E-02	4.9E-02	2.9E-03	4.8E-04	1.2E-03	7.3E-02	2.9E-03	1.5E-01	1.2E-01	3.7E+00	1.3E+00
Year 2	Installation and operating the Water Treatment System	3.9E-02	2.0E-02	9.3E-03	1.8E-01	7.8E-02	1.1E-01	1.5E-01	8.6E-03	1.4E-03	3.6E-03	2.2E-01	8.6E-03	4.5E-01	3.6E-01	1.1E+01	4.0E+00
Year 2	Stage 1a excavation (incl. work at stockpile areas & reservoir disposal)	1.4E-01	7.0E-02	3.3E-02	6.4E-01	2.7E-01	4.0E-01	5.1E-01	3.0E-02	5.0E-03	1.3E-02	7.7E-01	3.0E-02	1.6E+00	1.2E+00	3.9E+01	1.4E+01
Year 2	Tunnel excavation	1.3E-02	6.7E-03	3.1E-03	6.2E-02	2.6E-02	3.8E-02	4.9E-02	2.9E-03	4.8E-04	1.2E-03	7.3E-02	2.9E-03	1.5E-01	1.2E-01	3.7E+00	1.3E+00
Year 2	Tunnel lining	1.5E-02	7.5E-03	3.5E-03	6.9E-02	2.9E-02	4.3E-02	5.5E-02	3.2E-03	5.4E-04	1.3E-03	8.2E-02	3.2E-03	1.7E-01	1.3E-01	4.2E+00	1.5E+00
Year 2	Construction of intake structure following LLOT lining	6.6E-03	3.4E-03	1.6E-03	3.1E-02	1.3E-02	1.9E-02	2.5E-02	1.4E-03	2.4E-04	6.0E-04	3.7E-02	1.4E-03	7.5E-02	6.0E-02	1.9E+00	6.6E-01
Year 2	Demolish accl bld, inst., dam crest paving, exst intake&outlet struct	1.2E-02	5.9E-03	2.7E-03	5.4E-02	2.3E-02	3.3E-02	4.3E-02	2.5E-03	4.2E-04	1.0E-03	6.4E-02	2.5E-03	1.3E-01	1.0E-01	3.3E+00	1.2E+00
Year 3	Miscellaneous Activities	3.3E-02	1.7E-02	7.8E-03	1.6E-01	6.6E-02	9.5E-02	1.3E-01	7.2E-03	1.2E-03	3.0E-03	1.8E-01	7.2E-03	3.8E-01	3.0E-01	1.1E+01	4.0E+00
Year 3	Stage 1b excavation (incl. work at stockpile areas & reservoir disposal)	1.2E-01	5.9E-02	2.7E-02	5.5E-01	2.3E-01	3.3E-01	4.4E-01	2.5E-02	4.2E-03	1.1E-02	6.5E-01	2.5E-02	1.3E+00	1.1E+00	3.9E+01	1.4E+01
Year 3	Construction of the tie-back wall at Cochrane Road	6.9E-03	3.5E-03	1.6E-03	3.3E-02	1.4E-02	2.0E-02	2.7E-02	1.5E-03	2.5E-04	6.3E-04	3.9E-02	1.5E-03	8.0E-02	6.3E-02	2.3E+00	8.2E-01
Year 3	Demolish existing spillway	2.5E-02	1.3E-02	5.9E-03	1.2E-01	4.9E-02	7.1E-02	9.5E-02	5.4E-03	9.0E-04	2.3E-03	1.4E-01	5.4E-03	2.9E-01	2.3E-01	8.4E+00	3.0E+00
Year 3	Excavation and foundation preparation	8.3E-03	4.2E-03	2.0E-03	3.9E-02	1.7E-02	2.4E-02	3.2E-02	1.8E-03	3.0E-04	7.6E-04	4.6E-02	1.8E-03	9.6E-02	7.6E-02	2.8E+00	9.9E-01
Year 3	HLOW and Access Adit portal excavation	1.7E-02	8.4E-03	3.9E-03	7.8E-02	3.3E-02	4.8E-02	6.3E-02	3.6E-03	6.0E-04	1.5E-03	9.2E-02	3.6E-03	1.9E-01	1.5E-01	5.6E+00	2.0E+00
Year 3	HLOW Tunnel and Access Adit Tunnel excavation	3.3E-02	1.7E-02	7.8E-03	1.6E-01	6.6E-02	9.5E-02	1.3E-01	7.2E-03	1.2E-03	3.0E-03	1.8E-01	7.2E-03	3.8E-01	3.0E-01	1.1E+01	4.0E+00
Year 3	HLOW Tunnel and Access Adit lining	4.1E-02	2.1E-02	9.8E-03	2.0E-01	8.2E-02	1.2E-01	1.6E-01	9.0E-03	1.5E-03	3.8E-03	2.3E-01	9.0E-03	4.8E-01	3.8E-01	1.4E+01	4.9E+00
Year 3	Construction of intake structure, concrete encasement	1.7E-02	8.5E-03	3.9E-03	7.8E-02	3.3E-02	4.8E-02	6.4E-02	3.6E-03	6.0E-04	1.5E-03	9.2E-02	3.6E-03	1.9E-01	1.5E-01	5.6E+00	2.0E+00
Year 3	Gate Shaft excavation	1.1E-02	5.6E-03	2.6E-03	5.2E-02	2.2E-02	3.2E-02	4.3E-02	2.4E-03	4.0E-04	1.0E-03	6.2E-02	2.4E-03	1.3E-01	1.0E-01	3.7E+00	1.3E+00
Year 3	Gate Shaft lining	6.9E-03	3.5E-03	1.6E-03	3.3E-02	1.4E-02	2.0E-02	2.7E-02	1.5E-03	2.5E-04	6.3E-04	3.9E-02	1.5E-03	8.0E-02	6.3E-02	2.3E+00	8.2E-01
Year 3	Installation and operating the Water Treatment System	3.3E-02	1.7E-02	7.8E-03	1.6E-01	6.6E-02	9.5E-02	1.3E-01	7.2E-03	1.2E-03	3.0E-03	1.8E-01	7.2E-03	3.8E-01	3.0E-01	1.1E+01	4.0E+00
Year 4	Miscellaneous Activities	2.9E-02	1.5E-02	6.9E-03	1.4E-01	5.8E-02	8.4E-02	1.1E-01	6.4E-03	1.1E-03	2.7E-03	1.6E-01	6.4E-03	3.4E-01	2.7E-01	1.1E+01	3.9E+00
Year 4	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	1.2E-02	6.2E-03	2.9E-03	5.7E-02	2.4E-02	3.5E-02	4.7E-02	2.6E-03	4.4E-04	1.1E-03	6.8E-02	2.6E-03	1.4E-01	1.1E-01	4.7E+00	1.6E+00
Year 4	Stage 2a excavation (incl. work at stockpile areas & reservoir disposal)	7.7E-02	3.9E-02	1.8E-02	3.6E-01	1.5E-01	2.2E-01	3.0E-01	1.7E-02	2.8E-03	7.0E-03	4.3E-01	1.7E-02	8.9E-01	7.0E-01	2.9E+01	1.0E+01
Year 4	Stage 2b Fill (incl. work at stockpile areas & reservoir disposal)	1.3E-01	6.8E-02	3.2E-02	6.3E-01	2.7E-01	3.8E-01	5.2E-01	2.9E-02	4.9E-03	1.2E-02	7.4E-01	2.9E-02	1.5E+00	1.2E+00	5.1E+01	1.8E+01
Year 4	Excavation and foundation preparation	2.9E-02	1.5E-02	6.9E-03	1.4E-01	5.8E-02	8.4E-02	1.1E-01	6.4E-03	1.1E-03	2.7E-03	1.6E-01	6.4E-03	3.4E-01	2.7E-01	1.1E+01	3.9E+00
Year 4	Construction of spillway structure	5.5E-02	2.8E-02	1.3E-02	2.6E-01	1.1E-01	1.6E-01	2.1E-01	1.2E-02	2.0E-03	5.0E-03	3.0E-01	1.2E-02	6.3E-01	5.0E-01	2.1E+01	7.4E+00
Year 4	Pipe, mechanical and electrical installation	1.9E-02	9.9E-03	4.6E-03	9.2E-02	3.9E-02	5.6E-02	7.6E-02	4.2E-03	7.1E-04	1.8E-03	1.1E-01	4.2E-03	2.3E-01	1.8E-01	7.5E+00	2.6E+00
Year 4	Installation and operating the Water Treatment System	2.9E-02	1.5E-02	6.9E-03	1.4E-01	5.8E-02	8.4E-02	1.1E-01	6.4E-03	1.1E-03	2.6E-03	1.6E-01	6.4E-03	3.4E-01	2.7E-01	1.1E+01	3.9E+00
Year 5	Miscellaneous Activities	2.6E-02	1.3E-02	6.0E-03	1.2E-01	5.1E-02	7.3E-02	1.0E-01	5.6E-03	9.3E-04	2.3E-03	1.4E-01	5.6E-03	3.0E-01	2.3E-01	1.1E+01	3.9E+00
Year 5	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	1.1E-02	5.4E-03	2.5E-03	5.0E-02	2.1E-02	3.1E-02	4.3E-02	2.3E-03	3.9E-04	9.7E-04	5.9E-02	2.3E-03	1.2E-01	9.7E-02	4.7E+00	1.6E+00
Year 5	Stage 3a Fill (incl. work at stockpile areas & reservoir disposal)	1.5E-01	7.8E-02	3.6E-02	7.3E-01	3.1E-01	4.4E-01	6.1E-01	3.3E-02	5.6E-03	1.4E-02	8.5E-01	3.3E-02	1.8E+00	1.4E+00	6.7E+01	2.4E+01
Year 5	Preparation, excavation, blasting, and hauling of material	2.3E-02	1.2E-02	5.5E-03	1.1E-01	4.7E-02	6.7E-02	9.4E-02	5.1E-03	8.5E-04	2.1E-03	1.3E-01	5.1E-03	2.7E-01	2.1E-01	1.0E+01	3.6E+00
Year 5	Strip sediment, excavate test trenches	1.6E-03	8.1E-04	3.8E-04	7.6E-03	3.2E-03	4.6E-03	6.5E-03	3.5E-04	5.8E-05	1.5E-04	8.9E-03	3.5E-04	1.9E-02	1.5E-02	7.0E-01	2.5E-01
Year 5	Construction of spillway structure	2.7E-02	1.4E-02	6.3E-03	1.3E-01	5.3E-02	7.7E-02	1.1E-01	5.8E-03	9.7E-04	2.4E-03	1.5E-01	5.8E-03	3.1E-01	2.4E-01	1.2E+01	4.1E+00
Year 5	Excavate sloping intake structure (upper half)	3.2E-03	1.6E-03	7.6E-04	1.5E-02	6.4E-03	9.2E-03	1.3E-02	7.0E-04	1.2E-04	2.9E-04	1.8E-02	7.0E-04	3.8E-02	2.9E-02	1.4E+00	4.9E-01
Year 5	Construction of sloping intake structure (upper half)	2.1E-02	1.1E-02	5.0E-03	1.0E-01	4.3E-02	6.1E-02	8.6E-02	4.6E-03	7.7E-04	1.9E-03	1.2E-01	4.6E-03	2.5E-01	1.9E-01	9.3E+00	3.3E+00
Year 5	Construction of CIP tunnel and outlet structure	3.2E-02	1.6E-02	7.6E-03	1.5E-01	6.4E-02	9.2E-02	1.3E-01	7.0E-03	1.2E-03	2.9E-03	1.8E-01	7.0E-03	3.7E-01	2.9E-01	1.4E+01	4.9E+00
Year 5	Excavate downstream portal trench and outlet structure foundation	6.4E-03	3.3E-03	1.5E-03	3.0E-02	1.3E-02	1.8E-02	2.6E-02	1.4E-03	2.3E-04	5.8E-04	3.6E-02	1.4E-03	7.5E-02	5.9E-02	2.8E+00	9.9E-01
Year 5	Pipe, mechanical and electrical installation	1.1E-02	5.4E-03	2.5E-03	5.1E-02	2.1E-02	3.1E-02	4.3E-02	2.3E-03	3.9E-04	9.7E-04	5.9E-02	2.3E-03	1.3E-01	9.8E-02	4.7E+00	1.6E+00
Year 5	Connection of the Pipeline and Force Main to the LLOW outlet structure	3.2E-03	1.6E-03	7.6E-04	1.5E-02	6.4E-03	9.2E-03	1.3E-02	7.0E-04	1.2E-04	2.9E-04	1.8E-02	7.0E-04	3.8E-02	3.0E-02	1.4E+00	4.9E-01
Year 5	Installation and operating the Water Treatment System	2.6E-02	1.3E-02	6.0E-03	1.2E-01	5.1E-02	7.3E-02	1.0E-01	5.6E-03	9.3E-04	2.3E-03	1.4E-01	5.6E-03	3.0E-01	2.3E-01	1.1E+01	3.9E+00

Table 9
Construction Gasoline Truck TOG-Speciated Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Year	Construction Activity	Emission (ton/yr)[1]															
		1,3-Butadiene	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	n-hexane	Methanol	Methyl Ethyl Ketone	Naphthalene	Propene	Styrene	Toluene	Xylenes	DPM	$PM_{2.5}$
Year 6	Miscellaneous Activities	2.3E-02	1.1E-02	5.3E-03	1.1E-01	4.5E-02	6.5E-02	9.2E-02	4.9E-03	8.2E-04	2.0E-03	1.3E-01	4.9E-03	2.7E-01	2.1E-01	1.1E+01	3.9E+00
Year 6	Hauling filter and drain material to the site and stockpiling in Staging Area 1E	9.4E-03	4.8E-03	2.2E-03	4.5E-02	1.9E-02	2.7E-02	3.8E-02	2.0E-03	3.4E-04	8.5E-04	5.2E-02	2.0E-03	1.1E-01	8.6E-02	4.7E+00	1.6E+00
Year 6	Construct bypass pump system	1.9E-03	9.7E-04	4.5E-04	9.1E-03	3.8E-03	5.5E-03	8.0E-03	4.1E-04	6.9E-05	1.7E-04	1.1E-02	4.1E-04	2.3E-02	1.7E-02	9.3E-01	3.3E-01
Year 6	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	9.0E-02	4.6E-02	2.1E-02	4.3E-01	1.8E-01	2.6E-01	3.7E-01	2.0E-02	3.3E-03	8.2E-03	5.0E-01	2.0E-02	1.1E+00	8.3E-01	4.5E+01	1.6E+01
Year 6	Excavation, blasting, and hauling of material	7.5E-03	3.8E-03	1.8E-03	3.6E-02	1.5E-02	2.2E-02	3.1E-02	1.6E-03	2.7E-04	6.8E-04	4.2E-02	1.6E-03	8.9E-02	6.9E-02	3.7E+00	1.3E+00
Year 6	Excavation, hauling & moisture conditioning	3.8E-03	1.9E-03	8.9E-04	1.8E-02	7.5E-03	1.1E-02	1.5E-02	8.2E-04	1.4E-04	3.4E-04	2.1E-02	8.2E-04	4.4E-02	3.4E-02	1.9E+00	6.6E-01
Year 6	Excavate sloping intake structure (lower half)	1.9E-03	9.7E-04	4.5E-04	9.1E-03	3.8E-03	5.5E-03	8.0E-03	4.1E-04	6.9E-05	1.7E-04	1.1E-02	4.1E-04	2.3E-02	1.7E-02	9.3E-01	3.3E-01
Year 6	Construction of sloping intake structure (lower half)	1.1E-02	5.8E-03	2.7E-03	5.4E-02	2.3E-02	3.2E-02	4.7E-02	2.5E-03	4.1E-04	1.0E-03	6.3E-02	2.5E-03	1.3E-01	1.0E-01	5.6E+00	2.0E+00
Year 6	Pipe, mechanical and electrical installation	7.5E-03	3.8E-03	1.8E-03	3.6E-02	1.5E-02	2.2E-02	3.1E-02	1.6E-03	2.7E-04	6.9E-04	4.2E-02	1.6E-03	8.9E-02	6.9E-02	3.7E+00	1.3E+00
Year 6	Demolish diversion intake structure	1.9E-03	9.7E-04	4.5E-04	9.2E-03	3.9E-03	5.5E-03	8.2E-03	4.2E-04	6.9E-05	1.7E-04	1.1E-02	4.2E-04	2.3E-02	1.8E-02	9.3E-01	3.3E-01
Year 6	Construct pipe supports, lining at Diversion Tunnel/LLOT intersection	5.7E-03	2.9E-03	1.3E-03	2.7E-02	1.1E-02	1.6E-02	2.4E-02	1.2E-03	2.1E-04	5.2E-04	3.2E-02	1.2E-03	6.7E-02	5.2E-02	2.8E+00	9.8E-01
Year 6	Pipe, mechanical and electrical installation	1.5E-02	7.7E-03	3.6E-03	7.2E-02	3.0E-02	4.3E-02	6.2E-02	3.3E-03	5.5E-04	1.4E-03	8.4E-02	3.3E-03	1.8E-01	1.4E-01	7.5E+00	2.6E+00
Year 6	Excavation and foundation preparation	5.7E-03	2.9E-03	1.3E-03	2.7E-02	1.1E-02	1.6E-02	2.3E-02	1.2E-03	2.1E-04	5.1E-04	3.1E-02	1.2E-03	6.7E-02	5.2E-02	2.8E+00	9.8E-01
Year 6	Installation and operating the Water Treatment System	2.2E-02	1.1E-02	5.3E-03	1.1E-01	4.5E-02	6.5E-02	9.2E-02	4.9E-03	8.2E-04	2.0E-03	1.3E-01	4.9E-03	2.6E-01	2.1E-01	1.1E+01	3.9E+00
Year 7	Miscellaneous Activities	1.5E-02	7.8E-03	3.6E-03	7.3E-02	3.1E-02	4.4E-02	6.4E-02	3.3E-03	5.6E-04	1.4E-03	8.5E-02	3.3E-03	1.8E-01	1.4E-01	8.4E+00	3.0E+00
Year 7	Construction of concrete lined channel	3.8E-02	1.9E-02	9.0E-03	1.8E-01	7.7E-02	1.1E-01	1.6E-01	8.3E-03	1.4E-03	3.5E-03	2.1E-01	8.3E-03	4.5E-01	3.5E-01	2.1E+01	7.4E+00
Year 7	Restoring parking areas and construction of permanent access roads	3.1E-02	1.6E-02	7.2E-03	1.5E-01	6.1E-02	8.8E-02	1.3E-01	6.7E-03	1.1E-03	2.8E-03	1.7E-01	6.7E-03	3.6E-01	2.8E-01	1.7E+01	5.9E+00
Year 7	Allowance - scope to be determined	1.5E-02	7.8E-03	3.6E-03	7.3E-02	3.1E-02	4.4E-02	6.4E-02	3.3E-03	5.6E-04	1.4E-03	8.5E-02	3.3E-03	1.8E-01	1.4E-01	8.4E+00	3.0E+00

Notes:

1. TOG was speciated according to the profile provided by BAAQMD Recommended Methods For Screening and Modeling Local Risks and Hazards.

2. All PM_{10} is taken to be DPM for the purpose of health risk assessment.

Abbreviations:

DPM - diesel particulate matter
PM - particulate matter
TOG - total organic gases
yr - year

References:

BAAQMD Recommended Methods For Screening and Modeling Local Risks and Hazards:
Available Online at: https://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20Modeling%20Approach.ashx

Table 10
Construction Boats Emission Factor Derivation
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Input Parameters[1]

Equipment Type	Fuel Type	Power Rating (HP)	Classification	Engine Type[2]	Model Year[2]	HP Bin
Boat - 30' Work Boat	Gasoline	400	Pleasure Craft - Vessels W/ Outboard Engines	G2-CARB	2010	500
Boat - 16' Whaler	Gasoline	115	Pleasure Craft - Vessels W/ Outboard Engines	G2-CARB	2010	120
Boat - 16' Skiff	Gasoline	40	Pleasure Craft - Vessels W/ Outboard Engines	G2-CARB	2010	50

Exhaust Emission Factors[3]

Equipment Type	NO_x	ROG	PM	CO_2	CH_4	N_2O[4]
	g/hp-hr					
Boat - 30' Work Boat	0.23	12	7.1	636	12	0.023
Boat - 16' Whaler	2.8	10	7.1	636	10	0.023
Boat - 16' Skiff	2.6	11	7.1	636	11	0.023

ROG Evaporative Emission Factors[3]

Equipment Type	Hotsoak	Diurnal	Resting Loss	Running Loss
	g/event	g/day	g/day	g/hr
Boat - 30' Work Boat	16	24	15	2.1
Boat - 16' Whaler	16	24	15	2.1
Boat - 16' Skiff	16	24	15	2.1

Abbreviations:

CARB - California Air Resources Board
G2-CARB - 2-stroke fuel injection engine
HC - total hydrocarbons
HP - horsepower
NOx - nitrogen oxides
PM - particulate matter
ROG - reactive organic gases
USEPA - United States Environmental Protection Agency

Notes:

1. Input parameters were provided by Valley Water and matched to their respective gasoline-fueled boat classifications in CARB's
2. Since no boat engine type was provided, the most conservative engine type (2-stroke fuel-injected) was selected. Valley Water has indicated that they will use boats newer than 2010.
3. Zero-hour emission factors for NOx, ROG, PM, CO, CO_2, and CH_4 were derived from the PC Model Database. ROG emission factors were converted from total hydrocarbon emission factors based on values from the PC model.
4. N_2O emission factors sourced from the USEPA Emission Factors for Greenhouse Gas Emission Inventories, Table 5 for 2-stroke gasoline fueled ships and boats.

References:

CARB. Pleasure Craft (PC) Model Database. 2014. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-

Sea Grant Alaska. 2011. Saving Fuel on Your Recreational or Charter Boat. Available at: https://nsgl.gso.uri.edu/aku/akug11009.pdf. Accessed January 2022.

U.S. Environmental Protection Agency (USEPA). Emission Factors for Greenhouse Gas Emission Inventories. Available at: https://www.epa.gov/sites/default/files/2021-04/documents/emission-factors_apr2021.pdf. Accessed January 2022.

Table 11
Project Construction Boat Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Input Parameters[1]

Equipment Type	Fuel Type	Power Rating (HP)	Classification	Engine Type[2]	Model Year[2]	HP Bin
Boat - 30' Work Boat	Gasoline	400	Pleasure Craft - Vessels W/ Outboard Engines	G2-CARB	2010	500
Boat - 16' Whaler	Gasoline	115	Pleasure Craft - Vessels W/ Outboard Engines	G2-CARB	2010	120
Boat - 16' Skiff	Gasoline	40	Pleasure Craft - Vessels W/ Outboard Engines	G2-CARB	2010	50

Exhaust Emissions[3]

Equipment Type	NO_x	ROG	PM	CO_2	CH_4	N_2O
	ton/yr					
Boat - 30' Work Boat	0.13	6.5	4.0	356	6.4	0.013
Boat - 16' Whaler	0.44	1.6	1.1	102	1.5	0.0037
Boat - 16' Skiff	0.15	0.60	0.40	36	0.59	0.0013

ROG Evaporative Emissions[3]

Equipment Type	Hotsoak[4]	Diurnal	Resting Loss	Running Loss
	g/yr			
Boat - 30' Work Boat	11,752	1,035	1,322	3,385
Boat - 16' Whaler	11,752	1,035	1,322	3,385
Boat - 16' Skiff	11,752	1,035	1,322	3,385

Boat Emissions

Equipment Type	NO_x	ROG	PM_{10}[4]	$PM_{2.5}$[4]	CO_2	CH_4	N_2O
	ton/yr						
Boat - 30' Work Boat	0.13	6.5	3.6	2.7	356	6.4	0.013
Boat - 16' Whaler	0.44	1.6	1.0	0.78	102	1.5	0.0037
Boat - 16' Skiff	0.15	0.62	0.36	0.27	36	0.59	0.0013
Total	**0.72**	**8.7**	**5.0**	**3.7**	**494**	**8.6**	**0.018**

Abbreviations:

G2-FI - 2-stroke fuel injection engine
NOx - nitrogen oxides
PM - particulate matter
HC - total hydrocarbons
ROG - reactive organic gases
CO - carbon monoxide
SO_2 - sulfur dioxide
SOx - sulfur oxides
CO_2 - carbon dioxide
CH_4 - methane
N_2O - nitrous oxide
hp-hr - horsepower-hour
CARB - California Air Resources Board
USEPA - United States Environmental Protection Agency
HP - horsepower

Notes:

1. Input parameters were provided by Valley Water and matched to their respective gasoline-fueled boat classifications in CARB's Pleasure Craft (PC) Model Database.
2. Valley Water has committed to using boats of model year 2010 or newer.
3. ROG emissions were calculated following the methodology used by CARB's Pleasure Craft Model Database, which matches the OFFROAD equipment methodology . The number of engine starts was conservatively assumed to be four times per day to account for transport to and from the work area, including a lunch break, based on the workdays given by the provided construction duration and utilization.
4. PM_{10} and $PM_{2.5}$ emissions were calculated as a fraction of total PM emissions using speciation fractions of 0.9 and 0.68, respectively; these fractions were sourced from the PC Model database.

References:

CARB. Pleasure Craft (PC) Model Database. 2014. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road-0. Accessed January 2022.

Table 12
Boat TOG-Speciated Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Chemical[1]	Emission (ton/yr)		
	Boat - 30' Work Boat	Boat - 16' Whaler	Boat - 16' Skiff
1,3-Butadiene	0.043	0.010	0.0040
Acetaldehyde	0.022	0.0053	0.0020
Acrolein	0.010	0.0024	9.4E-04
Benzene	0.19	0.047	0.018
Ethylbenzene	0.083	0.020	0.0076
Formaldehyde	0.12	0.030	0.011
n-hexane	0.13	0.030	0.012
Methanol	0.0094	0.0023	8.7E-04
Methyl Ethyl Ketone	0.0016	3.8E-04	1.5E-04
Naphthalene	0.0039	9.4E-04	3.6E-04
Propene	0.24	0.058	0.022
Styrene	0.0094	0.0023	8.7E-04
Toluene	0.45	0.11	0.042
Xylenes	0.38	0.091	0.035
DPM	3.6	1.0	0.36
$PM_{2.5}$	2.7	0.78	0.27

Notes:

1. TOG was speciated according to the profile provided by BAAQMD's Recommended Methods For Screening and Modeling Local Risks and Hazards.
2. All PM_{10} is taken to be DPM for the purpose of emissions.

Abbreviations:

DPM - diesel particulate matter
PM - particulate matter
TOG - total organic gases
yr - year

References:

BAAQMD Recommended Methods For Screening and Modeling Local Risks and Hazards. Available Online at:https://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20Modeling%20Approach.ashx

Table 13
Blasting Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Year	Unmitigated Emissions						Mitigated Emissions[2]					
	TSP	PM_{10}	$PM_{2.5}$	CO	NO_X	SO_2	TSP	PM_{10}	$PM_{2.5}$	CO	NO_X	SO_2
	ton						ton					
Year 5	3.6	1.9	1.9	1.9	0.48	0.057	1.5	0.80	0.80	1.9	0.48	0.057
Year 6	13	6.9	6.9	7.2	1.8	0.22	5.8	3.0	3.0	7.2	1.8	0.22
Total	**17**	**8.7**	**8.7**	**9.1**	**2.3**	**0.27**	**7.3**	**3.8**	**3.8**	**9.1**	**2.3**	**0.27**

Notes:

1. Emissions represent the combined sum of emissions from blast hole drilling, entrained blasting dust, and criteria emisssions from blasting. Emissions assume wet drilling operation.
2. Particulate matter emissions are assumed to be controlled by 75% with complete coverage of the blasting site by wind screens, consistent with Mojave Desert Air Quality Management District Emissions Inventory Guidance.

Abbreviations:

ANFO - Amonium Nitrate/Fuel Oil
AQMD - Air Quality Management District
CO - carbon monoxide
lbs - pounds
NO_X - nitrogen oxides
PM_{10} - particulate matter with diameter of 10 micrometers or less
$PM_{2.5}$ - particulate matter with diameter of 2.5 micrometers or less
SO_2 - sulfur dioxide
TSP - total suspended particulates
USEPA - United States Environmental Protection Agency

References:

Mojave Desert AQMD. Mojave Desert AQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries. November 4, 1999. Available at: https://www.mdaqmd.ca.gov/home/showpublisheddocument/768/636305689272570000. Accessed April 2023.

USEPA. AP-42: Compilation of Air Emissions Factors. Section 11.9 Western Surface Coal Mining. 2010. Available at https://www.epa.gov/sites/default/files/2020-10/documents/c11s09.pdf. Accessed April 2023.

USEPA. AP-42: Compilation of Air Emissions Factors. Section 13.3 Explosives Detonation. 2010. Available at https://www.epa.gov/sites/default/files/2020-10/documents/13.3_explosives_detonation.pdf. Accessed April 2023.

Mojave Desert Air Quality Management District Emissions Inventory Guidance. Section D. Bulldozing, Scraping and Grading of Materials. Available at: https://www.mdaqmd.ca.gov/home/showpublisheddocument/768/636305689272570000. Accessed April 2023.

Table 14-a
Emissions from Blast Hole Drilling
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Year	Number of Holes Drilled[1]	Emission Factors[2]			Unmitigated Emissions[4]			Mitigated Emissions[3,4]		
		TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$
		lb/hole			ton			ton		
Year 5	5,400	1.3	0.68	0.68	3.5	1.8	1.8	0.88	0.46	0.46
Year 6	20,200				13	6.9	6.9	3.3	1.7	1.7
Total	**25,600**				**17**	**8.7**	**8.7**	**4.2**	**2.2**	**2.2**

Notes:

1. Valley Water provided blasting information that included the annual number of blast holes drilled.
2. The emission factor for TSP was selected from USEPA AP-42 Table 11.9-4. Emission factors for PM_{10} and $PM_{2.5}$ were selected from the Mojave Desert AQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries, as AP-42 does not provide PM_{10} and $PM_{2.5}$ emission factors.
3. Particulate matter emissions are assumed to be controlled by 75% with complete coverage of the blasting site by wind screens, consistent with Mojave Desert Air Quality Management District Emissions Inventory Guidance.
4. This emission methodology does not include exhaust emissions from drilling equipment and assumes a wet drilling operation.

Abbreviations:

AQMD - Air Quality Management District
lbs - pounds
PM_{10} - particulate matter with diameter of 10 micrometers or less
$PM_{2.5}$ - particulate matter with diameter of 2.5 micrometers or less
TSP - total suspended particulates
USEPA - United States Environmental Protection Agency

References:

Mojave Desert AQMD. Mojave Desert AQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries. November 4, 1999. Available at: https://www.mdaqmd.ca.gov/home/showpublisheddocument/768/636305689272570000. Accessed April 2023.

USEPA. AP-42: Compilation of Air Emissions Factors. Section 11.9 Western Surface Coal Mining. 2010. Available at https://www.epa.gov/sites/default/files/2020-10/documents/c11s09.pdf. Accessed April 2023.

Table 14-b
Blasting Dust Entrainment
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Year	Number of Blasts[1]	Area Shifted by Blasting[2]	PM Size Factor			Unmitigated Emissions[3]			Mitigated Emissions[3,4]		
			TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$
		sq. ft. per blast	Unitless			ton			ton		
Year 5	66	2,953	1.00	0.52	0.52	2.6	1.4	1.4	0.66	0.34	0.34
Year 6	246					10	5.1	5.1	2.5	1.3	1.3
Total	**312**					**13**	**6.5**	**6.5**	**3.1**	**1.6**	**1.6**

Notes:

1. The number of blasts was conservatively assumed to be based on a six-foot distance between blast holes, spanning one-half the distance of the Basalt Hill Borrow Area. Total number of blast holes was provided by Valley Water.
2. Area shifted per blast was determined assuming a 6x6 foot area disturbed per blast hole.
3. Blasting dust entrainment calculations are based on the "Most Complex" Mojave Desert AQMD Guidance Methodology B for dust entrainment from blasting, consistent with guidance in USEPA AP-42 Table 11.9-2.
3. Particulate matter emissions are assumed to be controlled by 75% with complete coverage of the blasting site by wind screens, consistent with Mojave Desert Air Quality Management District Emissions Inventory Guidance.

Abbreviations:

AQMD - Air Quality Management District

lbs - pounds

PM_{10} - particulate matter with diameter of 10 micrometers or less

$PM_{2.5}$ - particulate matter with diameter of 2.5 micrometers or less

TSP - total suspended particulates

USEPA - United States Environmental Protection Agency

References:

Mojave Desert AQMD. Mojave Desert AQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries. November 4, 1999. Available at: https://www.mdaqmd.ca.gov/home/showpublisheddocument/768/636305689272570000. Accessed April 2023.

USEPA. AP-42: Compilation of Air Emissions Factors. Section 11.9 Western Surface Coal Mining. 2010. Available at https://www.epa.gov/sites/default/files/2020-10/documents/c11s09.pdf. Accessed April 2023.

Table 14-c
Blasting Criteria Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Year	Explosive Type[1]	Amount of Explosives Detonated[1]	Emission Factor[2]			Emissions		
			CO	NO_x	SO_2	CO	NO_x	SO_2
		ton	lb/ton			ton		
Year 5	ANFO	57	67	17	2.0	1.9	0.48	0.057
Year 6	ANFO	215				7.2	1.8	0.22
Total	**--**	**272**				**9.1**	**2.3**	**0.27**

Notes:

1. Valley Water provided blasting information that included the type and amount of explosives detonated in each year.
2. Emission factors were selected from the Mojave Desert AQMD Guidance for criteria emissions from blasting, which correspond to USEPA AP-42 Table 13.3-1. VOC emissions are considered negligible for all exlosives. TSP, PM_{10}, and $PM_{2.5}$ emissions are subsumed within the dust entrainment emissions.

Abbreviations:

ANFO - Amonium Nitrate/Fuel Oil
AQMD - Air Quality Management District
CO - carbon monoxide
lbs - pounds
NO_X - nitrogen oxides
PM_{10} - particulate matter with diameter of 10 micrometers or less
$PM_{2.5}$ - particulate matter with diameter of 2.5 micrometers or less
SO_2 - sulfur dioxide
USEPA - United States Environmental Protection Agency
VOC - volatile organic compounds

References:

Mojave Desert AQMD. Mojave Desert AQMD Emissions Inventory Guidance for Mineral Handling and Processing Industries. November 4, 1999. Available at: https://www.mdaqmd.ca.gov/home/showpublisheddocument/768/636305689272570000. Accessed April 2023.

USEPA. AP-42: Compilation of Air Emissions Factors. Section 11.9 Western Surface Coal Mining. 2010. Available at https://www.epa.gov/sites/default/files/2020-10/documents/c11s09.pdf. Accessed April 2023.

USEPA. AP-42: Compilation of Air Emissions Factors. Section 13.3 Explosives Detonation. 2010. Available at https://www.epa.gov/sites/default/files/2020-10/documents/13.3_explosives_detonation.pdf. Accessed April 2023.

Table 15
Blasting PM_{10} Speciated Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Chemical[1]	Multi-Pathway Pollutant?	Composition (mg/kg)[1]	Emission (lb/yr)	
			Year 5	Year 6
Silver	No	0.26	4.2E-04	0.0016
Arsenic	Yes	7.4	0.012	0.044
Barium	No	206	0.33	1.2
Beryllium	Yes	0.71	0.0011	0.0042
Cadmium	Yes	0.49	7.9E-04	0.0030
Cobalt	No	41	0.065	0.24
Chromium (Hexavalent)	Yes	315	0.025	0.094
Copper	No	77	0.12	0.46
Mercury	No	0.11	1.7E-04	6.4E-04
Molybdenum	No	2.6	0.0042	0.016
Nickel	Yes	968	1.6	5.8
Lead	Yes	8.9	0.014	0.053
Vanadium	No	70	0.11	0.42
Zinc	No	453	0.73	2.7

Notes:

1. PM_{10} was speciated according to a speciation profile based on the median and 95% UCL of data collected from onsite sampling data of soil composition for chronic and acute impacts, respectively.

2. Speciation is of PM_{10} released through blasting dust entrainment and blast hole drilling.

3. Hexavalent chromium was taken to be 5% of the total chromium composition, consistent with guidance for aggregate piles provided by the San Joaquin Valley Air Pollution Control District.

Abbreviations:

mg - milligrams
kg - kilograms
lb - pound
yr - year
PM - particulate matter
UCL - upper confidence level

References:

SJVAPCD, AB 2588 Hot Spots Air Toxics Profiles. March 2017.

Table 16
Unmitigated Construction CAP Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		ton/yr			
Year 1	2024	54	19	5.6	4.3
Year 2	2025	14	162	5.4	5.2
Year 3	2026	13	152	5.1	4.9
Year 4	2027	16	179	6.0	5.7
Year 5	2028	13	150	5.0	4.7
Year 6	2029	14	160	4.9	4.7
Year 7	2030	1.6	12	0.33	0.29

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		lb/day			
Year 1	2024	**398**	**138**	41	32
Year 2	2025	**88**	**996**	33	32
Year 3	2026	**82**	**932**	32	30
Year 4	2027	**92**	**1,015**	34	32
Year 5	2028	**83**	**922**	30	29
Year 6	2029	**86**	**983**	30	29
Year 7	2030	11	**84**	2.3	2.0
BAAQMD Threshold[1]		54	54	82	54

Notes:

1. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines. For PM, this includes exhaust emissions only. Fugitive emissions are controlled by BAAQMD Best Management Practices.

Abbreviations:

ROG - reactive organic gases

BAAQMD - Bay Area Air Quality Management District

PM - particulate matter

yr - year

CAP - criteria air pollutants

lb - pound

Table 17
Mitigated Construction CAP Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		ton/yr			
Year 1	2024	9.1	3.7	5.1	3.8
Year 2	2025	4.5	36	0.83	0.81
Year 3	2026	4.6	24	0.79	0.75
Year 4	2027	5.6	38	1.0	1.0
Year 5	2028	4.8	29	0.87	0.82
Year 6	2029	4.9	42	0.92	0.89
Year 7	2030	0.45	3.3	0.10	0.086

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		lb/day			
Year 1	2024	**67**	28	37	28
Year 2	2025	28	**224**	5.1	5.0
Year 3	2026	28	**150**	4.9	4.6
Year 4	2027	32	**216**	5.8	5.5
Year 5	2028	30	**178**	5.3	5.0
Year 6	2029	30	**262**	5.7	5.5
Year 7	2030	3.1	22	0.70	0.58
BAAQMD Threshold[1]		54	54	82	54

Notes:

1. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines. For PM, this includes exhaust emissions only. Fugitive emissions are controlled by BAAQMD Best Management Practices.

Abbreviations:

ROG - reactive organic gases
PM - particulate matter
CAP - criteria air pollutants
BAAQMD - Bay Area Air Quality Management District
yr - year
lb - pound

References:

2023 CEQA Statute and Guidelines. Available online at: https://www.califaep.org/docs/CEQA_Handbook_2023_final.pdf

Table 18
Unmitigated Construction GHG Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Year		CO_2	CH_4	N_2O	CO_2e
		MT/yr			
Year 1	2024	4,040	46	0.066	5,215
Year 2	2025	26,229	1.0	0.23	26,322
Year 3	2026	26,561	1.0	0.24	26,660
Year 4	2027	34,340	1.3	0.34	34,475
Year 5	2028	29,060	1.1	0.28	29,173
Year 6	2029	29,591	1.2	0.30	29,710
Year 7	2030	3,980	0.14	0.057	4,000

Abbreviations:

GHG - greenhouse gases
CO_2e - CO_2-equivalent emissions
yr - year
MT - metric tonne

Table 19
Mitigated Construction GHG Emissions
Anderson Dam Seismic Retrofit
Santa Clara County, CA

Construction Year		CO_2	CH_4	N_2O	CO_2e[1]
		MT/yr			
Year 1	2024	4,040	7.8	0.066	4,254
Year 2	2025	26,229	1.0	0.23	26,322
Year 3	2026	26,561	1.0	0.24	26,660
Year 4	2027	34,340	1.3	0.34	34,475
Year 5	2028	29,060	1.1	0.28	29,173
Year 6	2029	29,591	1.2	0.30	29,710
Year 7	2030	3,980	0.14	0.057	4,000

Abbreviations:

GHG - greenhouse gases
CO_2e - CO_2-equivalent emissions
yr - year
MT - metric tonne

Table 20
Construction Phasing Schedule
Ogier Ponds Conservation Measure
Santa Clara County, CA

Year	Construction Activity	Start Date	End Date	Calendar Year	Number of Days[2]
Year 6	Miscellaneous Activities	6/1/2029	12/31/2029	2029	152
	Clear and Grub	6/1/2029	9/1/2029	2029	66
	Construction of the Haul Roads and Preparation of Stockpile Areas	6/1/2029	9/1/2029	2029	66
	Construct creek bypass system	6/1/2029	7/1/2029	2029	21
	Dewater Pond 1	6/1/2029	9/1/2029	2029	66
	Pond 1 Fill Borrow Hill Excavation	8/1/2029	10/1/2029	2029	44
	Pond 1 Fill Import from Bassalt Hill Excavation	8/1/2029	1/1/2030	2029-2030	110
Year 7	Miscellaneous Activities	6/1/2030	12/31/2030	2030	152
	Excavate and Sort Creek Materials from Holiday Bench Excavation	6/1/2030	10/1/2030	2030	87
	Bypass Channel	6/1/2030	11/1/2030	2030	110
	Berms	6/1/2030	11/1/2030	2030	110
	Spillway	11/1/2030	1/1/2031	2030-2031	44
	Outlet Culverts	11/1/2030	1/1/2031	2030-2031	44
Year 8	Miscellaneous Activities	1/1/2031	9/1/2031	2031	174
	Spillway	1/1/2031	2/1/2031	2031	23
	Outlet Culverts	1/1/2031	2/1/2031	2031	23
	Planting	4/1/2031	9/1/2031	2031	110
	Allowance -scope to be determined	1/1/2031	9/1/2031	2031	174

Notes:

1. Construction schedule and phasing information were provided by Valley Water.
2. Project construction will generally occur on Mondays through Fridays between the hours of 6 AM and 6 PM. Equipment maintenance will occur on Saturdays.

Table 21
Construction Equipment List
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Miscellaneous Activities	Year 6	7	Medium excavator	Diesel	0.5	1	172	10
	Year 6	7	Loader	Diesel	0.5	1	298	10
	Year 6	7	Light truck - Forman	Gasoline	1	1	290	10
	Year 6	7	Light truck - Crew	Gasoline	1	1	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 6	3	Medium Bulldozer	Diesel	0.9	1	354	10
	Year 6	3	Medium excavator	Diesel	0.9	1	273	10
	Year 6	3	Motor grader	Diesel	0.9	1	290	10
	Year 6	3	Track drill rig	Diesel	0.9	1	201	10
	Year 6	3	Light truck - Forman	Gasoline	0.9	2	290	10
	Year 6	3	Light truck - Crew	Gasoline	0.9	2	290	10
	Year 6	3	Articulated dump truck	Diesel	0.9	2	496	10
	Year 6	3	Water truck	Diesel	0.9	2	330	10
	Year 6	3	Pump for water trucks	Diesel	1	1	74	10
	Year 6	3	Loader	Diesel	0.9	1	298	10
Construct creek bypass system	Year 6	1	Long-reach excavator	Diesel	0.9	1	424	10
	Year 6	1	Generator (80 kW)	Diesel	1	1	152	10
	Year 6	1	Light truck - Forman	Gasoline	0.9	1	290	10
	Year 6	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 6	1	Articulated dump truck	Diesel	0.9	1	496	10
	Year 6	1	Water truck	Diesel	0.9	1	330	10
	Year 6	1	Pump for water trucks	Diesel	0.9	1	74	10
	Year 6	1	Loader	Diesel	0.9	1	298	10

Table 21
Construction Equipment List
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Dewater Pond 1	Year 6	3	Pump	Diesel	0.7	40	17	24
	Year 6	3	Long-reach excavator	Diesel	0.9	1	424	10
	Year 6	3	Generator (80 kW)	Diesel	1	1	152	10
	Year 6	3	Light truck - Forman	Gasoline	0.9	1	290	10
	Year 6	3	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 6	2	Bulldozer	Diesel	0.9	1	722	10
	Year 6	2	Long-reach excavator	Diesel	0.9	1	424	10
	Year 6	2	Loader	Diesel	0.9	2	298	10
	Year 6	2	Light truck - Forman	Gasoline	0.9	1	290	10
	Year 6	2	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 6	2	Articulated dump truck	Diesel	0.9	2	496	10
	Year 6	2	Water truck	Diesel	0.9	0	330	10
	Year 6	2	Pump for water trucks	Diesel	0.9	0	74	10
Pond 1 Fill Borrow Hill Excavation	Year 6	2	Bulldozer	Diesel	0.9	1	722	10
	Year 6	2	Long-reach excavator	Diesel	0.9	1	424	10
	Year 6	2	Loader	Diesel	0.9	1	298	10
	Year 6	2	Light truck - Forman	Gasoline	0.9	1	290	10
	Year 6	2	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 6	2	Articulated dump truck	Diesel	0.9	20	496	10
	Year 6	2	Water truck	Diesel	0.9	1	330	10
	Year 6	2	Pump for water trucks	Diesel	0.9	1	74	10
Pond 1 Fill Import from Bassalt Hill Excavation	Year 6	2	Bulldozer	Diesel	0.9	0	722	10
	Year 6	2	Long-reach excavator	Diesel	0.9	0	424	10
	Year 6	2	Loader	Diesel	0.9	1	298	10
	Year 6	2	Light truck - Forman	Gasoline	0.9	1	290	10
	Year 6	2	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 6	2	Articulated dump truck	Diesel	0.9	20	496	10
	Year 6	2	Water truck	Diesel	0.9	1	330	10
	Year 6	2	Pump for water trucks	Diesel	0.9	1	74	10
Miscellaneous Activities	Year 7	7	Medium excavator	Diesel	0.5	1	172	10
	Year 7	7	Loader	Diesel	0.5	1	298	10
	Year 7	7	Light truck - Forman	Gasoline	1	1	290	10
	Year 7	7	Light truck - Crew	Gasoline	1	1	290	10

Table 21
Construction Equipment List
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Excavate and Sort Creek Materials from Holiday Bench Excavation	Year 7	4	Bulldozer	Diesel	0.9	2	722	10
	Year 7	4	Long-reach excavator	Diesel	0.9	1	424	10
	Year 7	4	Loader	Diesel	0.9	2	298	10
	Year 7	4	Light truck - Forman	Gasoline	0.9	1	290	10
	Year 7	4	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 7	4	Articulated dump truck	Diesel	0.9	20	496	10
	Year 7	4	Water truck	Diesel	0.9	1	330	10
	Year 7	4	Pump for water trucks	Diesel	0.9	1	74	10
Bypass Channel	Year 7	5	Bulldozer	Diesel	0.7	2	722	10
	Year 7	5	Motor grader	Diesel	0.9	1	290	10
	Year 7	5	Long-reach excavator	Diesel	0.9	1	424	10
	Year 7	5	Tamping foot roller	Diesel	0.7	1	405	10
	Year 7	5	Light truck - Forman	Gasoline	0.9	1	290	10
	Year 7	5	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 7	5	Articulated dump truck	Diesel	0.9	2	496	10
	Year 7	5	Water truck	Diesel	0.9	1	330	10
	Year 7	5	Pump for water trucks	Diesel	0.9	1	74	10
Berms	Year 7	5	Bulldozer	Diesel	0.7	2	722	10
	Year 7	5	Motor grader	Diesel	0.9	1	290	10
	Year 7	5	Long-reach excavator	Diesel	0.9	1	424	10
	Year 7	5	Tamping foot roller	Diesel	0.7	1	405	10
	Year 7	5	Light truck - Forman	Gasoline	0.9	1	290	10
	Year 7	5	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 7	5	Articulated dump truck	Diesel	0.9	2	496	10
	Year 7	5	Water truck	Diesel	0.9	1	330	10
	Year 7	5	Pump for water trucks	Diesel	0.9	1	74	10

Table 21
Construction Equipment List
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Spillway	Year 7	2	Concrete pump truck	Diesel	0.7	1	500	10
	Year 7	2	Compressor	Diesel	0.7	1	173	10
	Year 7	2	Bobcat	Diesel	0.7	1	68	10
	Year 7	2	Loader	Diesel	0.7	1	298	10
	Year 7	2	Manlift	Diesel	0.7	2	67	10
	Year 7	2	Crane 150t	Diesel	0.7	0	300	10
	Year 7	2	Pump	Diesel	1	2	17	10
	Year 7	2	Welder	Diesel	0.7	2	66	10
	Year 7	2	Concrete vibrator	Gasoline	0.7	4	6.5	10
	Year 7	2	Generator (80 kW)	Diesel	1	1	152	10
	Year 7	2	Light truck - Forman	Gasoline	1	2	290	10
	Year 7	2	Light truck - Crew	Gasoline	1	1	290	10
	Year 7	2	Light truck - Carpenters	Gasoline	1	2	290	10
Outlet Culverts	Year 7	2	Concrete pump truck	Diesel	0.7	1	500	10
	Year 7	2	Compressor	Diesel	0.7	1	173	10
	Year 7	2	Bobcat	Diesel	0.7	1	68	10
	Year 7	2	Loader	Diesel	0.7	1	298	10
	Year 7	2	Manlift	Diesel	0.7	2	67	10
	Year 7	2	Crane 150t	Diesel	0.7	1	300	10
	Year 7	2	Pump	Diesel	1	2	17	10
	Year 7	2	Welder	Diesel	0.7	2	66	10
	Year 7	2	Concrete vibrator	Gasoline	0.7	4	6.5	10
	Year 7	2	Generator (80 kW)	Diesel	1	1	152	10
	Year 7	2	Light truck - Forman	Gasoline	1	2	290	10
	Year 7	2	Light truck - Crew	Gasoline	1	1	290	10
	Year 7	2	Light truck - Carpenters	Gasoline	1	2	290	10
Miscellaneous Activities	Year 8	8	Medium excavator	Diesel	0.5	1	172	10
	Year 8	8	Loader	Diesel	0.5	1	298	10
	Year 8	8	Light truck - Forman	Gasoline	1	1	290	10
	Year 8	8	Light truck - Crew	Gasoline	1	1	290	10

Table 21
Construction Equipment List
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Spillway	Year 8	1	Concrete pump truck	Diesel	0.7	1	500	10
	Year 8	1	Compressor	Diesel	0.7	1	173	10
	Year 8	1	Bobcat	Diesel	0.7	1	68	10
	Year 8	1	Loader	Diesel	0.7	1	298	10
	Year 8	1	Manlift	Diesel	0.7	2	67	10
	Year 8	1	Crane 150t	Diesel	0.7	0	300	10
	Year 8	1	Pump	Diesel	1	2	17	10
	Year 8	1	Welder	Diesel	0.7	2	66	10
	Year 8	1	Concrete vibrator	Gasoline	0.7	4	6.5	10
	Year 8	1	Generator (80 kW)	Diesel	1	1	152	10
	Year 8	1	Light truck - Forman	Gasoline	1	2	290	10
	Year 8	1	Light truck - Crew	Gasoline	1	1	290	10
	Year 8	1	Light truck - Carpenters	Gasoline	1	2	290	10
Outlet Culverts	Year 8	1	Concrete pump truck	Diesel	0.7	1	500	10
	Year 8	1	Compressor	Diesel	0.7	1	173	10
	Year 8	1	Bobcat	Diesel	0.7	1	68	10
	Year 8	1	Loader	Diesel	0.7	1	298	10
	Year 8	1	Manlift	Diesel	0.7	2	67	10
	Year 8	1	Crane 150t	Diesel	0.7	1	300	10
	Year 8	1	Pump	Diesel	1	2	17	10
	Year 8	1	Welder	Diesel	0.7	2	66	10
	Year 8	1	Concrete vibrator	Gasoline	0.7	4	6.5	10
	Year 8	1	Generator (80 kW)	Diesel	1	1	152	10
	Year 8	1	Light truck - Forman	Gasoline	1	2	290	10
	Year 8	1	Light truck - Crew	Gasoline	1	1	290	10
	Year 8	1	Light truck - Carpenters	Gasoline	1	2	290	10
Planting	Year 8	5	Bobcat	Diesel	1	2	68	10
	Year 8	5	Loader	Diesel	1	2	298	10
	Year 8	5	Light truck - Forman	Gasoline	1	2	290	10
	Year 8	5	Light truck - Crew	Gasoline	1	1	290	10
	Year 8	5	Light truck - Carpenters	Gasoline	1	2	290	10

Table 21
Construction Equipment List
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Allowance -scope to be determined	Year 8	8	Articulated dump truck	Diesel	0.5	2	496	10
	Year 8	8	Medium excavator	Diesel	1	1	273	10
	Year 8	8	Bulldozer	Diesel	0.5	1	354	10
	Year 8	8	Loader	Diesel	1	1	298	10
	Year 8	8	Water truck	Diesel	0.5	1	330	10
	Year 8	8	Generator (80 kW)	Diesel	1	1	152	10
	Year 8	8	Light truck - Forman	Gasoline	1	1	290	10
	Year 8	8	Light truck - Crew	Gasoline	1	1	290	10

Table 22-a
Fugitive Dust Emissions from Paved Road Dust
Ogier Ponds Conservation Measure
Santa Clara County, CA

Phase	Subphase	# Days	Total Trips[1]			Emissions (lb/yr)[3]	
			Worker	Vendor	Hauling	PM_{10}	$PM_{2.5}$
Year 6	Site Mobilization	66	1,980	528	0	4.6	0.69
Year 6	Control of Water	21	420	105	0	1.0	0.14
Year 6	Demolition and Clear and Grub	66	1,980	528	0	4.6	0.69
Year 6	Pond 1 Fill Borrow Hill Excavation	44	1,320	352	6,338	24	3.6
Year 6	Pond 1 Fill Import from Bassalt Hill Excavation	110	3,300	880	15,763	60	9.0
Year 7	Import and Sort Creek Materials from Holiday Bench Excavation	87	2,610	696	8,794	35	5.3
Year 7	Bypass Channel	110	3,300	880	0	7.6	1.1
Year 7	Berms	110	3,300	880	0	7.6	1.1
Year 7	Spillway	43	1,290	344	0	3.0	0.45
Year 8	Spillway	23	690	184	0	1.6	0.24
Year 7	Outlet Culverts	43	1,290	344	0	3.0	0.45
Year 8	Outlet Culverts	23	690	184	0	1.6	0.24
Year 8	Planting	110	3,300	880	0	7.6	1.1
Year 8	Allowance - Scope to be Determined	174	5,220	1,392	0	12	1.8

Notes:

1. Construction trip rates were provided by Valley Water for each subphase.
2. Emissions from paved road dust were calculated using the total trips provided by Valley Water, calculated unpaved road emission factors, and trip lengths provided in Table 23-b.
3. A 26% reduction in the PM_{10} emission factor was taken for street sweeping of arterial/collector streets, based on SCAQMD's Fugitive Dust Table XI-C.

Abbreviations:

lb - pounds
PM - particulate matter
SCAQMD - South Coast Air Quality Management District
yr - year

References:

SCAQMD. 2007. Table XI-C Mitigation Measure Examples:
Dust From Paved Roads. Available online at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

Table 22-b
Fugitive Dust Emissions from Grading Activity
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Year	Construction Activity	Total Work Days	Maximum Area Disturbed[1]	VMT[2]	Uncontrolled PM_{10} Emission Factor[3]	Uncontrolled $PM_{2.5}$ Emission Factor[4]	Emissions[5]			
							PM_{10}		$PM_{2.5}$	
		Days	acre/day	mile/day	lb/VMT	lb/VMT	lb/day	lb/yr	lb/day	lb/yr
Year 6	Clear and Grub	66	0.63	0.43	1.5	0.17	0.26	17	0.028	1.8
Year 6	Construction of the Haul Roads and Preparation of Stockpile Areas	66	1.3	0.86			0.52	34	0.056	3.7
Year 6	Pond 1 Fill Borrow Hill Excavation	44	0.63	0.43			0.26	11	0.028	1.2
Year 7	Excavate and Sort Creek Materials from Holiday Bench Excavation	87	1.3	0.86			0.52	45	0.056	4.9
Year 7	Bypass Channel	110	1.9	1.3			0.78	85	0.084	9.2
Year 7	Berms	110	1.9	1.3			0.78	85	0.084	9.2
Year 8	Allowance -scope to be determined	174	0.63	0.43			0.26	45	0.028	4.9

Notes:

1. Maximum graded area is based on the number of crawler tractors, graders, rubber tired dozers, and scrapers used for each construction activity, as outlined in CalEEMod® User's Guide, Appendix A, Section 4.3.
2. VMT per day calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for grading equipment. The equation is:
   $VMT = A_S/W_b \times (43{,}560 \text{ sqft/acre})/(5{,}280 \text{ ft/mile})$, where:
   A_S = A_S, acres graded per day (varies by sub-activity)
   12 = W_b, blade width of grading equipment
3. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for grading equipment. The equation is: $EF_{PM10} = 0.051 \times (S)^{2.0} \times F_{PM10}$, where:
   7.1 = S, mean vehicle speed (mph) (AP-42 default)
   0.6 = F_{PM10}, PM_{10} scaling factor (AP-42 default)
4. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for grading equipment. The equation is: $EF_{PM2.5} = 0.04 \times (S)^{2.5} \times F_{PM2.5}$, where:
   7.1 = S, mean vehicle speed (mph) (AP-42 default)
   0.031 = $F_{PM2.5}$, $PM_{2.5}$ scaling factor (AP-42 default)
5. Fugitive $PM_{2.5}$ emissions from grading will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
lb - pounds
PM - particulate matter
VMT - vehicle miles traveled
yr - year

References:

CalEEMod® User's Guide, Appendix A, Section 4.3:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 22-c
Fugitive Dust Emissions from Truck Loading Activity
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Subphase	Construction Phase	Material Loaded	Uncontrolled Emission Factor[1]		Annual Emissions[2]			
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
		ton	lb/ton material		lb/day		ton/yr	
Year 6	Pond 1 Fill Borrow Hill Excavation	128,186	8.9E-05	1.4E-05	0.10	0.015	0.0022	3.4E-04
Year 6	Pond 1 Fill Import from Bassalt Hill Excavation	318,823			0.10	0.015	0.0056	8.4E-04
Year 7	Import and Sort Creek Materials from Holiday Bench Excavation	177,868			0.071	0.011	0.0031	4.7E-04

Notes:

1. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 13.2.4 for aggregate handling. The equation is:

   $EF = k \times (0.0032) \times (U/5)^{1.3} / (M/2)^{1.4}$, where the following default values are used:

   0.35 = k_{PM10}, PM_{10} particle size multiplier
   0.053 = $k_{PM2.5}$, $PM_{2.5}$ particle size multiplier
   2.2 = mean wind speed (U), meters per second
   4.9 = mean wind speed (U), miles per hour
   12 = material moisture content (M), %

2. Fugitive $PM_{2.5}$ emissions from truck loading will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
lb - pounds
mph - miles per hour
PM - particulate matter
VMT - vehicle miles traveled
yr - year

References:

CalEEMod® User's Guide, Appendix A, Section 4.3:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 22-d
Fugitive Dust Emissions from Bulldozing Activity
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Year	Construction Subphase	Equipment Work Hours[1]	Uncontrolled PM_{10} Emission Factor[2]	Uncontrolled $PM_{2.5}$ Emission Factor[3]	Annual Emissions[4]	
					PM_{10}	$PM_{2.5}$
		hr/day	lb/hr	lb/hr	ton/yr	ton/yr
Year 6	Clear and Grub	10	0.75	0.41	0.10	0.053
Year 6	Construction of the Haul Roads and Preparation of Stockpile Areas	10			0.10	0.053
Year 6	Pond 1 Fill Borrow Hill Excavation	10			0.065	0.036
Year 7	Excavate and Sort Creek Materials from Holiday Bench Excavation	20			0.26	0.14
Year 7	Bypass Channel	20			0.32	0.18
Year 7	Berms	20			0.32	0.18
Year 8	Allowance -scope to be determined	10			0.26	0.14

Notes:

1. Construction schedule is based on Project-specific estimate. Includes planned hours for all tracked dozers to be used during the given phase.
2. Emission factors were calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for bulldozing equipment. The equation is:
   $EF_{PM10} = C_{PM15} \times s^{1.5} / M^{1.4} \times F_{PM10}$, where the following default values are used:

   1.0 = C_{PM15}, arbitrary coefficient
   6.9 = s, material silt content (%)
   7.9 = M, material moisture content (%)
   0.75 = F_{PM10}, PM_{10} scaling factor
3. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for bulldozing equipment. The equation is:
   $EF_{PM2.5} = C_{TSP} \times s^{1.2} / M^{1.3} \times F_{PM2.5}$, where the following default values are used:

   5.7 = C_{TSP}, arbitrary coefficient
   6.9 = s, material silt content (%)
   7.9 = M, material moisture content (%)
   0.105 = $F_{PM2.5}$, $PM_{2.5}$ scaling factor
4. Fugitive $PM_{2.5}$ emissions from bulldozing will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
lbs - pounds
PM_{10} - particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in aerodynamic diameter
VMT - vehicle miles traveled

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 23-a
Onroad Construction Trips
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Subphase	Year	Number of Work Days	Construction Roundtrips[1]		
			Total Worker Trips[2]	Total Vendor Trips[2]	Total Haul Trips[2]
			(trips/day)	(trips/day)	(trips)
Site Mobilization	2029	66	30	8	0
Control of Water	2029	21	20	5	0
Demolition and Clear and Grub	2029	66	30	8	0
Pond 1 Fill Borrow Hill Excavation	2029	44	30	8	6,338
Pond 1 Fill Import from Basalt Hill Excavation	2029	110	30	8	15,763
Import and Sort Creek Materials from Holiday Bench Excavation	2030	87	30	8	8,794
Bypass Channel	2030	110	30	8	0
Berms	2030	110	30	8	0
Spillway	2030	43	30	8	0
Spillway	2031	23	30	8	0
Outlet Culverts	2030	43	30	8	0
Outlet Culverts	2031	23	30	8	0
Planting	2031	110	30	8	0

Notes:

1. Construction trip rates were provided by Valley Water for each subphase.
2. CalEEMod® default fleet mixes were used for Worker (LD_Mix), Vendor (MHDT/HHDT), and Hauling (HHDT) trips. LD_Mix was assumed to be 100% gasoline vehicles and MHDT/HHDT and HHDT were assumed to be 100% diesel vehicles.

Abbreviations:

LD_Mix - light duty mix
MHDT - medium-heavy duty trucks
HHDT - heavy-heavy duty trucks
CalEEMod® - CALifornia Emissions Estimator MODel
VMT - vehicle miles traveled

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 23-b
Construction Trip Lengths
Ogier Ponds Conservation Measure
Santa Clara County, CA

Trip Type	One-Way Trip Length (mi)
Worker[1]	11.7
Vendor[2]	8.4
Haul[3]	20.0

Notes:

1. Consistent with CalEEMod® methodology, worker trip length is based on the default Home-to-Work trip length for Santa Clara County as reported in the CalEEMod® user guide, Appendix D.
2. Consistent with CalEEMod® methodology, vendor trip length is based on the default Commercial-to-Nonwork trip length for Santa Clara County as reported in the CalEEMod® user guide, Appendix D.
3. Consistent with CalEEMod® methodology, haul trip length is based on the default length of 20 miles as reported in the CalEEMod® user guide, Appendix A.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel

mi - mile

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

CalEEMod® User's Guide, Appendix D:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-d2020-4-0-full-merge.pdf?sfvrsn=12

Table 24
Construction Gasoline Truck Emissions
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Phase	Construction Subphase	Year	Onsite Truck Use[1]		Onsite Truck Emissions[2,3]									
			(hours/year)	(vehicles/year)	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
					(lbs)						(MT)			
Year 6	Miscellaneous Activities	2029	2,782	2.0	3.9	3.2	106	1.1	9.3	3.3	49	2.6E-04	3.8E-04	50
	Clear and Grub	2029	720	2.0	1.0	0.84	27	0.28	2.4	0.84	13	6.8E-05	1.0E-04	13
	Construction of the Haul Roads and Preparation of Stockpile Areas	2029	2,160	4.0	3.1	2.5	82	0.84	7.2	2.5	38	2.0E-04	3.0E-04	39
	Construct creek bypass system	2029	360	2.0	0.52	0.42	14	0.14	1.2	0.42	6.4	3.4E-05	5.0E-05	6.4
	Dewater Pond 1	2029	540	1.0	0.77	0.63	21	0.21	1.8	0.63	10	5.1E-05	7.5E-05	10
	Pond 1 Fill Borrow Hill Excavation	2029	720	2.0	1.0	0.84	27	0.28	2.4	0.84	13	6.8E-05	1.0E-04	13
	Pond 1 Fill Import from Bassalt Hill Excavation	2029	720	2.0	1.0	0.84	27	0.28	2.4	0.84	13	6.8E-05	1.0E-04	13
Year 7	Miscellaneous Activities	2030	2,800	2.0	3.7	3.2	105	1.1	9.3	3.3	49	2.4E-04	3.6E-04	49
	Excavate and Sort Creek Materials from	2030	1,456	2.0	1.9	1.6	55	0.56	4.9	1.7	26	1.3E-04	1.9E-04	26
	Bypass Channel	2030	1,800	2.0	2.4	2.0	67	0.69	6.0	2.1	32	1.6E-04	2.3E-04	32
	Berms	2030	1,800	2.0	2.4	2.0	67	0.69	6.0	2.1	32	1.6E-04	2.3E-04	32
	Spillway	2030	2,045	5.0	2.7	2.3	77	0.79	6.8	2.4	36	1.8E-04	2.6E-04	36
	Outlet Culverts	2030	2,045	5.0	2.7	2.3	77	0.79	6.8	2.4	36	1.8E-04	2.6E-04	36
Year 8	Miscellaneous Activities	2031	3,164	2.0	3.9	3.5	117	1.2	11	3.7	55	2.5E-04	3.8E-04	55
	Spillway	2031	1,000	5.0	1.2	1.1	37	0.38	3.3	1.2	17	8.1E-05	1.2E-04	18
	Outlet Culverts	2031	1,000	5.0	1.2	1.1	37	0.38	3.3	1.2	17	8.1E-05	1.2E-04	18
	Planting	2031	5,000	5.0	6.1	5.5	185	1.9	17	5.9	87	4.0E-04	6.0E-04	88
	Allowance -scope to be determined	2031	3,164	2.0	3.9	3.5	117	1.2	11	3.7	55	2.5E-04	3.8E-04	55

Notes:

1. The number of LHDT2 vehicles and schedule were provided by Valley Water.
2. Work trucks are assumed to be similar to light-heavy duty trucks (LHDT2) as defined in EMFAC2021. Emission factors are from EMFAC2021 ("Emission Rates" mode) for LHDT2 diesel vehicles (aggregated model year) in Santa Clara County. RUNEX emission factors are specific to vehicle speed of 15 mph. All other emission factor types are for aggregated speed. Emission factors were multiplied by the appropriate usage parameter based on the units. Emission factors in units of g/trip, g/mi, and g/vehicle/day, were multiplied by trips, miles, and total vehicles, respectively, in order to obtain mass emissions.
3. Global warming potentials used in the calculation of CO_2e are 1, 25, and 298 for CO_2, CH_4, and N_2O, respectively.

Abbreviations:

CH_4 - methane
CO_2 - carbon Dioxide
CO_2e - carbon dioxide equivalents
lb - pound
MT - metric ton
N_2O - nitrous oxide
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Resources Board. EMFAC2021. Available online at: https://arb.ca.gov/emfac/emissions-inventory

Table 25
Construction Gasoline Truck TOG-Speciated Emissions
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Year	Construction Activity	Emission (ton/yr)[1]															
		1,3-Butadiene	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	n-hexane	Methanol	Methyl Ethyl Ketone	Naphthalene	Propene	Styrene	Toluene	Xylenes	DPM[2]	$PM_{2.5}$
Year 6	Miscellaneous Activities	0.019	0.0095	0.0044	0.089	0.037	0.054	0.076	0.0041	6.8E-04	0.0017	0.10	0.0041	0.22	0.17	9.3	3.3
Year 6	Clear and Grub	0.0048	0.0025	0.0011	0.023	0.010	0.014	0.020	0.0011	1.8E-04	4.4E-04	0.027	0.0011	0.057	0.044	2.4	0.84
Year 6	Construction of the Haul Roads and Preparation of Stockpile Areas	0.014	0.0074	0.0034	0.069	0.029	0.042	0.059	0.0032	5.3E-04	0.0013	0.081	0.0032	0.17	0.13	7.2	2.5
Year 6	Construct creek bypass system	0.0024	0.0012	5.7E-04	0.012	0.0049	0.0070	0.010	5.3E-04	8.8E-05	2.2E-04	0.013	5.3E-04	0.029	0.022	1.2	0.42
Year 6	Dewater Pond 1	0.0036	0.0018	8.6E-04	0.017	0.0072	0.010	0.015	7.9E-04	1.3E-04	3.3E-04	0.020	7.9E-04	0.043	0.033	1.8	0.63
Year 6	Pond 1 Fill Borrow Hill Excavation	0.0048	0.0025	0.0011	0.023	0.010	0.014	0.020	0.0011	1.8E-04	4.4E-04	0.027	0.0011	0.057	0.044	2.4	0.84
Year 6	Pond 1 Fill Import from Bassalt Hill Excavation	0.0048	0.0025	0.0011	0.023	0.010	0.014	0.020	0.0011	1.8E-04	4.4E-04	0.027	0.0011	0.057	0.044	2.4	0.84
Year 7	Miscellaneous Activities	0.017	0.0086	0.0040	0.081	0.034	0.049	0.070	0.0037	6.2E-04	0.0015	0.094	0.0037	0.20	0.16	9.3	3.3
Year 7	Excavate and Sort Creek Materials from Holiday Bench Excavation	0.0088	0.0045	0.0021	0.042	0.018	0.025	0.037	0.0019	3.2E-04	8.0E-04	0.049	0.0019	0.10	0.081	4.9	1.7
Year 7	Bypass Channel	0.011	0.0056	0.0026	0.052	0.022	0.031	0.045	0.0024	4.0E-04	0.0010	0.061	0.0024	0.13	0.10	6.0	2.1
Year 7	Berms	0.011	0.0056	0.0026	0.052	0.022	0.031	0.045	0.0024	4.0E-04	0.0010	0.061	0.0024	0.13	0.10	6.0	2.1
Year 7	Spillway	0.012	0.0063	0.0029	0.059	0.025	0.036	0.052	0.0027	4.5E-04	0.0011	0.069	0.0027	0.15	0.11	6.8	2.4
Year 7	Outlet Culverts	0.012	0.0063	0.0029	0.059	0.025	0.036	0.052	0.0027	4.5E-04	0.0011	0.069	0.0027	0.15	0.11	6.8	2.4
Year 8	Miscellaneous Activities	0.017	0.0089	0.0041	0.084	0.035	0.050	0.074	0.0038	6.3E-04	0.0016	0.10	0.0038	0.21	0.16	11	3.7
Year 8	Spillway	0.0055	0.0028	0.0013	0.027	0.011	0.016	0.024	0.0012	2.0E-04	5.0E-04	0.031	0.0012	0.066	0.051	3.3	1.2
Year 8	Outlet Culverts	0.0055	0.0028	0.0013	0.027	0.011	0.016	0.024	0.0012	2.0E-04	5.0E-04	0.031	0.0012	0.066	0.051	3.3	1.2
Year 8	Planting	0.028	0.014	0.0065	0.13	0.055	0.079	0.12	0.0060	0.0010	0.0025	0.15	0.0060	0.33	0.25	17	5.9
Year 8	Allowance -scope to be determined	0.017	0.0089	0.0041	0.084	0.035	0.050	0.074	0.0038	6.3E-04	0.0016	0.10	0.0038	0.21	0.16	11	3.7

Notes:

1. TOG was speciated according to the profile provided by BAAQMD Recommended Methods For Screening and Modeling Local Risks and Hazards.
2. All PM_{10} is taken to be DPM for the purpose of health risk assessment.

Abbreviations:

DPM - diesel particulate matter
PM - particulate matter
yr- year

References:

BAAQMD Recommended Methods For Screening and Modeling Local Risks and Hazards:
Available Online at: https://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20Modeling%20Approach.ashx

Table 26
Unmitigated Construction CAP Emissions
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		ton/yr			
Year 6	2029	5.2	**30**	1.4	1.3
Year 7	2030	3.6	**29**	2.1	2.1
Year 8	2031	1.4	**10**	0.64	0.64

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		lb/day			
Year 6	2029	40	**227**	11	10
Year 7	2030	28	**223**	16	16
Year 8	2031	11	**79**	4.9	4.9
BAAQMD Threshold[1]		54	54	82	54

Notes:

1. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines. For PM, this includes exhaust emissions only. Fugitive emissions are controlled by BAAQMD Best Management Practices.

Abbreviations:

ROG - reactive organic gases

PM - particulate matter

CAP - criteria air pollutants

BAAQMD - Bay Area Air Quality Management District

yr - year

lb - pound

Table 27
Mitigated Construction CAP Emissions
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		ton/yr			
Year 6	2029	1.5	**11**	0.71	0.48
Year 7	2030	1.0	**7.7**	1.4	0.79
Year 8	2031	0.41	2.8	0.43	0.25

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		lb/day			
Year 6	2029	11	**87**	5.4	3.6
Year 7	2030	7.7	**59**	11	6.1
Year 8	2031	3.2	22	3.3	1.9
BAAQMD Threshold[1]		54	54	82	54

Notes:

1. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines. For PM, this includes exhaust emissions only. Fugitive emissions are controlled by BAAQMD Best Management Practices.

Abbreviations:

ROG - reactive organic gases

PM - particulate matter

CAP - criteria air pollutants

BAAQMD - Bay Area Air Quality Management District

yr - year

lb - pound

Table 28
Unmitigated Construction GHG Emissions
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Year		CO_2	CH_4	N2O	CO_2e
		MT/yr			
Year 6	2029	14,137	0.55	0.20	14,210
Year 7	2030	9,342	0.36	0.11	9,384
Year 8	2031	3,849	0.15	0.033	3,863

Abbreviations:

GHG - greenhouse gases
CO_2e - CO_2-equivalent emissions
yr - year
MT - metric tonne

Table 29
Mitigated Construction GHG Emissions
Ogier Ponds Conservation Measure
Santa Clara County, CA

Construction Year		CO_2	CH_4	N2O	CO_2e
		MT/yr			
Year 6	2029	14,137	0.55	0.20	14,210
Year 7	2030	9,342	0.36	0.11	9,384
Year 8	2031	3,849	0.15	0.033	3,863

Abbreviations:

GHG - greenhouse gases
CO_2e - CO_2-equivalent emissions
yr - year
MT - metric tonne

Table 30
Construction Phasing Schedule
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Year	Construction Activity	Start Date	End Date	Calendar Year	Number of Days[2]
Year 4	Site Mobilization	6/1/2027	11/1/2027	2027	110
	Construction of the Haul Roads and Preparation of Stockpile Areas	6/1/2027	6/16/2027	2027	12
	Clear and Grub	6/1/2027	6/16/2027	2027	12
	Construct creek Bypass system	6/1/2027	6/16/2027	2027	12
	Dewater	6/1/2027	7/1/2027	2027	23
Year 5	Roughened Ramp	1/1/2028	6/1/2028	2028	109
	Planting	1/1/2028	6/1/2028	2028	109

Notes:

1. Construction schedule and phasing information were provided by Valley Water.
2. Project construction will generally occur on Mondays through Fridays between the hours of 6 AM and 6 PM. Equipment maintenance will occur on Saturdays.

Table 31
Construction Equipment
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Site Mobilization	Year 4	5	Medium excavator	Diesel	0.5	1	172	5
	Year 4	5	Loader	Diesel	0.5	1	298	5
	Year 4	5	Light truck - Forman	Gasoline	1	1	290	5
	Year 4	5	Light truck - Crew	Gasoline	1	1	290	5
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	Medium Bulldozer	Diesel	0.9	1	354	5
	Year 4	0.5	Medium excavator	Diesel	0.9	1	273	5
	Year 4	0.5	Loader	Diesel	0.9	1	298	5
	Year 4	0.5	Motor grader	Diesel	0.9	1	290	5
	Year 4	0.5	Small backhoe	Diesel	1	1	70	5
	Year 4	0.5	Track drill rig	Diesel	0.9	2	201	5
	Year 4	0.5	Light truck - Forman	Gasoline	0.9	2	290	5
	Year 4	0.5	Light truck - Crew	Gasoline	0.9	1	290	5
	Year 4	0.5	Articulated dump truck	Diesel	0.9	2	496	5
	Year 4	0.5	Water truck	Diesel	0.9	2	330	5
	Year 4	0.5	Pump for water trucks	Diesel	1	1	74	5
Clear and Grub	Year 4	0.5	Bulldozer	Diesel	0.9	1	722	5
	Year 4	0.5	Long-reach excavator	Diesel	0.9	1	424	5
	Year 4	0.5	Loader	Diesel	0.9	1	298	5
	Year 4	0.5	Light truck - Forman	Gasoline	0.9	1	290	5
	Year 4	0.5	Light truck - Crew	Gasoline	0.9	1	290	5
	Year 4	0.5	Articulated dump truck	Diesel	0.9	1	496	5
	Year 4	0.5	Water truck	Diesel	0.9	1	330	5
	Year 4	0.5	Pump for water trucks	Diesel	0.9	1	74	5
Construct creek Bypass system	Year 4	0.5	Long-reach excavator	Diesel	0.9	1	424	5
	Year 4	0.5	Generator (80 kW)	Diesel	1	1	152	5
	Year 4	0.5	Small backhoe	Diesel	1	1	70	5
	Year 4	0.5	Light truck - Forman	Gasoline	0.9	1	290	5
	Year 4	0.5	Light truck - Crew	Gasoline	0.9	1	290	5
	Year 4	0.5	Articulated dump truck	Diesel	0.9	1	496	5
	Year 4	0.5	Water truck	Diesel	0.9	1	330	5
	Year 4	0.5	Pump for water trucks	Diesel	0.9	1	74	5
	Year 4	0.5	Loader	Diesel	0.9	1	298	5
Dewater	Year 4	1	Pump	Diesel	0.7	4	17	7
	Year 4	1	Small backhoe	Diesel	1	1	70	5
	Year 4	1	Long-reach excavator	Diesel	0.9	1	424	5
	Year 4	1	Generator (80 kW)	Diesel	1	1	152	5
	Year 4	1	Light truck - Forman	Gasoline	0.9	1	290	5
	Year 4	1	Loader	Diesel	0.9	1	298	5
Roughened Ramp	Year 5	5	Bulldozer	Diesel	0.9	1	722	5
	Year 5	5	Long-reach excavator	Diesel	0.9	1	424	5
	Year 5	5	Small backhoe	Diesel	1	1	70	5
	Year 5	5	Loader	Diesel	0.9	1	298	5
	Year 5	5	Bobcat	Diesel	0.9	1	68	5
	Year 5	5	Light truck - Forman	Gasoline	0.9	1	290	5
	Year 5	5	Light truck - Crew	Gasoline	0.9	1	290	5
	Year 5	5	Articulated dump truck	Diesel	0.9	2	496	5
	Year 5	5	Water truck	Diesel	0.9	1	330	5
	Year 5	5	Pump for water trucks	Diesel	0.9	1	74	5
Planting	Year 5	5	Bobcat	Diesel	1	2	68	5
	Year 5	5	Loader	Diesel	1	2	298	5
	Year 5	5	Bobcat	Diesel	0.9	1	68	5
	Year 5	5	Light truck - Forman	Gasoline	1	2	290	5
	Year 5	5	Light truck - Crew	Gasoline	1	1	290	5
	Year 5	5	Light truck - Carpenters	Gasoline	1	2	290	5

Notes:

1. A list of equipment was provided by Valley Water. In cases where equipment appeared on the most recent project description but did not appear on the equipment list, this equipment was added to the air quality analysis.

Abbreviations:

HP - horsepower
kW - kilowatts

Table 32-a
Fugitive Dust Emissions from Paved Road Dust
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Phase	Subphase	# Days	Total Trips[1]			Emissions (lb/yr)[2,3]	
			Worker	Vendor	Hauling	PM_{10}	$PM_{2.5}$
Year 4	Site Mobilization	110	1,100	220	0	2.4	0.37
Year 4	Construction of the Haul Roads and Preparation of Stockpile Areas	12	450	90	0	1.0	0.15
Year 4	Clear and Grub	12	240	48	0	0.53	0.080
Year 4	Construct Creek Bypass System	12	270	54	0	0.60	0.090
Year 4	Dewater	23	518	104	0	1.1	0.17
Year 5	Roughened Ramp	109	2,998	600	87,200	296	44
Year 5	Planting	109	2,725	545	2,180	13	2.0

Notes:

1. Construction trip rates were provided by Valley Water for each subphase.
2. Emissions from paved road dust were calculated using the total trips provided by Valley Water, calculated unpaved road emission factors, and trip lengths provided in Table 33-b.
3. A 26% reduction in the PM_{10} emission factor was taken for street sweeping of arterial/collector streets, based on SCAQMD's Fugitive Dust Table XI-C.

Abbreviations:

lb - pounds
PM - particulate matter
yr - year
SCAQMD - South Coast Air Quality Management District

References:

SCAQMD. 2007. Table XI-C Mitigation Measure Examples:
Dust From Paved Roads. Available online at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

Table 32-b
Fugitive Dust Emissions from Grading Activity
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Year	Construction Activity	Total Work Days	Maximum Area Disturbed[1]	VMT[2]	Uncontrolled PM_{10} Emission Factor[3]	Uncontrolled $PM_{2.5}$ Emission Factor[4]	Emissions[5]			
							PM_{10}		$PM_{2.5}$	
		Days	acre/day	mile/day	lb/VMT	lb/VMT	lb/day	lb/yr	lb/day	lb/yr
Year 4	Construction of the Haul Roads and Preparation of Stockpile Areas	12	1.5	1.0	1.5	0.17	0.72	8.6	0.077	0.93
Year 4	Clear and Grub	12	0.75	0.52			0.36	4.3	0.039	0.46
Year 5	Roughened Ramp	109	0.75	0.52			0.36	39	0.039	4.2

Notes:

1. Maximum graded area is based on the number of crawler tractors, graders, rubber tired dozers, and scrapers used for each construction activity, as outlined in CalEEMod® User's Guide, Appendix A, Section 4.3.
2. VMT per day calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for grading equipment. The equation is: $VMT = A_S/W_b \times (43{,}560\ sqft/acre)/(5{,}280\ ft/mile)$, where:
   A_S = A_S, acres graded per day (varies by sub-activity)
   12 = W_b, blade width of grading equipment
3. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for grading equipment. The equation is: $EF_{PM10} = 0.051 \times (S)^{2.0} \times F_{PM10}$, where:
   7.1 = S, mean vehicle speed (mph) (AP-42 default)
   0.6 = F_{PM10}, PM_{10} scaling factor (AP-42 default)
4. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for grading equipment. The equation is: $EF_{PM2.5} = 0.04 \times (S)^{2.5} \times F_{PM2.5}$, where:
   7.1 = S, mean vehicle speed (mph) (AP-42 default)
   0.031 = $F_{PM2.5}$, $PM_{2.5}$ scaling factor (AP-42 default)
5. Fugitive $PM_{2.5}$ emissions from grading will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
yr - year
VMT - vehicle miles traveled
PM - particulate matter
lb - pounds

References:

CalEEMod® User's Guide, Appendix A, Section 4.3:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 32-c
Fugitive Dust Emissions from Truck Loading Activity
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Phase	Construction Subphase	Material Loaded	Uncontrolled Emission Factor[1]		Annual Emissions[2]	
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
		ton	lb/ton material		ton/yr	ton/yr
Roughened Ramp	Year 5	8,091	8.9E-05	1.4E-05	1.6E-04	2.5E-05
Planting	Year 5	202			4.1E-06	6.2E-07

Notes:

1. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 13.2.4 for aggregate handling. The equation is:

   $EF = k \times (0.0032) \times (U/5)^{1.3} / (M/2)^{1.4}$, where the following default values are used:

   0.35 = k_{PM10}, PM_{10} particle size multiplier
   0.053 = $k_{PM2.5}$, $PM_{2.5}$ particle size multiplier
   2.2 = mean wind speed (U), meters per second
   4.9 = mean wind speed (U), miles per hour
   12 = material moisture content (M), %

2. Fugitive PM emissions from truck loading will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
lbs - pounds
mph - miles per hour
PM_{10} - particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in aerodynamic diameter
VMT - vehicle miles traveled
yr - year

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 32-d
Fugitive Dust Emissions from Bulldozing Activity
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Year	Construction Subphase	Equipment Work Hours[1]	Uncontrolled PM_{10} Emission Factor[2]	Uncontrolled $PM_{2.5}$ Emission Factor[3]	Annual Emissions[4]	
					PM_{10}	$PM_{2.5}$
		hr/day	lb/hr	lb/hr	ton/yr	ton/yr
Year 4	Construction of the Haul Roads and Preparation of Stockpile Areas	9.0	0.75	0.41	0.018	0.010
Year 4	Clear and Grub	9.0			0.018	0.010
Year 5	Roughened Ramp	9.0			0.17	0.091

Notes:

1. Construction schedule is based on Project-specific estimate. Includes planned hours for all tracked dozers to be used during the given phase.
2. Emission factors were calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for bulldozing equipment. The equation is:
   $EF_{PM10} = C_{PM15} \times s^{1.5} / M^{1.4} \times F_{PM10}$, where the following default values are used:

   1.0 = C_{PM15}, arbitrary coefficient
   6.9 = s, material silt content (%)
   7.9 = M, material moisture content (%)
   0.75 = F_{PM10}, PM_{10} scaling factor
3. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for bulldozing equipment. The equation is:
   $EF_{PM2.5} = C_{TSP} \times s^{1.2} / M^{1.3} \times F_{PM2.5}$, where the following default values are used:

   5.7 = C_{TSP}, arbitrary coefficient
   6.9 = s, material silt content (%)
   7.9 = M, material moisture content (%)
   0.105 = $F_{PM2.5}$, $PM_{2.5}$ scaling factor
4. Fugitive $PM_{2.5}$ emissions from bulldozing will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
lbs - pounds
PM_{10} - particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in aerodynamic diameter
VMT - vehicle miles traveled

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 33-a
Onroad Construction Trips
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Subphase	Year	Number of Work Days	Construction Roundtrips[1]		
			Total Worker Trips[2]	Total Vendor Trips[2]	Total Haul Trips[2]
			(trips/day)	(trips/day)	(trips)
Site Mobilization	2027	110	10	2.0	0
Construction of the Haul Roads and Preparation of Stockpile Areas	2027	12	38	7.5	0
Clear and Grub	2027	12	20	4.0	0
Construct creek Bypass system	2027	12	23	4.5	0
Dewater	2027	23	23	4.5	0
Roughened Ramp	2028	109	28	5.5	800
Planting	2028	109	25	5.0	20

Notes:

1. Worker trip rates were calculated assuming 1.25 one-way trips per piece of construction equipment. Vendor trips were calculated assuming 20% of worker trips. Haul trips were calculated using haul material provided by the client, assuming one truck can carry 16 cubic yards of material.

2. CalEEMod® default fleet mixes were used for Worker (LD_Mix), Vendor (MHDT/HHDT), and Hauling (HHDT) trips. LD_Mix was assumed to be 100% gasoline vehicles and MHDT/HHDT and HHDT were assumed to be 100% diesel vehicles.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
HHDT - heavy-heavy duty trucks
LD_Mix - light duty mix
MHDT - medium-heavy duty trucks
VMT - vehicle miles traveled

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 33-b
Construction Trip Lengths
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Trip Type	One-Way Trip Length (mi)
Worker[1]	11.7
Vendor[2]	8.4
Haul[3]	20.0

Notes:

1. Consistent with CalEEMod® methodology, worker trip length is based on the default Home-to-Work trip length for Santa Clara County as reported in the CalEEMod® user guide, Appendix D.
2. Consistent with CalEEMod® methodology, vendor trip length is based on the default Commercial-to-Nonwork trip length for Santa Clara County as reported in the CalEEMod® user guide, Appendix D.
3. Consistent with CalEEMod® methodology, haul trip length is based on the default length of 20 miles as reported in the CalEEMod® user guide, Appendix A.

Abbreviations:

CalEEMod® - California Emissions Estimator Model

mi - mile

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

CalEEMod® User's Guide, Appendix D:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-d2020-4-0-full-merge.pdf?sfvrsn=12

Table 34
Construction Gasoline Truck Emissions
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Phase	Construction Subphase	Year	Onsite Truck Use[1]		Onsite Truck Emissions[2,3]									
			(hours/year)	(vehicles /year)	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
					(lbs)						(MT)			
Year 4	Site Mobilization	2027	2,000	2.0	3.4	11	81	0.79	6.7	2.4	36	2.3E-04	3.3E-04	36
	Construction of the Haul Roads and Preparation of Stockpile Areas	2027	295	3.0	0.52	1.6	12	0.12	1.0	0.35	5.3	3.5E-05	4.8E-05	5.4
	Clear and Grub	2027	196	2.0	0.35	1.1	8.0	0.078	0.65	0.23	3.6	2.3E-05	3.2E-05	3.6
	Construct creek Bypass system	2027	196	2.0	0.35	1.1	8.0	0.078	0.65	0.23	3.6	2.3E-05	3.2E-05	3.6
	Dewater	2027	188	1.0	0.33	1.0	7.6	0.074	0.63	0.22	3.4	2.2E-05	3.1E-05	3.4
Year 5	Roughened Ramp	2028	1,784	2.0	2.8	8.6	70	0.70	5.9	2.1	32	1.9E-04	2.7E-04	32
	Planting	2028	4,955	5.0	7.7	24	194	1.9	17	5.8	89	5.2E-04	7.4E-04	89

Notes:

1. An average emission factors is calculated using the following criteria:
2. Work trucks are assumed to be similar to light-heavy duty trucks (LHDT2) as defined in EMFAC2021. Emission factors are from EMFAC2021 ("Emission Rates" mode) for LHDT2 diesel vehicles (aggregated model year) in Santa Clara County. RUNEX emission factors are specific to vehicle speed of 15 mph. All other emission factor types are for aggregated speed. Emission factors were multiplied by the appropriate usage parameter based on the units. Emission factors in units of g/trip, g/mi, and g/vehicle/day, were multiplied by trips, miles, and total vehicles, respectively, in order to obtain mass emissions.
3. Global warming potentials used in the calculation of CO_2e are 1, 25, and 298 for CO_2, CH_4, and N_2O, respectively.

Abbreviations:

CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalents
lb - pound
MT - metric tonne
N_2O - nitrous oxide
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Resources Board. EMFAC2021. Available online at: https://arb.ca.gov/emfac/emissions-inventory

Table 35
Construction Gasoline Truck TOG-Speciated Emissions
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Year	Construction Activity	Emission (ton/yr)[1]															
		1,3-Butadiene	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	n-hexane	Methanol	Methyl Ethyl Ketone	Naphthalene	Propene	Styrene	Toluene	Xylenes	DPM	$PM_{2.5}$
Year 4	Site Mobilization	0.017	0.0088	0.0041	0.082	0.034	0.050	0.068	0.0038	6.3E-04	0.0016	0.10	0.0038	0.20	0.16	6.7	2.4
Year 4	Construction of the Haul Roads and Preparation of Stockpile Areas	0.0026	0.0013	6.1E-04	0.012	0.0051	0.0074	0.010	5.6E-04	9.4E-05	2.3E-04	0.014	5.6E-04	0.030	0.023	1.0	0.35
Year 4	Clear and Grub	0.0017	8.7E-04	4.1E-04	0.0081	0.0034	0.0049	0.0068	3.7E-04	6.2E-05	1.6E-04	0.010	3.7E-04	0.020	0.016	0.65	0.23
Year 4	Construct creek Bypass system	0.0017	8.7E-04	4.1E-04	0.0081	0.0034	0.0049	0.0068	3.7E-04	6.2E-05	1.6E-04	0.010	3.7E-04	0.020	0.016	0.65	0.23
Year 4	Dewater	0.0016	8.3E-04	3.9E-04	0.0077	0.0033	0.0047	0.0064	3.6E-04	6.0E-05	1.5E-04	0.0091	3.6E-04	0.019	0.015	0.63	0.22
Year 5	Roughened Ramp	0.014	0.0069	0.0032	0.064	0.027	0.039	0.054	0.0030	4.9E-04	0.0012	0.075	0.0030	0.16	0.12	5.9	2.1
Year 5	Planting	0.038	0.019	0.0089	0.18	0.075	0.11	0.15	0.0082	0.0014	0.0034	0.21	0.0082	0.44	0.34	17	5.8

Notes:

1. TOG was speciated according to the profile provided by BAAQMD Recommended Methods For Screening and Modeling Local Risks and Hazards.
2. All PM_{10} is taken to be DPM for the purpose of health risk assessment.

Abbreviations:

DPM - diesel particulate matter
PM - particulate matter
TOG - total organic gases

References:

BAAQMD Recommended Methods For Screening and Modeling Local Risks and Hazards:
Available Online at: https://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20Modeling%20Approach.ashx

Table 36
Unmitigated Construction CAP Emissions
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		ton/yr			
Year 4	2027	0.14	1.1	0.093	0.062
Year 5	2028	0.34	2.7	0.45	0.21

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		lb/day			
Year 4	2027	1.8	14	1.2	0.8
Year 5	2028	4.5	35	5.9	2.8
BAAQMD Threshold[1]		54	54	82	54

Notes:

1. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines. For PM, this includes exhaust emissions only. Fugitive emissions are controlled by BAAQMD Best Management Practices.

Abbreviations:

ROG - reactive organic gases

PM - particulate matter

CAP - criteria air pollutants

BAAQMD - Bay Area Air Quality Management District

yr - year

lb - pound

Table 37
Mitigated Construction CAP Emissions
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		ton/yr			
Year 4	2027	0.038	0.31	0.057	0.029
Year 5	2028	0.10	0.90	0.37	0.14

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		lb/day			
Year 4	2027	0.49	4.1	0.74	0.38
Year 5	2028	1.3	12	4.8	1.8
BAAQMD Threshold[1]		54	54	82	54

Notes:

1. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines. For PM, this includes exhaust emissions only. Fugitive emissions are controlled by BAAQMD Best Management Practices.

Abbreviations:

ROG - reactive organic gases

BAAQMD - Bay Area Air Quality Management District

PM - particulate matter

yr - year

CAP - criteria air pollutants

lb - pound

Table 38
Unmitigated Construction GHG Emissions
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Year		CO_2	CH_4	N_2O	CO_2e
		MT/yr			
Year 4	2027	352	0.012	0.0033	353
Year 5	2028	930	0.032	0.011	934

Abbreviations:

GHG - greenhouse gases
CO_2e - CO_2-equivalent emissions
yr - year
MT - metric tonne

Table 39
Mitigated Construction GHG Emissions
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

Construction Year		CO_2	CH_4	N_2O	CO_2e
		MT/yr			
Year 4	2027	352	0.012	0.0033	353
Year 5	2028	930	0.032	0.011	934

Abbreviations:

GHG - greenhouse gases
CO_2e - CO_2-equivalent emissions
yr - year
MT - metric tonne

Table 40
Construction Phasing Schedule
Sediment Augmentation Program
Santa Clara County, CA

Year	Construction Activity	Start Date	End Date	Number of Days[2]
Year 2	Miscellaneous Activities	6/1/2025	12/31/2025	153
	Construction of the haul roads and preparation of stockpile areas	6/1/2025	7/1/2025	22
	Clear and Grub	6/1/2025	6/15/2025	10
	Construct creek bypass system	6/1/2025	7/1/2025	22
	Dewater	6/1/2025	10/1/2025	88
	Roughened Ramp	6/1/2025	10/1/2025	88
	Moving material from stockpile area to project site	6/1/2025	10/1/2025	88
	Planting	9/1/2025	12/31/2025	88
	Allowance -scope to be determined	6/1/2025	11/1/2025	110
Year 3	Miscellaneous activities	6/1/2026	12/31/2026	154
	Construction of the haul roads and preparation of stockpile areas	6/1/2026	7/1/2026	23
	Clear and Grub	6/1/2026	6/15/2026	11
	Construct creek bypass system	6/1/2026	7/1/2026	23
	Dewater	6/1/2026	10/1/2026	89
	Moving material from stockpile area to project site	6/1/2026	10/1/2026	89
	Planting	9/1/2026	12/31/2026	88
	Allowance -scope to be determined	6/1/2026	11/1/2026	110
Year 4	Miscellaneous activities	6/1/2027	12/31/2027	154
	Construction of the haul roads and preparation of stockpile areas	6/1/2027	7/1/2027	23
	Clear and Grub	6/1/2027	6/15/2027	11
	Construct creek bypass system	6/1/2027	7/1/2027	23
	Dewater	6/1/2027	10/1/2027	89
	Moving material from stockpile area to project site	6/1/2027	10/1/2027	89
	Planting	9/1/2027	12/31/2027	88
	Allowance -scope to be determined	6/1/2027	11/1/2027	110
Year 5	Miscellaneous activities	6/1/2028	12/31/2028	152
	Construction of the haul roads and preparation of stockpile areas	6/1/2028	7/1/2028	22
	Clear and Grub	6/1/2028	6/15/2028	11
	Construct creek bypass system	6/1/2028	7/1/2028	22
	Dewater	6/1/2028	10/1/2028	87
	Moving material from stockpile area to project site	6/1/2028	10/1/2028	87
	Planting	9/1/2028	12/31/2028	86
	Allowance -scope to be determined	6/1/2028	11/1/2028	110
Year 6	Miscellaneous activities	6/1/2029	12/31/2029	152
	Construction of the haul roads and preparation of stockpile areas	6/1/2029	7/1/2029	21
	Clear and Grub	6/1/2029	6/15/2029	11
	Construct creek bypass system	6/1/2029	7/1/2029	21
	Dewater	6/1/2029	10/1/2029	87
	Moving material from stockpile area to project site	6/1/2029	10/1/2029	87
	Planting	9/1/2029	12/31/2029	86
	Allowance -scope to be determined	6/1/2029	11/1/2029	110
Year 7	Miscellaneous activities	6/1/2030	12/31/2030	152
	Construction of the haul roads and preparation of stockpile areas	6/1/2030	7/1/2030	21
	Clear and Grub	6/1/2030	6/15/2030	10
	Construct creek bypass system	6/1/2030	7/1/2030	21
	Dewater	6/1/2030	10/1/2030	87
	Moving material from stockpile area to project site	6/1/2030	10/1/2030	87
	Planting	9/1/2030	12/31/2030	87
	Allowance -scope to be determined	6/1/2030	11/1/2030	110
Year 8	Miscellaneous activities	6/1/2031	12/31/2031	153
	Construction of the haul roads and preparation of stockpile areas	6/1/2031	7/1/2031	22
	Clear and Grub	6/1/2031	6/15/2031	10
	Construct creek bypass system	6/1/2031	7/1/2031	22
	Dewater	6/1/2031	10/1/2031	88
	Moving material from stockpile area to project site	6/1/2031	10/1/2031	88
	Planting	9/1/2031	12/31/2031	88
	Allowance -scope to be determined	6/1/2031	11/1/2031	110
Year 9	Miscellaneous activities	6/1/2032	12/31/2032	154
	Construction of the haul roads and preparation of stockpile areas	6/1/2032	7/1/2032	23
	Clear and Grub	6/1/2032	6/15/2032	11
	Construct creek bypass system	6/1/2032	7/1/2032	23
	Dewater	6/1/2032	10/1/2032	89
	Moving material from stockpile area to project site	6/1/2032	10/1/2032	89
	Planting	9/1/2032	12/31/2032	88
	Allowance -scope to be determined	6/1/2032	11/1/2032	110

Table 40
Construction Phasing Schedule
Sediment Augmentation Program
Santa Clara County, CA

Year	Construction Activity	Start Date	End Date	Number of Days[2]
Year 10	Miscellaneous activities	6/1/2033	12/31/2033	153
	Construction of the haul roads and preparation of stockpile areas	6/1/2033	7/1/2033	23
	Clear and Grub	6/1/2033	6/15/2033	11
	Construct creek bypass system	6/1/2033	7/1/2033	23
	Dewater	6/1/2033	10/1/2033	88
	Moving material from stockpile area to project site	6/1/2033	10/1/2033	88
	Planting	9/1/2033	12/31/2033	87
	Allowance -scope to be determined	6/1/2033	11/1/2033	110
Year 11	Miscellaneous activities	6/1/2034	12/31/2034	152
	Construction of the haul roads and preparation of stockpile areas	6/1/2034	7/1/2034	22
	Clear and Grub	6/1/2034	6/15/2034	11
	Construct creek bypass system	6/1/2034	7/1/2034	22
	Dewater	6/1/2034	10/1/2034	87
	Moving material from stockpile area to project site	6/1/2034	10/1/2034	87
	Planting	9/1/2034	12/31/2034	86
	Allowance -scope to be determined	6/1/2034	11/1/2034	110
Year 12	Miscellaneous activities	6/1/2035	12/31/2035	152
	Construction of the haul roads and preparation of stockpile areas	6/1/2035	7/1/2035	21
	Clear and Grub	6/1/2035	6/15/2035	11
	Construct creek bypass system	6/1/2035	7/1/2035	21
	Dewater	6/1/2035	10/1/2035	87
	Moving material from stockpile area to project site	6/1/2035	10/1/2035	87
	Planting	9/1/2035	12/31/2035	86
	Allowance -scope to be determined	6/1/2035	11/1/2035	110
Year 13	Miscellaneous activities	6/1/2036	12/31/2036	153
	Construction of the haul roads and preparation of stockpile areas	6/1/2036	7/1/2036	22
	Clear and Grub	6/1/2036	6/15/2036	10
	Construct creek bypass system	6/1/2036	7/1/2036	22
	Dewater	6/1/2036	10/1/2036	88
	Moving material from stockpile area to project site	6/1/2036	10/1/2036	88
	Planting	9/1/2036	12/31/2036	88
	Allowance -scope to be determined	6/1/2036	11/1/2036	110
Year 14	Miscellaneous activities	6/1/2037	12/31/2037	154
	Construction of the haul roads and preparation of stockpile areas	6/1/2037	7/1/2037	23
	Clear and Grub	6/1/2037	6/15/2037	11
	Construct creek bypass system	6/1/2037	7/1/2037	23
	Dewater	6/1/2037	10/1/2037	89
	Moving material from stockpile area to project site	6/1/2037	10/1/2037	89
	Planting	9/1/2037	12/31/2037	88
	Allowance -scope to be determined	6/1/2037	11/1/2037	110
Year 15	Miscellaneous activities	6/1/2038	12/31/2038	154
	Construction of the haul roads and preparation of stockpile areas	6/1/2038	7/1/2038	23
	Clear and Grub	6/1/2038	6/15/2038	11
	Construct creek bypass system	6/1/2038	7/1/2038	23
	Dewater	6/1/2038	10/1/2038	89
	Moving material from stockpile area to project site	6/1/2038	10/1/2038	89
	Planting	9/1/2038	12/31/2038	88
	Allowance -scope to be determined	6/1/2038	11/1/2038	110

Notes:

1. Construction schedule and phasing information for Years 2 through 4 were provided by Valley Water. For Years 5 through 15 of construction, construction activities were conservatively assumed to continue at equal intensity level as Year 4.

2. Project construction will generally occur on Mondays through Fridays between the hours of 6 AM and 6 PM. Equipment maintenance will occur on Saturdays.

Table 41
Construction Equipment
Sediment Augmentation Program
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Miscellaneous Activities	Year 2	5	Medium excavator	Diesel	0.5	5	172	10
	Year 2	5	Loader	Diesel	0.5	5	298	10
	Year 2	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 2	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 2	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 2	1	Medium excavator	Diesel	0.9	2	273	10
	Year 2	1	Motor grader	Diesel	0.9	1	290	10
	Year 2	1	Track drill rig	Diesel	0.9	2	201	10
	Year 2	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 2	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 2	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 2	1	Water truck	Diesel	0.9	2	330	10
	Year 2	1	Pump for water trucks	Diesel	1	1	74	10
	Year 2	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 2	1	Bulldozer	Diesel	0.9	5	722	20
	Year 2	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 2	1	Loader	Diesel	0.9	5	298	10
	Year 2	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 2	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 2	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 2	1	Water truck	Diesel	0.9	0	330	10
	Year 2	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 2	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 2	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 2	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 2	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 2	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 2	1	Water truck	Diesel	0.9	5	330	10
	Year 2	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 2	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 2	1	Pump	Diesel	0.7	20	17	24
	Year 2	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 2	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 2	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 2	1	Loader	Diesel	0.9	5	298	10
Roughened Ramp	Year 2	5	Bulldozer	Diesel	0.9	0	722	20
	Year 2	5	Long-reach excavator	Diesel	0.9	1	424	20
	Year 2	5	Loader	Diesel	0.9	1	298	10
	Year 2	5	Bobcat	Diesel	0.9	1	68	10
	Year 2	5	Light truck - Forman	Gasoline	0.9	1	290	10
	Year 2	5	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 2	5	Articulated dump truck	Diesel	0.9	2	496	10
	Year 2	5	Water truck	Diesel	0.9	1	330	10
	Year 2	5	Pump for water trucks	Diesel	0.9	1	74	10
Planting	Year 2	5	Bobcat	Diesel	1	10	68	10
	Year 2	5	Loader	Diesel	1	10	298	10
	Year 2	5	Bobcat	Diesel	0.9	5	68	10
	Year 2	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 2	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 2	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 2	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 2	5	Medium excavator	Diesel	1	5	273	10
	Year 2	5	Bulldozer	Diesel	0.5	5	354	10
	Year 2	5	Loader	Diesel	1	5	298	10
	Year 2	5	Water truck	Diesel	0.5	5	330	10
	Year 2	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 2	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 2	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 3	5	Medium excavator	Diesel	0.5	5	172	10
	Year 3	5	Loader	Diesel	0.5	5	298	10
	Year 3	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 3	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 3	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 3	1	Medium excavator	Diesel	0.9	2	273	10
	Year 3	1	Motor grader	Diesel	0.9	1	290	10
	Year 3	1	Track drill rig	Diesel	0.9	2	201	10
	Year 3	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 3	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 3	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 3	1	Water truck	Diesel	0.9	2	330	10
	Year 3	1	Pump for water trucks	Diesel	1	1	74	10
	Year 3	1	Loader	Diesel	0.9	1	298	10

Table 41
Construction Equipment
Sediment Augmentation Program
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Clear and Grub	Year 3	1	Bulldozer	Diesel	0.9	5	722	20
	Year 3	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 3	1	Loader	Diesel	0.9	5	298	10
	Year 3	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 3	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 3	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 3	1	Water truck	Diesel	0.9	0	330	10
	Year 3	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 3	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 3	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 3	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 3	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 3	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 3	1	Water truck	Diesel	0.9	5	330	10
	Year 3	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 3	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 3	1	Pump	Diesel	0.7	20	17	24
	Year 3	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 3	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 3	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 3	1	Loader	Diesel	0.9	5	298	10
Planting	Year 3	5	Bobcat	Diesel	1	10	68	10
	Year 3	5	Loader	Diesel	1	10	298	10
	Year 3	5	Bobcat	Diesel	0.9	5	68	10
	Year 3	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 3	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 3	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 3	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 3	5	Medium excavator	Diesel	1	5	273	10
	Year 3	5	Bulldozer	Diesel	0.5	5	354	10
	Year 3	5	Loader	Diesel	1	5	298	10
	Year 3	5	Water truck	Diesel	0.5	5	330	10
	Year 3	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 3	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 3	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 4	5	Medium excavator	Diesel	0.5	5	172	10
	Year 4	5	Loader	Diesel	0.5	5	298	10
	Year 4	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 4	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 4	1	Medium excavator	Diesel	0.9	2	273	10
	Year 4	1	Motor grader	Diesel	0.9	1	290	10
	Year 4	1	Track drill rig	Diesel	0.9	2	201	10
	Year 4	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 4	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 4	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 4	1	Water truck	Diesel	0.9	2	330	10
	Year 4	1	Pump for water trucks	Diesel	1	1	74	10
	Year 4	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 4	1	Bulldozer	Diesel	0.9	5	722	20
	Year 4	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 4	1	Loader	Diesel	0.9	5	298	10
	Year 4	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 4	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 4	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 4	1	Water truck	Diesel	0.9	0	330	10
	Year 4	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 4	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 4	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 4	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 4	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 4	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 4	1	Water truck	Diesel	0.9	5	330	10
	Year 4	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 4	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 4	1	Pump	Diesel	0.7	20	17	24
	Year 4	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 4	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 4	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 4	1	Loader	Diesel	0.9	5	298	10

Table 41
Construction Equipment
Sediment Augmentation Program
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Planting	Year 4	5	Bobcat	Diesel	1	10	68	10
	Year 4	5	Loader	Diesel	1	10	298	10
	Year 4	5	Bobcat	Diesel	0.9	5	68	10
	Year 4	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 4	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 4	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 4	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 4	5	Medium excavator	Diesel	1	5	273	10
	Year 4	5	Bulldozer	Diesel	0.5	5	354	10
	Year 4	5	Loader	Diesel	1	5	298	10
	Year 4	5	Water truck	Diesel	0.5	5	330	10
	Year 4	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 4	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 4	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 5	5	Medium excavator	Diesel	0.5	5	172	10
	Year 5	5	Loader	Diesel	0.5	5	298	10
	Year 5	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 5	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 5	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 5	1	Medium excavator	Diesel	0.9	2	273	10
	Year 5	1	Motor grader	Diesel	0.9	1	290	10
	Year 5	1	Track drill rig	Diesel	0.9	2	201	10
	Year 5	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 5	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 5	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 5	1	Water truck	Diesel	0.9	2	330	10
	Year 5	1	Pump for water trucks	Diesel	1	1	74	10
	Year 5	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 5	1	Bulldozer	Diesel	0.9	5	722	20
	Year 5	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 5	1	Loader	Diesel	0.9	5	298	10
	Year 5	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 5	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 5	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 5	1	Water truck	Diesel	0.9	0	330	10
	Year 5	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 5	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 5	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 5	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 5	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 5	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 5	1	Water truck	Diesel	0.9	5	330	10
	Year 5	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 5	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 5	1	Pump	Diesel	0.7	20	17	24
	Year 5	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 5	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 5	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 5	1	Loader	Diesel	0.9	5	298	10
Planting	Year 5	5	Bobcat	Diesel	1	10	68	10
	Year 5	5	Loader	Diesel	1	10	298	10
	Year 5	5	Bobcat	Diesel	0.9	5	68	10
	Year 5	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 5	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 5	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 5	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 5	5	Medium excavator	Diesel	1	5	273	10
	Year 5	5	Bulldozer	Diesel	0.5	5	354	10
	Year 5	5	Loader	Diesel	1	5	298	10
	Year 5	5	Water truck	Diesel	0.5	5	330	10
	Year 5	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 5	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 5	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 6	5	Medium excavator	Diesel	0.5	5	172	10
	Year 6	5	Loader	Diesel	0.5	5	298	10
	Year 6	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 6	5	Light truck - Crew	Gasoline	1	5	290	10

Table 41
Construction Equipment
Sediment Augmentation Program
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 6	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 6	1	Medium excavator	Diesel	0.9	2	273	10
	Year 6	1	Motor grader	Diesel	0.9	1	290	10
	Year 6	1	Track drill rig	Diesel	0.9	2	201	10
	Year 6	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 6	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 6	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 6	1	Water truck	Diesel	0.9	2	330	10
	Year 6	1	Pump for water trucks	Diesel	1	1	74	10
	Year 6	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 6	1	Bulldozer	Diesel	0.9	5	722	20
	Year 6	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 6	1	Loader	Diesel	0.9	5	298	10
	Year 6	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 6	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 6	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 6	1	Water truck	Diesel	0.9	0	330	10
	Year 6	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 6	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 6	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 6	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 6	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 6	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 6	1	Water truck	Diesel	0.9	5	330	10
	Year 6	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 6	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 6	1	Pump	Diesel	0.7	20	17	24
	Year 6	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 6	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 6	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 6	1	Loader	Diesel	0.9	5	298	10
Planting	Year 6	5	Bobcat	Diesel	1	10	68	10
	Year 6	5	Loader	Diesel	1	10	298	10
	Year 6	5	Bobcat	Diesel	0.9	5	68	10
	Year 6	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 6	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 6	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 6	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 6	5	Medium excavator	Diesel	1	5	273	10
	Year 6	5	Bulldozer	Diesel	0.5	5	354	10
	Year 6	5	Loader	Diesel	1	5	298	10
	Year 6	5	Water truck	Diesel	0.5	5	330	10
	Year 6	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 6	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 6	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 7	5	Medium excavator	Diesel	0.5	5	172	10
	Year 7	5	Loader	Diesel	0.5	5	298	10
	Year 7	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 7	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 7	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 7	1	Medium excavator	Diesel	0.9	2	273	10
	Year 7	1	Motor grader	Diesel	0.9	1	290	10
	Year 7	1	Track drill rig	Diesel	0.9	2	201	10
	Year 7	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 7	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 7	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 7	1	Water truck	Diesel	0.9	2	330	10
	Year 7	1	Pump for water trucks	Diesel	1	1	74	10
	Year 7	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 7	1	Bulldozer	Diesel	0.9	5	722	20
	Year 7	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 7	1	Loader	Diesel	0.9	5	298	10
	Year 7	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 7	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 7	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 7	1	Water truck	Diesel	0.9	0	330	10
	Year 7	1	Pump for water trucks	Diesel	0.9	0	74	10

Table 41
Construction Equipment
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Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Construct creek bypass system	Year 7	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 7	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 7	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 7	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 7	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 7	1	Water truck	Diesel	0.9	5	330	10
	Year 7	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 7	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 7	1	Pump	Diesel	0.7	20	17	24
	Year 7	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 7	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 7	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 7	1	Loader	Diesel	0.9	5	298	10
Planting	Year 7	5	Bobcat	Diesel	1	10	68	10
	Year 7	5	Loader	Diesel	1	10	298	10
	Year 7	5	Bobcat	Diesel	0.9	5	68	10
	Year 7	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 7	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 7	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 7	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 7	5	Medium excavator	Diesel	1	5	273	10
	Year 7	5	Bulldozer	Diesel	0.5	5	354	10
	Year 7	5	Loader	Diesel	1	5	298	10
	Year 7	5	Water truck	Diesel	0.5	5	330	10
	Year 7	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 7	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 7	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 8	5	Medium excavator	Diesel	0.5	5	172	10
	Year 8	5	Loader	Diesel	0.5	5	298	10
	Year 8	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 8	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 8	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 8	1	Medium excavator	Diesel	0.9	2	273	10
	Year 8	1	Motor grader	Diesel	0.9	1	290	10
	Year 8	1	Track drill rig	Diesel	0.9	2	201	10
	Year 8	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 8	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 8	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 8	1	Water truck	Diesel	0.9	2	330	10
	Year 8	1	Pump for water trucks	Diesel	1	1	74	10
	Year 8	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 8	1	Bulldozer	Diesel	0.9	5	722	20
	Year 8	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 8	1	Loader	Diesel	0.9	5	298	10
	Year 8	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 8	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 8	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 8	1	Water truck	Diesel	0.9	0	330	10
	Year 8	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 8	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 8	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 8	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 8	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 8	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 8	1	Water truck	Diesel	0.9	5	330	10
	Year 8	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 8	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 8	1	Pump	Diesel	0.7	20	17	24
	Year 8	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 8	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 8	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 8	1	Loader	Diesel	0.9	5	298	10
Planting	Year 8	5	Bobcat	Diesel	1	10	68	10
	Year 8	5	Loader	Diesel	1	10	298	10
	Year 8	5	Bobcat	Diesel	0.9	5	68	10
	Year 8	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 8	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 8	5	Light truck - Carpenters	Gasoline	1	10	290	10

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Construction Equipment
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Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Allowance -scope to be determined	Year 8	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 8	5	Medium excavator	Diesel	1	5	273	10
	Year 8	5	Bulldozer	Diesel	0.5	5	354	10
	Year 8	5	Loader	Diesel	1	5	298	10
	Year 8	5	Water truck	Diesel	0.5	5	330	10
	Year 8	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 8	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 8	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 9	5	Medium excavator	Diesel	0.5	5	172	10
	Year 9	5	Loader	Diesel	0.5	5	298	10
	Year 9	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 9	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 9	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 9	1	Medium excavator	Diesel	0.9	2	273	10
	Year 9	1	Motor grader	Diesel	0.9	1	290	10
	Year 9	1	Track drill rig	Diesel	0.9	2	201	10
	Year 9	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 9	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 9	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 9	1	Water truck	Diesel	0.9	2	330	10
	Year 9	1	Pump for water trucks	Diesel	1	1	74	10
	Year 9	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 9	1	Bulldozer	Diesel	0.9	5	722	20
	Year 9	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 9	1	Loader	Diesel	0.9	5	298	10
	Year 9	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 9	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 9	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 9	1	Water truck	Diesel	0.9	0	330	10
	Year 9	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 9	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 9	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 9	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 9	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 9	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 9	1	Water truck	Diesel	0.9	5	330	10
	Year 9	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 9	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 9	1	Pump	Diesel	0.7	20	17	24
	Year 9	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 9	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 9	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 9	1	Loader	Diesel	0.9	5	298	10
Planting	Year 9	5	Bobcat	Diesel	1	10	68	10
	Year 9	5	Loader	Diesel	1	10	298	10
	Year 9	5	Bobcat	Diesel	0.9	5	68	10
	Year 9	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 9	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 9	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 9	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 9	5	Medium excavator	Diesel	1	5	273	10
	Year 9	5	Bulldozer	Diesel	0.5	5	354	10
	Year 9	5	Loader	Diesel	1	5	298	10
	Year 9	5	Water truck	Diesel	0.5	5	330	10
	Year 9	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 9	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 9	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 10	5	Medium excavator	Diesel	0.5	5	172	10
	Year 10	5	Loader	Diesel	0.5	5	298	10
	Year 10	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 10	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 10	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 10	1	Medium excavator	Diesel	0.9	2	273	10
	Year 10	1	Motor grader	Diesel	0.9	1	290	10
	Year 10	1	Track drill rig	Diesel	0.9	2	201	10
	Year 10	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 10	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 10	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 10	1	Water truck	Diesel	0.9	2	330	10
	Year 10	1	Pump for water trucks	Diesel	1	1	74	10
	Year 10	1	Loader	Diesel	0.9	1	298	10

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Construction Equipment
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Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Clear and Grub	Year 10	1	Bulldozer	Diesel	0.9	5	722	20
	Year 10	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 10	1	Loader	Diesel	0.9	5	298	10
	Year 10	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 10	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 10	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 10	1	Water truck	Diesel	0.9	0	330	10
	Year 10	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 10	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 10	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 10	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 10	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 10	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 10	1	Water truck	Diesel	0.9	5	330	10
	Year 10	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 10	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 10	1	Pump	Diesel	0.7	20	17	24
	Year 10	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 10	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 10	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 10	1	Loader	Diesel	0.9	5	298	10
Planting	Year 10	5	Bobcat	Diesel	1	10	68	10
	Year 10	5	Loader	Diesel	1	10	298	10
	Year 10	5	Bobcat	Diesel	0.9	5	68	10
	Year 10	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 10	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 10	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 10	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 10	5	Medium excavator	Diesel	1	5	273	10
	Year 10	5	Bulldozer	Diesel	0.5	5	354	10
	Year 10	5	Loader	Diesel	1	5	298	10
	Year 10	5	Water truck	Diesel	0.5	5	330	10
	Year 10	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 10	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 10	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 11	5	Medium excavator	Diesel	0.5	5	172	10
	Year 11	5	Loader	Diesel	0.5	5	298	10
	Year 11	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 11	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 11	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 11	1	Medium excavator	Diesel	0.9	2	273	10
	Year 11	1	Motor grader	Diesel	0.9	1	290	10
	Year 11	1	Track drill rig	Diesel	0.9	2	201	10
	Year 11	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 11	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 11	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 11	1	Water truck	Diesel	0.9	2	330	10
	Year 11	1	Pump for water trucks	Diesel	1	1	74	10
	Year 11	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 11	1	Bulldozer	Diesel	0.9	5	722	20
	Year 11	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 11	1	Loader	Diesel	0.9	5	298	10
	Year 11	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 11	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 11	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 11	1	Water truck	Diesel	0.9	0	330	10
	Year 11	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 11	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 11	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 11	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 11	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 11	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 11	1	Water truck	Diesel	0.9	5	330	10
	Year 11	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 11	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 11	1	Pump	Diesel	0.7	20	17	24
	Year 11	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 11	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 11	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 11	1	Loader	Diesel	0.9	5	298	10

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Construction Equipment
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Planting	Year 11	5	Bobcat	Diesel	1	10	68	10
	Year 11	5	Loader	Diesel	1	10	298	10
	Year 11	5	Bobcat	Diesel	0.9	5	68	10
	Year 11	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 11	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 11	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 11	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 11	5	Medium excavator	Diesel	1	5	273	10
	Year 11	5	Bulldozer	Diesel	0.5	5	354	10
	Year 11	5	Loader	Diesel	1	5	298	10
	Year 11	5	Water truck	Diesel	0.5	5	330	10
	Year 11	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 11	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 11	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 12	5	Medium excavator	Diesel	0.5	5	172	10
	Year 12	5	Loader	Diesel	0.5	5	298	10
	Year 12	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 12	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 12	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 12	1	Medium excavator	Diesel	0.9	2	273	10
	Year 12	1	Motor grader	Diesel	0.9	1	290	10
	Year 12	1	Track drill rig	Diesel	0.9	2	201	10
	Year 12	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 12	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 12	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 12	1	Water truck	Diesel	0.9	2	330	10
	Year 12	1	Pump for water trucks	Diesel	1	1	74	10
	Year 12	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 12	1	Bulldozer	Diesel	0.9	5	722	20
	Year 12	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 12	1	Loader	Diesel	0.9	5	298	10
	Year 12	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 12	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 12	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 12	1	Water truck	Diesel	0.9	0	330	10
	Year 12	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 12	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 12	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 12	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 12	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 12	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 12	1	Water truck	Diesel	0.9	5	330	10
	Year 12	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 12	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 12	1	Pump	Diesel	0.7	20	17	24
	Year 12	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 12	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 12	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 12	1	Loader	Diesel	0.9	5	298	10
Planting	Year 12	5	Bobcat	Diesel	1	10	68	10
	Year 12	5	Loader	Diesel	1	10	298	10
	Year 12	5	Bobcat	Diesel	0.9	5	68	10
	Year 12	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 12	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 12	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 12	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 12	5	Medium excavator	Diesel	1	5	273	10
	Year 12	5	Bulldozer	Diesel	0.5	5	354	10
	Year 12	5	Loader	Diesel	1	5	298	10
	Year 12	5	Water truck	Diesel	0.5	5	330	10
	Year 12	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 12	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 12	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 13	5	Medium excavator	Diesel	0.5	5	172	10
	Year 13	5	Loader	Diesel	0.5	5	298	10
	Year 13	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 13	5	Light truck - Crew	Gasoline	1	5	290	10

Table 41
Construction Equipment
Sediment Augmentation Program
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 13	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 13	1	Medium excavator	Diesel	0.9	2	273	10
	Year 13	1	Motor grader	Diesel	0.9	1	290	10
	Year 13	1	Track drill rig	Diesel	0.9	2	201	10
	Year 13	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 13	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 13	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 13	1	Water truck	Diesel	0.9	2	330	10
	Year 13	1	Pump for water trucks	Diesel	1	1	74	10
	Year 13	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 13	1	Bulldozer	Diesel	0.9	5	722	20
	Year 13	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 13	1	Loader	Diesel	0.9	5	298	10
	Year 13	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 13	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 13	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 13	1	Water truck	Diesel	0.9	0	330	10
	Year 13	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 13	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 13	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 13	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 13	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 13	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 13	1	Water truck	Diesel	0.9	5	330	10
	Year 13	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 13	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 13	1	Pump	Diesel	0.7	20	17	24
	Year 13	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 13	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 13	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 13	1	Loader	Diesel	0.9	5	298	10
Planting	Year 13	5	Bobcat	Diesel	1	10	68	10
	Year 13	5	Loader	Diesel	1	10	298	10
	Year 13	5	Bobcat	Diesel	0.9	5	68	10
	Year 13	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 13	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 13	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 13	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 13	5	Medium excavator	Diesel	1	5	273	10
	Year 13	5	Bulldozer	Diesel	0.5	5	354	10
	Year 13	5	Loader	Diesel	1	5	298	10
	Year 13	5	Water truck	Diesel	0.5	5	330	10
	Year 13	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 13	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 13	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 14	5	Medium excavator	Diesel	0.5	5	172	10
	Year 14	5	Loader	Diesel	0.5	5	298	10
	Year 14	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 14	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 14	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 14	1	Medium excavator	Diesel	0.9	2	273	10
	Year 14	1	Motor grader	Diesel	0.9	1	290	10
	Year 14	1	Track drill rig	Diesel	0.9	2	201	10
	Year 14	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 14	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 14	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 14	1	Water truck	Diesel	0.9	2	330	10
	Year 14	1	Pump for water trucks	Diesel	1	1	74	10
	Year 14	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 14	1	Bulldozer	Diesel	0.9	5	722	20
	Year 14	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 14	1	Loader	Diesel	0.9	5	298	10
	Year 14	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 14	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 14	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 14	1	Water truck	Diesel	0.9	0	330	10
	Year 14	1	Pump for water trucks	Diesel	0.9	0	74	10

Table 41
Construction Equipment
Sediment Augmentation Program
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Construct creek bypass system	Year 14	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 14	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 14	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 14	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 14	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 14	1	Water truck	Diesel	0.9	5	330	10
	Year 14	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 14	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 14	1	Pump	Diesel	0.7	20	17	24
	Year 14	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 14	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 14	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 14	1	Loader	Diesel	0.9	5	298	10
Planting	Year 14	5	Bobcat	Diesel	1	10	68	10
	Year 14	5	Loader	Diesel	1	10	298	10
	Year 14	5	Bobcat	Diesel	0.9	5	68	10
	Year 14	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 14	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 14	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 14	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 14	5	Medium excavator	Diesel	1	5	273	10
	Year 14	5	Bulldozer	Diesel	0.5	5	354	10
	Year 14	5	Loader	Diesel	1	5	298	10
	Year 14	5	Water truck	Diesel	0.5	5	330	10
	Year 14	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 14	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 14	5	Light truck - Crew	Gasoline	1	5	290	10
Miscellaneous Activities	Year 15	5	Medium excavator	Diesel	0.5	5	172	10
	Year 15	5	Loader	Diesel	0.5	5	298	10
	Year 15	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 15	5	Light truck - Crew	Gasoline	1	5	290	10
Construction of the Haul Roads and Preparation of Stockpile Areas	Year 15	1	Medium Bulldozer	Diesel	0.9	2	354	10
	Year 15	1	Medium excavator	Diesel	0.9	2	273	10
	Year 15	1	Motor grader	Diesel	0.9	1	290	10
	Year 15	1	Track drill rig	Diesel	0.9	2	201	10
	Year 15	1	Light truck - Forman	Gasoline	0.9	3	290	10
	Year 15	1	Light truck - Crew	Gasoline	0.9	1	290	10
	Year 15	1	Articulated dump truck	Diesel	0.9	2	496	10
	Year 15	1	Water truck	Diesel	0.9	2	330	10
	Year 15	1	Pump for water trucks	Diesel	1	1	74	10
	Year 15	1	Loader	Diesel	0.9	1	298	10
Clear and Grub	Year 15	1	Bulldozer	Diesel	0.9	5	722	20
	Year 15	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 15	1	Loader	Diesel	0.9	5	298	10
	Year 15	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 15	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 15	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 15	1	Water truck	Diesel	0.9	0	330	10
	Year 15	1	Pump for water trucks	Diesel	0.9	0	74	10
Construct creek bypass system	Year 15	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 15	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 15	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 15	1	Light truck - Crew	Gasoline	0.9	5	290	10
	Year 15	1	Articulated dump truck	Diesel	0.9	5	496	10
	Year 15	1	Water truck	Diesel	0.9	5	330	10
	Year 15	1	Pump for water trucks	Diesel	0.9	5	74	10
	Year 15	1	Loader	Diesel	0.9	5	298	10
Dewater	Year 15	1	Pump	Diesel	0.7	20	17	24
	Year 15	1	Long-reach excavator	Diesel	0.9	5	424	20
	Year 15	1	Generator (80 kW)	Diesel	1	5	152	20
	Year 15	1	Light truck - Forman	Gasoline	0.9	5	290	10
	Year 15	1	Loader	Diesel	0.9	5	298	10

Table 41
Construction Equipment
Sediment Augmentation Program
Santa Clara County, CA

Construction Activity	Construction Year	Approximate Duration (months)	Equipment Type	Fuel Type	Utilization Factor	Equipment Quantity	Power Rating (HP)	Operating Hours/Day
Planting	Year 15	5	Bobcat	Diesel	1	10	68	10
	Year 15	5	Loader	Diesel	1	10	298	10
	Year 15	5	Bobcat	Diesel	0.9	5	68	10
	Year 15	5	Light truck - Forman	Gasoline	1	10	290	10
	Year 15	5	Light truck - Crew	Gasoline	1	5	290	10
	Year 15	5	Light truck - Carpenters	Gasoline	1	10	290	10
Allowance -scope to be determined	Year 15	5	Articulated dump truck	Diesel	0.5	5	496	10
	Year 15	5	Medium excavator	Diesel	1	5	273	10
	Year 15	5	Bulldozer	Diesel	0.5	5	354	10
	Year 15	5	Loader	Diesel	1	5	298	10
	Year 15	5	Water truck	Diesel	0.5	5	330	10
	Year 15	5	Generator (80 kW)	Diesel	1	5	152	10
	Year 15	5	Light truck - Forman	Gasoline	1	5	290	10
	Year 15	5	Light truck - Crew	Gasoline	1	5	290	10

Notes:

1. Construction activities were provided by Valley Water for Year 2 through Year 4, and construction equipment was provided by the Project Applicant for Year 2. Analyses conservatively assume that all activities will continue occurring after Year 3 through the end of Sediment Augmentation Program construction. Equipment is assumed to continue use after Year 2 for all applicable activities.

Table 42-a
Fugitive Dust Emissions from Paved Road Dust
Sediment Augmentation Program
Santa Clara County, CA

Phase	Subphase	# Days	Total Trips[1]			Emissions (lb/yr)[2,3]	
			Worker	Vendor	Hauling	PM_{10}	$PM_{2.5}$
Year 2	Import and Sort Creek Materials from Holiday Bench Excavation	88	0	0	1,661	5.5	0.83
Year 2	Import and Sort Creek Materials from Holiday Channel Excavation	88	0	0	1,661	5.5	0.83
Year 2	Import and Sort Creek Materials from stockpile	88	0	0	332	1.1	0.17
Year 3	Import and Sort Creek Materials from stockpile	67	0	0	332	1.1	0.17
Year 4	Import and Sort Creek Materials from stockpile	89	0	0	332	1.1	0.17
Year 5	Import and Sort Creek Materials from stockpile	87	0	0	332	1.1	0.17
Year 6	Import and Sort Creek Materials from stockpile	87	0	0	332	1.1	0.17
Year 7	Import and Sort Creek Materials from stockpile	87	0	0	332	1.1	0.17
Year 8	Import and Sort Creek Materials from stockpile	88	0	0	332	1.1	0.17
Year 9	Import and Sort Creek Materials from stockpile	89	0	0	332	1.1	0.17
Year 10	Import and Sort Creek Materials from stockpile	88	0	0	332	1.1	0.17
Year 11	Import and Sort Creek Materials from stockpile	87	0	0	332	1.1	0.17
Year 12	Import and Sort Creek Materials from stockpile	87	0	0	332	1.1	0.17
Year 13	Import and Sort Creek Materials from stockpile	88	0	0	332	1.1	0.17
Year 14	Import and Sort Creek Materials from stockpile	89	0	0	332	1.1	0.17
Year 15	Import and Sort Creek Materials from stockpile	89	0	0	332	1.1	0.17
Year 2	Miscellaneous Activities	153	3,825	765	0	8.5	1.3
Year 2	Construction of the haul roads and preparation of stockpile areas	22	484	110	0	1.1	0.16
Year 2	Clear and Grub	10	380	80	0	0.85	0.13
Year 2	Construct creek bypass system	22	1,100	220	0	2.4	0.37
Year 2	Dewater	88	4,400	880	0	10	1.5
Year 2	Roughened Ramp	88	1,056	264	0	2.4	0.36
Year 2	Planting	88	5,544	1,144	0	12	1.9
Year 2	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 3	Miscellaneous activities	154	3,850	770	0	8.5	1.3
Year 3	Construction of the haul roads and preparation of stockpile areas	23	506	115	0	1.1	0.17
Year 3	Clear and Grub	11	418	88	0	0.93	0.14
Year 3	Construct creek bypass system	23	1,150	230	0	2.6	0.38
Year 3	Dewater	89	4,450	890	0	10	1.5
Year 3	Planting	88	5,544	1,144	0	12	1.9
Year 3	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 4	Miscellaneous activities	154	3,850	770	0	8.5	1.3
Year 4	Construction of the haul roads and preparation of stockpile areas	23	506	115	0	1.1	0.17
Year 4	Clear and Grub	11	418	88	0	0.93	0.14
Year 4	Construct creek bypass system	23	1,150	230	0	2.6	0.38
Year 4	Dewater	89	4,450	890	0	10	1.5
Year 4	Planting	88	5,544	1,144	0	12	1.9
Year 4	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 5	Miscellaneous activities	152	3,800	760	0	8.4	1.3
Year 5	Construction of the haul roads and preparation of stockpile areas	22	484	110	0	1.1	0.16
Year 5	Clear and Grub	11	418	88	0	0.93	0.14
Year 5	Construct creek bypass system	22	1,100	220	0	2.4	0.37
Year 5	Dewater	87	4,350	870	0	10	1.4
Year 5	Planting	86	5,418	1,118	0	12	1.8
Year 5	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 6	Miscellaneous activities	152	3,800	760	0	8.4	1.3
Year 6	Construction of the haul roads and preparation of stockpile areas	21	462	105	0	1.0	0.16
Year 6	Clear and Grub	11	418	88	0	0.93	0.14
Year 6	Construct creek bypass system	21	1,050	210	0	2.3	0.35
Year 6	Dewater	87	4,350	870	0	10	1.4
Year 6	Planting	86	5,418	1,118	0	12	1.8
Year 6	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 7	Miscellaneous activities	152	3,800	760	0	8.4	1.3
Year 7	Construction of the haul roads and preparation of stockpile areas	21	462	105	0	1.0	0.16
Year 7	Clear and Grub	10	380	80	0	0.85	0.13
Year 7	Construct creek bypass system	21	1,050	210	0	2.3	0.35
Year 7	Dewater	87	4,350	870	0	10	1.4
Year 7	Planting	87	5,481	1,131	0	12	1.8
Year 7	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 8	Miscellaneous activities	153	3,825	765	0	8.5	1.3
Year 8	Construction of the haul roads and preparation of stockpile areas	22	484	110	0	1.1	0.16
Year 8	Clear and Grub	10	380	80	0	0.85	0.13
Year 8	Construct creek bypass system	22	1,100	220	0	2.4	0.37
Year 8	Dewater	88	4,400	880	0	10	1.5
Year 8	Planting	88	5,544	1,144	0	12	1.9
Year 8	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 9	Miscellaneous activities	154	3,850	770	0	8.5	1.3

Table 42-a
Fugitive Dust Emissions from Paved Road Dust
Sediment Augmentation Program
Santa Clara County, CA

Phase	Subphase	# Days	Total Trips[1]			Emissions (lb/yr)[2,3]	
			Worker	Vendor	Hauling	PM_{10}	$PM_{2.5}$
Year 9	Construction of the haul roads and preparation of stockpile areas	23	506	115	0	1.1	0.17
Year 9	Clear and Grub	11	418	88	0	0.93	0.14
Year 9	Construct creek bypass system	23	1,150	230	0	2.6	0.38
Year 9	Dewater	89	4,450	890	0	10	1.5
Year 9	Planting	88	5,544	1,144	0	12	1.9
Year 9	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 10	Miscellaneous activities	153	3,825	765	0	8.5	1.3
Year 10	Construction of the haul roads and preparation of stockpile areas	23	506	115	0	1.1	0.17
Year 10	Clear and Grub	11	418	88	0	0.93	0.14
Year 10	Construct creek bypass system	23	1,150	230	0	2.6	0.38
Year 10	Dewater	88	4,400	880	0	10	1.5
Year 10	Planting	87	5,481	1,131	0	12	1.8
Year 10	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 11	Miscellaneous activities	152	3,800	760	0	8.4	1.3
Year 11	Construction of the haul roads and preparation of stockpile areas	22	484	110	0	1.1	0.16
Year 11	Clear and Grub	11	418	88	0	0.93	0.14
Year 11	Construct creek bypass system	22	1,100	220	0	2.4	0.37
Year 11	Dewater	87	4,350	870	0	10	1.4
Year 11	Planting	86	5,418	1,118	0	12	1.8
Year 11	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 12	Miscellaneous activities	152	3,800	760	0	8.4	1.3
Year 12	Construction of the haul roads and preparation of stockpile areas	21	462	105	0	1.0	0.16
Year 12	Clear and Grub	11	418	88	0	0.93	0.14
Year 12	Construct creek bypass system	21	1,050	210	0	2.3	0.35
Year 12	Dewater	87	4,350	870	0	10	1.4
Year 12	Planting	86	5,418	1,118	0	12	1.8
Year 12	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 13	Miscellaneous activities	153	3,825	765	0	8.5	1.3
Year 13	Construction of the haul roads and preparation of stockpile areas	22	484	110	0	1.1	0.16
Year 13	Clear and Grub	10	380	80	0	0.85	0.13
Year 13	Construct creek bypass system	22	1,100	220	0	2.4	0.37
Year 13	Dewater	88	4,400	880	0	10	1.5
Year 13	Planting	88	5,544	1,144	0	12	1.9
Year 13	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 14	Miscellaneous activities	154	3,850	770	0	8.5	1.3
Year 14	Construction of the haul roads and preparation of stockpile areas	23	506	115	0	1.1	0.17
Year 14	Clear and Grub	11	418	88	0	0.93	0.14
Year 14	Construct creek bypass system	23	1,150	230	0	2.6	0.38
Year 14	Dewater	89	4,450	890	0	10	1.5
Year 14	Planting	88	5,544	1,144	0	12	1.9
Year 14	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8
Year 15	Miscellaneous activities	154	3,850	770	0	8.5	1.3
Year 15	Construction of the haul roads and preparation of stockpile areas	23	506	115	0	1.1	0.17
Year 15	Clear and Grub	11	418	88	0	0.93	0.14
Year 15	Construct creek bypass system	23	1,150	230	0	2.6	0.38
Year 15	Dewater	89	4,450	890	0	10	1.5
Year 15	Planting	88	5,544	1,144	0	12	1.9
Year 15	Allowance -scope to be determined	110	5,500	1,100	0	12	1.8

Notes:

1. Construction trip rates were determined assuming 1.25 worker trips per piece of construction equipment per phase and 0.2 vendor trips per worker trip. Haul trips were determined from hauled material volume provided by Valley Water.

2. Emissions from paved road dust were calculated using the total trips provided by Valley Water, calculated unpaved road emission factors, and trip lengths provided in Table 43-b.

3. A 26% reduction in the PM_{10} emission factor was taken for street sweeping of arterial/collector streets, based on SCAQMD's Fugitive Dust Table XI-C.

Abbreviations:

lb - pounds
PM - particulate matter
SCAQMD - South Coast Air Quality Management District
yr - year

References:

SCAQMD. 2007. Table XI-C Mitigation Measure Examples:
Dust From Paved Roads. Available online at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

Table 42-b
Fugitive Dust Emissions from Grading Activity
Sediment Augmentation Program
Santa Clara County, CA

Construction Year	Construction Activity	Total Work Days	Maximum Area Disturbed[1]	VMT[2]	Uncontrolled PM_{10} Emission Factor[3]	Uncontrolled $PM_{2.5}$ Emission Factor[4]	Annual Emissions[5]			
							PM_{10}		$PM_{2.5}$	
		Days	acre/day	mile/day	lb/VMT	lb/VMT	lb/day	lb/yr	lb/day	lb/yr
Year 2	Construction of the haul roads and preparation of stockpile areas	22	2.25	1.55	1.54	0.17	1.07	24	0.12	2.6
Year 2	Clear and Grub	10	3.75	2.58			1.8	18	0.19	1.9
Year 2	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 3	Construction of the haul roads and preparation of stockpile areas	23	2.25	1.55			1.07	25	0.12	2.7
Year 3	Clear and Grub	11	3.75	2.58			1.8	20	0.19	2.1
Year 3	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 4	Construction of the haul roads and preparation of stockpile areas	23	2.25	1.55			1.07	25	0.12	2.7
Year 4	Clear and Grub	11	3.75	2.58			1.8	20	0.19	2.1
Year 4	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 5	Construction of the haul roads and preparation of stockpile areas	22	2.25	1.55			1.07	24	0.12	2.6
Year 5	Clear and Grub	11	3.75	2.58			1.8	20	0.19	2.1
Year 5	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 6	Construction of the haul roads and preparation of stockpile areas	21	2.25	1.55			1.07	23	0.12	2.4
Year 6	Clear and Grub	11	3.75	2.58			1.8	20	0.19	2.1
Year 6	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 7	Construction of the haul roads and preparation of stockpile areas	21	2.25	1.55			1.07	23	0.12	2.4
Year 7	Clear and Grub	10	3.75	2.58			1.8	18	0.19	1.9
Year 7	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 8	Construction of the haul roads and preparation of stockpile areas	22	2.25	1.55			1.07	24	0.12	2.6
Year 8	Clear and Grub	10	3.75	2.58			1.8	18	0.19	1.9
Year 8	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 9	Construction of the haul roads and preparation of stockpile areas	23	2.25	1.55			1.07	25	0.12	2.7
Year 9	Clear and Grub	11	3.75	2.58			1.8	20	0.19	2.1
Year 9	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 10	Construction of the haul roads and preparation of stockpile areas	23	2.25	1.55			1.07	25	0.12	2.7
Year 10	Clear and Grub	11	3.75	2.58			1.8	20	0.19	2.1
Year 10	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 11	Construction of the haul roads and preparation of stockpile areas	22	2.25	1.55			1.07	24	0.12	2.6
Year 11	Clear and Grub	11	3.75	2.58			1.8	20	0.19	2.1
Year 11	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 12	Construction of the haul roads and preparation of stockpile areas	21	2.25	1.55			1.07	23	0.12	2.4
Year 12	Clear and Grub	11	3.75	2.58			1.8	20	0.19	2.1
Year 12	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 13	Construction of the haul roads and preparation of stockpile areas	22	2.25	1.55			1.07	24	0.12	2.6
Year 13	Clear and Grub	10	3.75	2.58			1.8	18	0.19	1.9
Year 13	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 14	Construction of the haul roads and preparation of stockpile areas	23	2.25	1.55			1.07	25	0.12	2.7
Year 14	Clear and Grub	11	3.75	2.58			1.8	20	0.19	2.1
Year 14	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21
Year 15	Construction of the haul roads and preparation of stockpile areas	23	2.25	1.55			1.07	25	0.12	2.7
Year 15	Clear and Grub	11	3.75	2.58			1.8	20	0.19	2.1
Year 15	Allowance -scope to be determined	110	3.75	2.58			1.8	197	0.19	21

Table 42-b
Fugitive Dust Emissions from Grading Activity
Sediment Augmentation Program
Santa Clara County, CA

Notes:

1. Maximum graded area is based on the number of crawler tractors, graders, rubber tired dozers, and scrapers used for each construction activity, as outlined in CalEEMod® User's Guide, Appendix A, Section 4.3.
2. VMT per day calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for grading equipment. The equation is: $VMT = A_S/W_b \times (43{,}560 \text{ sqft/acre})/(5{,}280 \text{ ft/mile})$, where:
   - A_S = A_S, acres graded per day (varies by sub-activity)
   - 12 = W_b, blade width of grading equipment (CalEEMod® default)
3. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for grading equipment. The equation is: $EF_{PM10} = 0.051 \times (S)^{2.0} \times F_{PM10}$, where:
   - 7.1 = S, mean vehicle speed (mph) (AP-42 default)
   - 0.6 = F_{PM10}, PM_{10} scaling factor (AP-42 default)
4. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for grading equipment. The equation is: $EF_{PM2.5} = 0.04 \times (S)^{2.5} \times F_{PM2.5}$, where:
   - 7.1 = S, mean vehicle speed (mph) (AP-42 default)
   - 0.031 = $F_{PM2.5}$, $PM_{2.5}$ scaling factor (AP-42 default)
5. Fugitive $PM_{2.5}$ emissions from grading will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
yr - year
VMT - vehicle miles traveled
PM - particulate matter
lb - pounds

References:

CalEEMod® User's Guide, Appendix A, Section 4.3:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 42-c
Fugitive Dust Emissions from Truck Loading Activity
Sediment Augmentation Program
Santa Clara County, CA

Construction Phase	Construction Subphase	Material Loaded	Uncontrolled Emission Factor[1]		Annual Emissions[2]	
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
		ton	lb/ton material		ton/yr	ton/yr
Import and Sort Creek Materials from Holiday Bench Excavation	Year 2	33,228	8.93E-05	1.35E-05	6.7E-04	1.0E-04
Import and Sort Creek Materials from Holiday Channel Excavation	Year 2	33,228			6.7E-04	1.0E-04
Import and Sort Creek Materials from stockpile	Year 2	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 3	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 4	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 5	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 6	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 7	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 8	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 9	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 10	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 11	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 12	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 13	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 14	6,646			1.3E-04	2.0E-05
Import and Sort Creek Materials from stockpile	Year 15	6,646			1.3E-04	2.0E-05

Notes:

1. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 13.2.4 for aggregate handling. The equation is:
EF = k x (0.0032) x $(U/5)^{1.3}$ / $(M/2)^{1.4}$, where the following default values are used:

0.35 = k_{PM10}, PM_{10} particle size multiplier
0.053 = $k_{PM2.5}$, $PM_{2.5}$ particle size multiplier
2.2 = mean wind speed (U), meters per second
4.9 = mean wind speed (U), miles per hour
12 = material moisture content (M), %

2. Fugitive $PM_{2.5}$ emissions from truck loading will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
lbs - pounds
PM - particulate matter
yr - year

References:

CalEEMod® User's Guide, Appendix A, Section 4.3:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 42-d
Fugitive Dust Emissions from Bulldozing Activity
Sediment Augmentation Program
Santa Clara County, CA

Construction Year	Construction Subphase	Equipment Work Hours[1]	Uncontrolled PM_{10} Emission Factor[2]	Uncontrolled $PM_{2.5}$ Emission Factor[3]	Annual Emissions[4]	
					PM_{10}	$PM_{2.5}$
		hr/day	lb/hr	lb/hr	ton/yr	ton/yr
Year 2	Construction of the haul roads and preparation of stockpile areas	10.0			0.037	0.020
Year 2	Clear and Grub	25.0			0.042	0.023
Year 2	Allowance -scope to be determined	25.0			0.47	0.26
Year 3	Construction of the haul roads and preparation of stockpile areas	10.0			0.039	0.021
Year 3	Clear and Grub	25.0			0.047	0.026
Year 3	Allowance -scope to be determined	25.0			0.47	0.26
Year 4	Construction of the haul roads and preparation of stockpile areas	10.0			0.039	0.021
Year 4	Clear and Grub	25.0			0.047	0.026
Year 4	Allowance -scope to be determined	25.0			0.47	0.26
Year 5	Construction of the haul roads and preparation of stockpile areas	10.0			0.037	0.020
Year 5	Clear and Grub	25.0			0.047	0.026
Year 5	Allowance -scope to be determined	25.0			0.47	0.26
Year 6	Construction of the haul roads and preparation of stockpile areas	10.0			0.036	0.020
Year 6	Clear and Grub	25.0			0.047	0.026
Year 6	Allowance -scope to be determined	25.0			0.47	0.26
Year 7	Construction of the haul roads and preparation of stockpile areas	10.0			0.036	0.020
Year 7	Clear and Grub	25.0	0.75	0.41	0.042	0.023
Year 7	Allowance -scope to be determined	25.0			0.47	0.26
Year 8	Construction of the haul roads and preparation of stockpile areas	10.0			0.037	0.020
Year 8	Clear and Grub	25.0			0.042	0.023
Year 8	Allowance -scope to be determined	25.0			0.47	0.26
Year 9	Construction of the haul roads and preparation of stockpile areas	10.0			0.039	0.021
Year 9	Clear and Grub	25.0			0.047	0.026
Year 9	Allowance -scope to be determined	25.0			0.47	0.26
Year 10	Construction of the haul roads and preparation of stockpile areas	10.0			0.039	0.021
Year 10	Clear and Grub	25.0			0.047	0.026
Year 10	Allowance -scope to be determined	25.0			0.47	0.26
Year 11	Construction of the haul roads and preparation of stockpile areas	10.0			0.037	0.020
Year 11	Clear and Grub	25.0			0.047	0.026
Year 11	Allowance -scope to be determined	25.0			0.47	0.26
Year 12	Construction of the haul roads and preparation of stockpile areas	10.0			0.036	0.020
Year 12	Clear and Grub	25.0			0.047	0.026
Year 12	Allowance -scope to be determined	25.0			0.47	0.26

Table 42-d
Fugitive Dust Emissions from Bulldozing Activity
Sediment Augmentation Program
Santa Clara County, CA

Construction Year	Construction Subphase	Equipment Work Hours[1]	Uncontrolled PM_{10} Emission Factor[2]	Uncontrolled $PM_{2.5}$ Emission Factor[3]	Annual Emissions[4]	
					PM_{10}	$PM_{2.5}$
		hr/day	lb/hr	lb/hr	ton/yr	ton/yr
Year 13	Construction of the haul roads and preparation of stockpile areas	10.0	0.41	0.41	0.037	0.020
Year 13	Clear and Grub	25.0			0.042	0.023
Year 13	Allowance -scope to be determined	25.0			0.47	0.26
Year 14	Construction of the haul roads and preparation of stockpile areas	10.0			0.039	0.021
Year 14	Clear and Grub	25.0			0.047	0.026
Year 14	Allowance -scope to be determined	25.0			0.47	0.26
Year 15	Construction of the haul roads and preparation of stockpile areas	10.0			0.039	0.021
Year 15	Clear and Grub	25.0			0.047	0.026
Year 15	Allowance -scope to be determined	25.0			0.47	0.26

Notes:

1. Construction schedule is based on Project-specific estimate. Includes planned hours for all tracked dozers to be used during the given phase.
2. Emission factors were calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for bulldozing equipment. The equation is:
   $EF_{PM10} = C_{PM15} \times s^{1.5} / M^{1.4} \times F_{PM10}$, where the following default values are used:

   1.0 = C_{PM15}, arbitrary coefficient
   6.9 = s, material silt content (%)
   7.9 = M, material moisture content (%)
   0.75 = F_{PM10}, PM_{10} scaling factor
3. Emission factor calculated following guidance in the CalEEMod® User's Guide, Appendix A, which is based on AP-42, Section 11.9 for bulldozing equipment. The equation is:
   $EF_{PM2.5} = C_{TSP} \times s^{1.2} / M^{1.3} \times F_{PM2.5}$, where the following default values are used:

   5.7 = C_{TSP}, arbitrary coefficient
   6.9 = s, material silt content (%)
   7.9 = M, material moisture content (%)
   0.105 = $F_{PM2.5}$, $PM_{2.5}$ scaling factor
4. Fugitive $PM_{2.5}$ emissions from bulldozing will be controlled by watering the construction site two times per day, which is estimated to reduce emissions by 55% per CalEEMod® recommendation.

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
lbs - pounds
yr - year
PM_{10} - particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in aerodynamic diameter
VMT - vehicle miles traveled

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 43-a
Onroad Construction Trips
Sediment Augmentation Program
Santa Clara County, CA

Construction Subphase	Year	Construction Roundtrips[1]		
		Total Worker Trips[2]	Total Vendor Trips[2]	Total Haul Trips[2]
		(trips/day)	(trips/day)	(trips)
Import and Sort Creek Materials from Holiday Bench Excavation	2025	0	0	1,661
Import and Sort Creek Materials from Holiday Channel Excavation	2025	0	0	1,661
Import and Sort Creek Materials from stockpile	2025	0	0	332
Import and Sort Creek Materials from stockpile	2026	0	0	332
Import and Sort Creek Materials from stockpile	2027	0	0	332
Import and Sort Creek Materials from stockpile	2028	0	0	332
Import and Sort Creek Materials from stockpile	2029	0	0	332
Import and Sort Creek Materials from stockpile	2030	0	0	332
Import and Sort Creek Materials from stockpile	2031	0	0	332
Import and Sort Creek Materials from stockpile	2032	0	0	332
Import and Sort Creek Materials from stockpile	2033	0	0	332
Import and Sort Creek Materials from stockpile	2034	0	0	332
Import and Sort Creek Materials from stockpile	2035	0	0	332
Import and Sort Creek Materials from stockpile	2036	0	0	332
Import and Sort Creek Materials from stockpile	2037	0	0	332
Import and Sort Creek Materials from stockpile	2038	0	0	332
Miscellaneous Activities	2025	25	5	0
Construction of the haul roads and preparation of stockpile areas	2025	22	5	0
Clear and Grub	2025	38	8	0
Construct creek bypass system	2025	50	10	0
Dewater	2025	50	10	0
Roughened Ramp	2025	12	3	0
Planting	2025	63	13	0
Allowance -scope to be determined	2025	50	10	0
Miscellaneous activities	2026	25	5	0
Construction of the haul roads and preparation of stockpile areas	2026	22	5	0
Clear and Grub	2026	38	8	0
Construct creek bypass system	2026	50	10	0
Dewater	2026	50	10	0
Planting	2026	63	13	0
Allowance -scope to be determined	2026	50	10	0
Miscellaneous activities	2027	25	5	0
Construction of the haul roads and preparation of stockpile areas	2027	22	5	0
Clear and Grub	2027	38	8	0
Construct creek bypass system	2027	50	10	0
Dewater	2027	50	10	0
Planting	2027	63	13	0
Allowance -scope to be determined	2027	50	10	0
Miscellaneous activities	2028	25	5	0
Construction of the haul roads and preparation of stockpile areas	2028	22	5	0
Clear and Grub	2028	38	8	0
Construct creek bypass system	2028	50	10	0
Dewater	2028	50	10	0
Planting	2028	63	13	0
Allowance -scope to be determined	2028	50	10	0
Miscellaneous activities	2029	25	5	0
Construction of the haul roads and preparation of stockpile areas	2029	22	5	0
Clear and Grub	2029	38	8	0
Construct creek bypass system	2029	50	10	0
Dewater	2029	50	10	0
Planting	2029	63	13	0
Allowance -scope to be determined	2029	50	10	0
Miscellaneous activities	2030	25	5	0
Construction of the haul roads and preparation of stockpile areas	2030	22	5	0
Clear and Grub	2030	38	8	0
Construct creek bypass system	2030	50	10	0
Dewater	2030	50	10	0
Planting	2030	63	13	0
Allowance -scope to be determined	2030	50	10	0
Miscellaneous activities	2031	25	5	0
Construction of the haul roads and preparation of stockpile areas	2031	22	5	0
Clear and Grub	2031	38	8	0
Construct creek bypass system	2031	50	10	0
Dewater	2031	50	10	0
Planting	2031	63	13	0
Allowance -scope to be determined	2031	50	10	0
Miscellaneous activities	2032	25	5	0
Construction of the haul roads and preparation of stockpile areas	2032	22	5	0

Table 43-a
Onroad Construction Trips
Sediment Augmentation Program
Santa Clara County, CA

Construction Subphase	Year	Construction Roundtrips[1]		
		Total Worker Trips[2] (trips/day)	Total Vendor Trips[2] (trips/day)	Total Haul Trips[2] (trips)
Clear and Grub	2032	38	8	0
Construct creek bypass system	2032	50	10	0
Dewater	2032	50	10	0
Planting	2032	63	13	0
Allowance -scope to be determined	2032	50	10	0
Miscellaneous activities	2033	25	5	0
Construction of the haul roads and preparation of stockpile areas	2033	22	5	0
Clear and Grub	2033	38	8	0
Construct creek bypass system	2033	50	10	0
Dewater	2033	50	10	0
Planting	2033	63	13	0
Allowance -scope to be determined	2033	50	10	0
Miscellaneous activities	2034	25	5	0
Construction of the haul roads and preparation of stockpile areas	2034	22	5	0
Clear and Grub	2034	38	8	0
Construct creek bypass system	2034	50	10	0
Dewater	2034	50	10	0
Planting	2034	63	13	0
Allowance -scope to be determined	2034	50	10	0
Miscellaneous activities	2035	25	5	0
Construction of the haul roads and preparation of stockpile areas	2035	22	5	0
Clear and Grub	2035	38	8	0
Construct creek bypass system	2035	50	10	0
Dewater	2035	50	10	0
Planting	2035	63	13	0
Allowance -scope to be determined	2035	50	10	0
Miscellaneous activities	2036	25	5	0
Construction of the haul roads and preparation of stockpile areas	2036	22	5	0
Clear and Grub	2036	38	8	0
Construct creek bypass system	2036	50	10	0
Dewater	2036	50	10	0
Planting	2036	63	13	0
Allowance -scope to be determined	2036	50	10	0
Miscellaneous activities	2037	25	5	0
Construction of the haul roads and preparation of stockpile areas	2037	22	5	0
Clear and Grub	2037	38	8	0
Construct creek bypass system	2037	50	10	0
Dewater	2037	50	10	0
Planting	2037	63	13	0
Allowance -scope to be determined	2037	50	10	0
Miscellaneous activities	2038	25	5	0
Construction of the haul roads and preparation of stockpile areas	2038	22	5	0
Clear and Grub	2038	38	8	0
Construct creek bypass system	2038	50	10	0
Dewater	2038	50	10	0
Planting	2038	63	13	0
Allowance -scope to be determined	2038	50	10	0

Notes:

1. Worker trip rates were calculated assuming 1.25 one-way trips per piece of construction equipment. Vendor trips were calculated assuming 20% of worker trips. Haul trips were calculated using haul material provided by the client, assuming one truck can carry 16 cubic yards of material.

2. CalEEMod® default fleet mixes were used for Worker (LD_Mix), Vendor (MHDT/HHDT), and Hauling (HHDT) trips. LD_Mix was assumed to be 100% gasoline vehicles and MHDT/HHDT and HHDT were assumed to be 100% diesel vehicles.

Abbreviations:

HHDT - heavy-heavy duty trucks
MHDT - medium-heavy duty trucks
LD_Mix - light duty mix

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

Table 43-b
Construction Trip Lengths
Sediment Augmentation Program
Santa Clara County, CA

Trip Type	One-Way Trip Length (mi)
Worker[1]	11.7
Vendor[2]	8.4
Haul[3]	20.0

Notes:

1. Consistent with CalEEMod® methodology, worker trip length is based on the default Home-to-Work trip length for Santa Clara County as reported in the CalEEMod® user guide, Appendix D.
2. Consistent with CalEEMod® methodology, vendor trip length is based on the default Commercial-to-Nonwork trip length for Santa Clara County as reported in the CalEEMod® user guide, Appendix D.
3. Consistent with CalEEMod® methodology, haul trip length is based on the default length of 20 miles as reported in the CalEEMod® user guide, Appendix A.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel

mi - mile

References:

CalEEMod® User's Guide, Appendix A:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-a2020-4-0.pdf?sfvrsn=6

CalEEMod® User's Guide, Appendix D:
Available online at: http://www.aqmd.gov/docs/default-source/caleemod/user-guide-2021/appendix-d2020-4-0-full-merge.pdf?sfvrsn=12

Table 44
Construction Gasoline Truck Emissions
Sediment Augmentation Program
Santa Clara County, CA

Construction Phase	Construction Subphase	Year	Onsite Truck Use[1]		Onsite Truck Emissions[2,3]									
			(hours/year)	(vehicles/year)	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
					(lbs)						(MT)			
Year 2	Miscellaneous Activities	2025	10,000	10	21	67	447	4.0	33	12	186	0.0015	0.0020	187
	Construction of the haul roads and preparation of stockpile areas	2025	360	4.0	0.80	2.4	16	0.15	1.2	0.42	6.7	5.5E-05	7.0E-05	6.7
	Clear and Grub	2025	900	10	2.0	6.1	40	0.36	3.0	1.1	17	1.4E-04	1.8E-04	17
	Construct creek bypass system	2025	900	10	2.0	6.1	40	0.36	3.0	1.1	17	1.4E-04	1.8E-04	17
	Dewater	2025	900	5.0	2.0	6.1	40	0.36	3.0	1.1	17	1.4E-04	1.8E-04	17
	Roughened Ramp	2025	1,800	2.0	3.9	12	80	0.73	6.0	2.1	33	2.7E-04	3.5E-04	34
	Planting	2025	25,000	25	54	168	1,117	10	83	29	465	0.0038	0.0049	467
	Allowance -scope to be determined	2025	10,000	10	21	67	447	4.0	33	12	186	0.0015	0.0020	187
Year 3	Miscellaneous activities	2026	10,000	10	19	60	420	4.0	33	12	184	0.0013	0.0018	184
	Construction of the haul roads and preparation of stockpile areas	2026	360	4.0	0.70	2.2	15	0.14	1.2	0.42	6.6	4.8E-05	6.4E-05	6.6
	Clear and Grub	2026	900	10	1.8	5.4	38	0.36	3.0	1.1	17	1.2E-04	1.6E-04	17
	Construct creek bypass system	2026	900	10	1.8	5.4	38	0.36	3.0	1.1	17	1.2E-04	1.6E-04	17
	Dewater	2026	900	5.0	1.7	5.4	38	0.36	3.0	1.1	17	1.2E-04	1.6E-04	17
	Planting	2026	25,000	25	47	150	1,050	10	83	29	459	0.0033	0.0045	460
	Allowance -scope to be determined	2026	10,000	10	19	60	420	4.0	33	12	184	0.0013	0.0018	184
Year 4	Miscellaneous activities	2027	10,000	10	17	54	406	3.9	33	12	181	0.0012	0.0016	182
	Construction of the haul roads and preparation of stockpile areas	2027	360	4.0	0.64	1.9	15	0.14	1.2	0.42	6.5	4.3E-05	5.9E-05	6.6
	Clear and Grub	2027	900	10	1.6	4.8	37	0.36	3.0	1.1	16	1.1E-04	1.5E-04	16
	Construct creek bypass system	2027	900	10	1.6	4.8	37	0.36	3.0	1.1	16	1.1E-04	1.5E-04	16
	Dewater	2027	900	5.0	1.6	4.8	37	0.36	3.0	1.1	16	1.1E-04	1.5E-04	16
	Planting	2027	25,000	25	43	134	1,014	10	83	29	454	0.0029	0.0041	455
	Allowance -scope to be determined	2027	10,000	10	17	54	406	3.9	33	12	181	0.0012	0.0016	182
Year 5	Miscellaneous activities	2028	10,000	10	16	48	392	3.9	33	12	180	0.0011	0.0015	180
	Construction of the haul roads and preparation of stockpile areas	2028	360	4.0	0.58	1.7	14	0.14	1.2	0.42	6.5	3.8E-05	5.4E-05	6.5
	Clear and Grub	2028	900	10	1.5	4.3	35	0.35	3.0	1.1	16	9.5E-05	1.3E-04	16
	Construct creek bypass system	2028	900	10	1.5	4.3	35	0.35	3.0	1.1	16	9.5E-05	1.3E-04	16
	Dewater	2028	900	5.0	1.4	4.3	35	0.35	3.0	1.1	16	9.5E-05	1.3E-04	16
	Planting	2028	25,000	25	39	121	980	10	83	29	449	0.0026	0.0037	450
	Allowance -scope to be determined	2028	10,000	10	16	48	392	3.9	33	12	180	0.0011	0.0015	180
Year 6	Miscellaneous activities	2029	10,000	10	14	44	381	3.9	33	12	178	9.5E-04	0.0014	178
	Construction of the haul roads and preparation of stockpile areas	2029	360	4.0	0.53	1.6	14	0.14	1.2	0.42	6.4	3.4E-05	5.0E-05	6.4
	Clear and Grub	2029	900	10	1.3	3.9	34	0.35	3.0	1.1	16	8.6E-05	1.2E-04	16
	Construct creek bypass system	2029	900	10	1.3	3.9	34	0.35	3.0	1.1	16	8.6E-05	1.2E-04	16
	Dewater	2029	900	5.0	1.3	3.9	34	0.35	3.0	1.1	16	8.6E-05	1.2E-04	16
	Planting	2029	25,000	25	35	109	952	10	83	29	445	0.0024	0.0035	446
	Allowance -scope to be determined	2029	10,000	10	14	44	381	3.9	33	12	178	9.5E-04	0.0014	178
Year 7	Miscellaneous activities	2030	10,000	10	13	40	375	3.8	33	12	176	8.7E-04	0.0013	177
	Construction of the haul roads and preparation of stockpile areas	2030	360	4.0	0.49	1.4	14	0.14	1.2	0.42	6.3	3.2E-05	4.6E-05	6.4
	Clear and Grub	2030	900	10	1.2	3.6	34	0.35	3.0	1.1	16	7.9E-05	1.2E-04	16
	Construct creek bypass system	2030	900	10	1.2	3.6	34	0.35	3.0	1.1	16	7.9E-05	1.2E-04	16
	Dewater	2030	900	5.0	1.2	3.6	34	0.35	3.0	1.1	16	7.9E-05	1.2E-04	16
	Planting	2030	25,000	25	33	99	937	10	83	29	441	0.0022	0.0032	442
	Allowance -scope to be determined	2030	10,000	10	13	40	375	3.8	33	12	176	8.7E-04	0.0013	177
Year 8	Miscellaneous activities	2031	10,000	10	12	36	370	3.8	33	12	175	8.0E-04	0.0012	175
	Construction of the haul roads and preparation of stockpile areas	2031	360	4.0	0.46	1.3	13	0.14	1.2	0.42	6.3	2.9E-05	4.3E-05	6.3
	Clear and Grub	2031	900	10	1.1	3.3	33	0.34	3.0	1.1	16	7.3E-05	1.1E-04	16
	Construct creek bypass system	2031	900	10	1.1	3.3	33	0.34	3.0	1.1	16	7.3E-05	1.1E-04	16
	Dewater	2031	900	5.0	1.1	3.3	33	0.34	3.0	1.1	16	7.3E-05	1.1E-04	16
	Planting	2031	25,000	25	31	91	924	10	83	29	437	0.0020	0.0030	438
	Allowance -scope to be determined	2031	10,000	10	12	36	370	3.8	33	12	175	8.0E-04	0.0012	175
Year 9	Miscellaneous activities	2032	10,000	10	11	33	362	3.8	33	12	174	7.3E-04	0.0011	174
	Construction of the haul roads and preparation of stockpile areas	2032	360	4.0	0.43	1.2	13	0.14	1.2	0.42	6.3	2.7E-05	4.1E-05	6.3
	Clear and Grub	2032	900	10	1.1	3.0	33	0.34	3.0	1.1	16	6.6E-05	1.0E-04	16
	Construct creek bypass system	2032	900	10	1.1	3.0	33	0.34	3.0	1.1	16	6.6E-05	1.0E-04	16
	Dewater	2032	900	5.0	1.0	3.0	33	0.34	3.0	1.1	16	6.6E-05	1.0E-04	16
	Planting	2032	25,000	25	28	83	906	9.5	83	29	434	0.0018	0.0028	435
	Allowance -scope to be determined	2032	10,000	10	11	33	362	3.8	33	12	174	7.3E-04	0.0011	174

Table 44
Construction Gasoline Truck Emissions
Sediment Augmentation Program
Santa Clara County, CA

Construction Phase	Construction Subphase	Year	Onsite Truck Use[1]		Onsite Truck Emissions[2,3]									
			(hours/year)	(vehicles/year)	ROG	NOx	CO	SOx	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
					(lbs)						(MT)			
Year 10	Miscellaneous activities	2033	10,000	10	11	31	362	3.8	33	12	173	6.9E-04	0.0011	173
	Construction of the haul roads and preparation of stockpile areas	2033	360	4.0	0.40	1.1	13	0.14	1.2	0.42	6.2	2.5E-05	3.8E-05	6.2
	Clear and Grub	2033	900	10	1.0	2.8	33	0.34	3.0	1.1	16	6.3E-05	9.6E-05	16
	Construct creek bypass system	2033	900	10	1.0	2.8	33	0.34	3.0	1.1	16	6.3E-05	9.6E-05	16
	Dewater	2033	900	5.0	1.0	2.8	33	0.34	3.0	1.1	16	6.2E-05	9.6E-05	16
	Planting	2033	25,000	25	27	77	904	9.4	83	29	432	0.0017	0.0027	432
	Allowance -scope to be determined	2033	10,000	10	11	31	362	3.8	33	12	173	6.9E-04	0.0011	173
Year 11	Miscellaneous activities	2034	10,000	10	10	28	361	3.7	33	12	172	6.5E-04	0.0010	172
	Construction of the haul roads and preparation of stockpile areas	2034	360	4.0	0.39	1.0	13	0.13	1.2	0.42	6.2	2.4E-05	3.6E-05	6.2
	Clear and Grub	2034	900	10	1.0	2.6	33	0.34	3.0	1.1	15	5.9E-05	9.1E-05	15
	Construct creek bypass system	2034	900	10	1.0	2.6	33	0.34	3.0	1.1	15	5.9E-05	9.1E-05	15
	Dewater	2034	900	5.0	0.94	2.6	33	0.34	3.0	1.1	15	5.9E-05	9.1E-05	15
	Planting	2034	25,000	25	26	71	903	9.3	83	29	429	0.0016	0.0025	430
	Allowance -scope to be determined	2034	10,000	10	10	28	361	3.7	33	12	172	6.5E-04	0.0010	172
Year 12	Miscellaneous activities	2035	10,000	10	10	26	360	3.7	33	12	171	6.1E-04	0.0010	171
	Construction of the haul roads and preparation of stockpile areas	2035	360	4.0	0.37	1.0	13	0.13	1.2	0.42	6.1	2.2E-05	3.4E-05	6.2
	Clear and Grub	2035	900	10	0.93	2.4	32	0.33	3.0	1.1	15	5.6E-05	8.6E-05	15
	Construct creek bypass system	2035	900	10	0.93	2.4	32	0.33	3.0	1.1	15	5.6E-05	8.6E-05	15
	Dewater	2035	900	5.0	0.91	2.4	32	0.33	3.0	1.1	15	5.5E-05	8.6E-05	15
	Planting	2035	25,000	25	25	66	900	9.3	83	29	427	0.0015	0.0024	428
	Allowance -scope to be determined	2035	10,000	10	10	26	360	3.7	33	12	171	6.1E-04	0.0010	171
Year 13	Miscellaneous activities	2036	10,000	10	10	24	359	3.7	33	12	170	5.8E-04	9.0E-04	170
	Construction of the haul roads and preparation of stockpile areas	2036	360	4.0	0.36	0.88	13	0.13	1.2	0.42	6.1	2.1E-05	3.3E-05	6.1
	Clear and Grub	2036	900	10	0.91	2.2	32	0.33	3.0	1.1	15	5.3E-05	8.1E-05	15
	Construct creek bypass system	2036	900	10	0.91	2.2	32	0.33	3.0	1.1	15	5.3E-05	8.1E-05	15
	Dewater	2036	900	5.0	0.88	2.2	32	0.33	3.0	1.1	15	5.2E-05	8.1E-05	15
	Planting	2036	25,000	25	24	61	898	9.2	83	29	425	0.0014	0.0023	425
	Allowance -scope to be determined	2036	10,000	10	10	24	359	3.7	33	12	170	5.8E-04	9.0E-04	170
Year 14	Miscellaneous activities	2037	10,000	10	9.4	23	360	3.7	33	12	169	5.5E-04	8.6E-04	169
	Construction of the haul roads and preparation of stockpile areas	2037	360	4.0	0.36	0.82	13	0.13	1.2	0.42	6.1	2.0E-05	3.1E-05	6.1
	Clear and Grub	2037	900	10	0.90	2.1	32	0.33	3.0	1.1	15	5.0E-05	7.8E-05	15
	Construct creek bypass system	2037	900	10	0.90	2.1	32	0.33	3.0	1.1	15	5.0E-05	7.8E-05	15
	Dewater	2037	900	5.0	0.87	2.1	32	0.33	3.0	1.1	15	5.0E-05	7.8E-05	15
	Planting	2037	25,000	25	24	57	899	9.2	83	29	423	0.0014	0.0022	423
	Allowance -scope to be determined	2037	10,000	10	9.4	23	360	3.7	33	12	169	5.5E-04	8.6E-04	169
Year 15	Miscellaneous activities	2038	10,000	10	9.2	21	360	3.7	33	12	168	5.3E-04	8.3E-04	169
	Construction of the haul roads and preparation of stockpile areas	2038	360	4.0	0.35	0.77	13	0.13	1.2	0.42	6.1	1.9E-05	3.0E-05	6.1
	Clear and Grub	2038	900	10	0.88	1.9	32	0.33	3.0	1.1	15	4.8E-05	7.4E-05	15
	Construct creek bypass system	2038	900	10	0.88	1.9	32	0.33	3.0	1.1	15	4.8E-05	7.4E-05	15
	Dewater	2038	900	5.0	0.85	1.9	32	0.33	3.0	1.1	15	4.8E-05	7.4E-05	15
	Planting	2038	25,000	25	23	53	900	9.2	83	29	421	0.0013	0.0021	421
	Allowance -scope to be determined	2038	10,000	10	9.2	21	360	3.7	33	12	168	5.3E-04	8.3E-04	169

Notes:

1. An average emission factors is calculated using the following criteria:
2. Work trucks are assumed to be similar to light-heavy duty trucks (LHDT2) as defined in EMFAC2021. Emission factors are from EMFAC2021 ("Emission Rates" mode) for LHDT2 diesel vehicles (aggregated model year) in Santa Clara County. RUNEX emission factors are specific to vehicle speed of 15 mph. All other emission factor types are for aggregated speed. Emission factors were multiplied by the appropriate usage parameter based on the units. Emission factors in units of g/trip, g/mi, and g/vehicle/day, were multiplied by trips, miles, and total vehicles, respectively, in order to obtain mass emissions.
3. Global warming potentials used in the calculation of CO_2e are 1, 25, and 298 for CO_2, CH_4, and N_2O, respectively.

Abbreviations:

CH_4 - Methane
CO_2 - Carbon Dioxide
CO_2e - Carbon Dioxide Equivalents
lb - pound
MT - metric tonne
N_2O - nitrous oxide
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Resources Board. EMFAC2021. Available online at: https://arb.ca.gov/emfac/emissions-inventory

Table 45
Construction Gasoline Truck TOG-Speciated Emissions
Sediment Augmentation Program
Santa Clara County, CA

Construction Year	Construction Activity	Emission (ton/yr)[1]															
		1,3-Butadiene	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	n-hexane	Methanol	Methyl Ethyl Ketone	Naphthalene	Propene	Styrene	Toluene	Xylenes	DPM	$PM_{2.5}$
Year 2	Miscellaneous Activities	0.12	0.060	0.028	0.55	0.23	0.34	0.43	0.026	0.0043	0.011	0.65	0.026	1.3	1.1	33	12
Year 2	Construction of the haul roads and preparation of stockpile areas	0.0042	0.0022	0.0010	0.020	0.0084	0.012	0.016	9.3E-04	1.5E-04	3.9E-04	0.024	9.3E-04	0.048	0.038	1.2	0.42
Year 2	Clear and Grub	0.011	0.0054	0.0025	0.050	0.021	0.030	0.040	0.0023	3.9E-04	0.0010	0.059	0.0023	0.12	0.10	3.0	1.1
Year 2	Construct creek bypass system	0.011	0.0054	0.0025	0.050	0.021	0.030	0.040	0.0023	3.9E-04	0.0010	0.059	0.0023	0.12	0.10	3.0	1.1
Year 2	Dewater	0.011	0.0054	0.0025	0.050	0.021	0.030	0.039	0.0023	3.8E-04	0.0010	0.059	0.0023	0.12	0.10	3.0	1.1
Year 2	Roughened Ramp	0.021	0.011	0.0050	0.10	0.042	0.061	0.078	0.0046	7.7E-04	0.0019	0.12	0.0046	0.24	0.19	6.0	2.1
Year 2	Planting	0.29	0.15	0.069	1.4	0.58	0.84	1.1	0.064	0.011	0.027	1.6	0.064	3.3	2.6	83	29
Year 2	Allowance -scope to be determined	0.12	0.060	0.028	0.55	0.23	0.34	0.43	0.026	0.0043	0.011	0.65	0.026	1.3	1.1	33	12
Year 3	Miscellaneous activities	0.10	0.050	0.023	0.46	0.20	0.28	0.38	0.022	0.0036	0.0090	0.55	0.022	1.1	0.89	33	12
Year 3	Construction of the haul roads and preparation of stockpile areas	0.0036	0.0018	8.5E-04	0.017	0.0071	0.010	0.014	7.8E-04	1.3E-04	3.3E-04	0.020	7.8E-04	0.041	0.033	1.2	0.42
Year 3	Clear and Grub	0.0089	0.0046	0.0021	0.042	0.018	0.026	0.035	0.0020	3.3E-04	8.1E-04	0.050	0.0020	0.10	0.081	3.0	1.1
Year 3	Construct creek bypass system	0.0089	0.0046	0.0021	0.042	0.018	0.026	0.035	0.0020	3.3E-04	8.1E-04	0.050	0.0020	0.10	0.081	3.0	1.1
Year 3	Dewater	0.0089	0.0045	0.0021	0.042	0.018	0.026	0.034	0.0019	3.2E-04	8.1E-04	0.050	0.0019	0.10	0.081	3.0	1.1
Year 3	Planting	0.25	0.13	0.058	1.2	0.49	0.71	0.94	0.054	0.0090	0.022	1.4	0.054	2.8	2.2	83	29
Year 3	Allowance -scope to be determined	0.10	0.050	0.023	0.46	0.20	0.28	0.38	0.022	0.0036	0.0090	0.55	0.022	1.1	0.89	33	12
Year 4	Miscellaneous activities	0.087	0.044	0.021	0.41	0.17	0.25	0.34	0.019	0.0032	0.0079	0.48	0.019	1.0	0.79	33	12
Year 4	Construction of the haul roads and preparation of stockpile areas	0.0031	0.0016	7.4E-04	0.015	0.0063	0.0090	0.013	6.9E-04	1.1E-04	2.9E-04	0.018	6.9E-04	0.037	0.029	1.2	0.42
Year 4	Clear and Grub	0.0079	0.0040	0.0019	0.037	0.016	0.023	0.031	0.0017	2.9E-04	7.2E-04	0.044	0.0017	0.092	0.072	3.0	1.1
Year 4	Construct creek bypass system	0.0079	0.0040	0.0019	0.037	0.016	0.023	0.031	0.0017	2.9E-04	7.2E-04	0.044	0.0017	0.092	0.072	3.0	1.1
Year 4	Dewater	0.0078	0.0040	0.0019	0.037	0.016	0.023	0.031	0.0017	2.8E-04	7.1E-04	0.044	0.0017	0.091	0.071	3.0	1.1
Year 4	Planting	0.22	0.11	0.051	1.0	0.43	0.62	0.85	0.047	0.0079	0.020	1.2	0.047	2.5	2.0	83	29
Year 4	Allowance -scope to be determined	0.087	0.044	0.021	0.41	0.17	0.25	0.34	0.019	0.0032	0.0079	0.48	0.019	1.0	0.79	33	12
Year 5	Miscellaneous activities	0.076	0.039	0.018	0.36	0.15	0.22	0.30	0.017	0.0028	0.0069	0.42	0.017	0.89	0.69	33	12
Year 5	Construction of the haul roads and preparation of stockpile areas	0.0028	0.0014	6.5E-04	0.013	0.0055	0.0079	0.011	6.0E-04	1.0E-04	2.5E-04	0.015	6.0E-04	0.033	0.025	1.2	0.42
Year 5	Clear and Grub	0.0069	0.0035	0.0016	0.033	0.014	0.020	0.028	0.0015	2.5E-04	6.3E-04	0.038	0.0015	0.081	0.063	3.0	1.1
Year 5	Construct creek bypass system	0.0069	0.0035	0.0016	0.033	0.014	0.020	0.028	0.0015	2.5E-04	6.3E-04	0.038	0.0015	0.081	0.063	3.0	1.1
Year 5	Dewater	0.0069	0.0035	0.0016	0.033	0.014	0.020	0.028	0.0015	2.5E-04	6.2E-04	0.038	0.0015	0.081	0.063	3.0	1.1
Year 5	Planting	0.19	0.10	0.045	0.90	0.38	0.55	0.76	0.041	0.0069	0.017	1.1	0.041	2.2	1.7	83	29
Year 5	Allowance -scope to be determined	0.076	0.039	0.018	0.36	0.15	0.22	0.30	0.017	0.0028	0.0069	0.42	0.017	0.89	0.69	33	12
Year 6	Miscellaneous activities	0.067	0.034	0.016	0.32	0.13	0.19	0.27	0.015	0.0024	0.0061	0.37	0.015	0.79	0.61	33	12
Year 6	Construction of the haul roads and preparation of stockpile areas	0.0024	0.0012	5.8E-04	0.012	0.0049	0.0070	0.010	5.3E-04	8.8E-05	2.2E-04	0.014	5.3E-04	0.029	0.022	1.2	0.42
Year 6	Clear and Grub	0.0061	0.0031	0.0014	0.029	0.012	0.017	0.025	0.0013	2.2E-04	5.5E-04	0.034	0.0013	0.072	0.056	3.0	1.1
Year 6	Construct creek bypass system	0.0061	0.0031	0.0014	0.029	0.012	0.017	0.025	0.0013	2.2E-04	5.5E-04	0.034	0.0013	0.072	0.056	3.0	1.1
Year 6	Dewater	0.0061	0.0031	0.0014	0.029	0.012	0.017	0.025	0.0013	2.2E-04	5.5E-04	0.034	0.0013	0.072	0.056	3.0	1.1
Year 6	Planting	0.17	0.085	0.040	0.80	0.33	0.48	0.68	0.037	0.0061	0.015	0.93	0.037	2.0	1.5	83	29
Year 6	Allowance -scope to be determined	0.067	0.034	0.016	0.32	0.13	0.19	0.27	0.015	0.0024	0.0061	0.37	0.015	0.79	0.61	33	12
Year 7	Miscellaneous activities	0.061	0.031	0.014	0.29	0.12	0.17	0.25	0.013	0.0022	0.0055	0.34	0.013	0.72	0.56	33	12
Year 7	Construction of the haul roads and preparation of stockpile areas	0.0022	0.0011	5.2E-04	0.011	0.0044	0.0063	0.0094	4.8E-04	8.0E-05	2.0E-04	0.012	4.8E-04	0.026	0.020	1.2	0.42
Year 7	Clear and Grub	0.0055	0.0028	0.0013	0.026	0.011	0.016	0.023	0.0012	2.0E-04	5.0E-04	0.031	0.0012	0.066	0.051	3.0	1.1
Year 7	Construct creek bypass system	0.0055	0.0028	0.0013	0.026	0.011	0.016	0.023	0.0012	2.0E-04	5.0E-04	0.031	0.0012	0.066	0.051	3.0	1.1
Year 7	Dewater	0.0055	0.0028	0.0013	0.026	0.011	0.016	0.023	0.0012	2.0E-04	5.0E-04	0.030	0.0012	0.065	0.050	3.0	1.1
Year 7	Planting	0.15	0.077	0.036	0.72	0.30	0.43	0.63	0.033	0.0055	0.014	0.84	0.033	1.8	1.4	83	29
Year 7	Allowance -scope to be determined	0.061	0.031	0.014	0.29	0.12	0.17	0.25	0.013	0.0022	0.0055	0.34	0.013	0.72	0.56	33	12
Year 8	Miscellaneous activities	0.055	0.028	0.013	0.26	0.11	0.16	0.23	0.012	0.0020	0.0050	0.31	0.012	0.66	0.51	33	12
Year 8	Construction of the haul roads and preparation of stockpile areas	0.0020	0.0010	4.7E-04	0.010	0.0040	0.0058	0.0087	4.4E-04	7.3E-05	1.8E-04	0.011	4.4E-04	0.024	0.019	1.2	0.42
Year 8	Clear and Grub	0.0050	0.0025	0.0012	0.024	0.010	0.014	0.022	0.0011	1.8E-04	4.6E-04	0.028	0.0011	0.060	0.046	3.0	1.1
Year 8	Construct creek bypass system	0.0050	0.0025	0.0012	0.024	0.010	0.014	0.022	0.0011	1.8E-04	4.6E-04	0.028	0.0011	0.060	0.046	3.0	1.1
Year 8	Dewater	0.0050	0.0025	0.0012	0.024	0.010	0.014	0.021	0.0011	1.8E-04	4.5E-04	0.028	0.0011	0.060	0.046	3.0	1.1
Year 8	Planting	0.14	0.070	0.033	0.66	0.28	0.40	0.58	0.030	0.0050	0.013	0.77	0.030	1.6	1.3	83	29
Year 8	Allowance -scope to be determined	0.055	0.028	0.013	0.26	0.11	0.16	0.23	0.012	0.0020	0.0050	0.31	0.012	0.66	0.51	33	12
Year 9	Miscellaneous activities	0.048	0.025	0.011	0.23	0.10	0.14	0.21	0.011	0.0018	0.0044	0.27	0.011	0.59	0.45	33	12
Year 9	Construction of the haul roads and preparation of stockpile areas	0.0018	9.0E-04	4.2E-04	0.0086	0.0036	0.0051	0.0080	3.8E-04	6.4E-05	1.6E-04	0.010	3.8E-04	0.022	0.016	1.2	0.42
Year 9	Clear and Grub	0.0044	0.0022	0.0010	0.021	0.0090	0.013	0.020	0.0010	1.6E-04	4.0E-04	0.024	0.0010	0.054	0.041	3.0	1.1
Year 9	Construct creek bypass system	0.0044	0.0022	0.0010	0.021	0.0090	0.013	0.020	0.0010	1.6E-04	4.0E-04	0.024	0.0010	0.054	0.041	3.0	1.1
Year 9	Dewater	0.0044	0.0022	0.0010	0.021	0.0089	0.013	0.019	0.0010	1.6E-04	4.0E-04	0.024	0.0010	0.053	0.041	3.0	1.1
Year 9	Planting	0.12	0.061	0.029	0.58	0.24	0.35	0.53	0.026	0.0044	0.011	0.67	0.026	1.5	1.1	83	29
Year 9	Allowance -scope to be determined	0.048	0.025	0.011	0.23	0.10	0.14	0.21	0.011	0.0018	0.0044	0.27	0.011	0.59	0.45	33	12
Year 10	Miscellaneous activities	0.045	0.023	0.011	0.22	0.091	0.13	0.20	0.010	0.0016	0.0041	0.25	0.010	0.55	0.42	33	12
Year 10	Construction of the haul roads and preparation of stockpile areas	0.0016	8.4E-04	3.9E-04	0.0080	0.0033	0.0047	0.0075	3.6E-04	6.0E-05	1.5E-04	0.0091	3.6E-04	0.020	0.015	1.2	0.42

Table 45
Construction Gasoline Truck TOG-Speciated Emissions
Sediment Augmentation Program
Santa Clara County, CA

Construction Year	Construction Activity	Emission (ton/yr)[1]															
		1,3-Butadiene	Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	n-hexane	Methanol	Methyl Ethyl Ketone	Naphthalene	Propene	Styrene	Toluene	Xylenes	DPM	$PM_{2.5}$
Year 10	Clear and Grub	0.0041	0.0021	0.0010	0.020	0.0084	0.012	0.019	9.0E-04	1.5E-04	3.7E-04	0.023	9.0E-04	0.051	0.038	3.0	1.1
Year 10	Construct creek bypass system	0.0041	0.0021	0.0010	0.020	0.0084	0.012	0.019	9.0E-04	1.5E-04	3.7E-04	0.023	9.0E-04	0.051	0.038	3.0	1.1
Year 10	Dewater	0.0041	0.0021	0.0010	0.020	0.0083	0.012	0.018	8.9E-04	1.5E-04	3.7E-04	0.023	8.9E-04	0.050	0.038	3.0	1.1
Year 10	Planting	0.11	0.057	0.027	0.55	0.23	0.32	0.50	0.025	0.0041	0.010	0.63	0.025	1.4	1.0	83	29
Year 10	Allowance -scope to be determined	0.045	0.023	0.011	0.22	0.091	0.13	0.20	0.010	0.0016	0.0041	0.25	0.010	0.55	0.42	33	12
Year 11	Miscellaneous activities	0.042	0.021	0.010	0.21	0.086	0.12	0.19	0.0092	0.0015	0.0038	0.23	0.0092	0.52	0.39	33	12
Year 11	Construction of the haul roads and preparation of stockpile areas	0.0015	7.8E-04	3.6E-04	0.0075	0.0031	0.0044	0.0072	3.4E-04	5.6E-05	1.4E-04	0.0085	3.4E-04	0.019	0.014	1.2	0.42
Year 11	Clear and Grub	0.0038	0.0020	9.1E-04	0.019	0.0079	0.011	0.018	8.4E-04	1.4E-04	3.5E-04	0.021	8.4E-04	0.048	0.036	3.0	1.1
Year 11	Construct creek bypass system	0.0038	0.0020	9.1E-04	0.019	0.0079	0.011	0.018	8.4E-04	1.4E-04	3.5E-04	0.021	8.4E-04	0.048	0.036	3.0	1.1
Year 11	Dewater	0.0038	0.0019	9.0E-04	0.019	0.0078	0.011	0.018	8.3E-04	1.4E-04	3.5E-04	0.021	8.3E-04	0.047	0.036	3.0	1.1
Year 11	Planting	0.11	0.054	0.025	0.51	0.21	0.30	0.48	0.023	0.0038	0.010	0.59	0.023	1.3	1.0	83	29
Year 11	Allowance -scope to be determined	0.042	0.021	0.010	0.21	0.086	0.12	0.19	0.0092	0.0015	0.0038	0.23	0.0092	0.52	0.39	33	12
Year 12	Miscellaneous activities	0.039	0.020	0.0092	0.19	0.080	0.11	0.18	0.0085	0.0014	0.0035	0.22	0.0085	0.48	0.37	33	12
Year 12	Construction of the haul roads and preparation of stockpile areas	0.0014	7.2E-04	3.4E-04	0.0070	0.0029	0.0041	0.0069	3.1E-04	5.2E-05	1.3E-04	0.0079	3.1E-04	0.018	0.013	1.2	0.42
Year 12	Clear and Grub	0.0036	0.0018	8.4E-04	0.018	0.0073	0.010	0.017	7.7E-04	1.3E-04	3.2E-04	0.020	7.7E-04	0.045	0.034	3.0	1.1
Year 12	Construct creek bypass system	0.0036	0.0018	8.4E-04	0.018	0.0073	0.010	0.017	7.7E-04	1.3E-04	3.2E-04	0.020	7.7E-04	0.045	0.034	3.0	1.1
Year 12	Dewater	0.0035	0.0018	8.3E-04	0.017	0.0072	0.010	0.017	7.7E-04	1.3E-04	3.2E-04	0.020	7.7E-04	0.044	0.033	3.0	1.1
Year 12	Planting	0.10	0.050	0.023	0.48	0.20	0.28	0.46	0.021	0.0035	0.0088	0.54	0.021	1.2	0.91	83	29
Year 12	Allowance -scope to be determined	0.039	0.020	0.0092	0.19	0.080	0.11	0.18	0.0085	0.0014	0.0035	0.22	0.0085	0.48	0.37	33	12
Year 13	Miscellaneous activities	0.036	0.018	0.0086	0.18	0.075	0.10	0.18	0.0079	0.0013	0.0033	0.20	0.0079	0.46	0.34	33	12
Year 13	Construction of the haul roads and preparation of stockpile areas	0.0013	6.7E-04	3.1E-04	0.0066	0.0027	0.0038	0.0066	2.9E-04	4.8E-05	1.2E-04	0.0074	2.9E-04	0.017	0.013	1.2	0.42
Year 13	Clear and Grub	0.0033	0.0017	7.8E-04	0.016	0.0069	0.010	0.017	7.2E-04	1.2E-04	3.0E-04	0.018	7.2E-04	0.042	0.031	3.0	1.1
Year 13	Construct creek bypass system	0.0033	0.0017	7.8E-04	0.016	0.0069	0.010	0.017	7.2E-04	1.2E-04	3.0E-04	0.018	7.2E-04	0.042	0.031	3.0	1.1
Year 13	Dewater	0.0033	0.0017	7.8E-04	0.016	0.0068	0.0094	0.016	7.2E-04	1.2E-04	3.0E-04	0.018	7.2E-04	0.042	0.031	3.0	1.1
Year 13	Planting	0.091	0.046	0.021	0.45	0.19	0.26	0.44	0.020	0.0033	0.0082	0.50	0.020	1.1	0.86	83	29
Year 13	Allowance -scope to be determined	0.036	0.018	0.0086	0.18	0.075	0.10	0.18	0.0079	0.0013	0.0033	0.20	0.0079	0.46	0.34	33	12
Year 14	Miscellaneous activities	0.034	0.017	0.0081	0.17	0.071	0.10	0.17	0.0075	0.0012	0.0031	0.19	0.0075	0.44	0.33	33	12
Year 14	Construction of the haul roads and preparation of stockpile areas	0.0013	6.4E-04	3.0E-04	0.0063	0.0026	0.0036	0.0065	2.7E-04	4.6E-05	1.1E-04	0.0070	2.7E-04	0.016	0.012	1.2	0.42
Year 14	Clear and Grub	0.0031	0.0016	7.4E-04	0.016	0.0065	0.0090	0.016	6.8E-04	1.1E-04	2.8E-04	0.017	6.8E-04	0.041	0.030	3.0	1.1
Year 14	Construct creek bypass system	0.0031	0.0016	7.4E-04	0.016	0.0065	0.0090	0.016	6.8E-04	1.1E-04	2.8E-04	0.017	6.8E-04	0.041	0.030	3.0	1.1
Year 14	Dewater	0.0031	0.0016	7.3E-04	0.016	0.0065	0.0089	0.016	6.8E-04	1.1E-04	2.8E-04	0.017	6.8E-04	0.040	0.030	3.0	1.1
Year 14	Planting	0.086	0.044	0.020	0.43	0.18	0.25	0.43	0.019	0.0031	0.0078	0.48	0.019	1.1	0.82	83	29
Year 14	Allowance -scope to be determined	0.034	0.017	0.0081	0.17	0.071	0.10	0.17	0.0075	0.0012	0.0031	0.19	0.0075	0.44	0.33	33	12
Year 15	Miscellaneous activities	0.032	0.017	0.0077	0.16	0.068	0.093	0.17	0.0071	0.0012	0.0030	0.18	0.0071	0.42	0.31	33	12
Year 15	Construction of the haul roads and preparation of stockpile areas	0.0012	6.0E-04	2.8E-04	0.0060	0.0025	0.0034	0.0063	2.6E-04	4.3E-05	1.1E-04	0.0066	2.6E-04	0.016	0.011	1.2	0.42
Year 15	Clear and Grub	0.0030	0.0015	7.0E-04	0.015	0.0062	0.0085	0.016	6.5E-04	1.1E-04	2.7E-04	0.017	6.5E-04	0.039	0.029	3.0	1.1
Year 15	Construct creek bypass system	0.0030	0.0015	7.0E-04	0.015	0.0062	0.0085	0.016	6.5E-04	1.1E-04	2.7E-04	0.017	6.5E-04	0.039	0.029	3.0	1.1
Year 15	Dewater	0.0029	0.0015	7.0E-04	0.015	0.0061	0.0085	0.015	6.4E-04	1.1E-04	2.7E-04	0.016	6.4E-04	0.038	0.028	3.0	1.1
Year 15	Planting	0.081	0.041	0.019	0.41	0.17	0.23	0.42	0.018	0.0030	0.0074	0.45	0.018	1.0	0.78	83	29
Year 15	Allowance -scope to be determined	0.032	0.017	0.0077	0.16	0.068	0.093	0.17	0.0071	0.0012	0.0030	0.18	0.0071	0.42	0.31	33	12

Notes:

1. TOG was speciated according to the profile provided by BAAQMD Recommended Methods For Screening and Modeling Local Risks and Hazards.

2. All PM_{10} is taken to be DPM for the purpose of health risk assessment.

Abbreviations:

DPM - diesel particulate matter

PM - particulate matter

yr - year

References:

BAAQMD Recommended Methods For Screening and Modeling Local Risks and Hazards:
Available Online at: https://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20Modeling%20Approach.ashx

Table 46
Unmitigated Construction CAP Emissions
Sediment Augmentation Program
Santa Clara County, CA

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		ton/yr			
Year 2	2025	2.7	**22**	2.0	1.1
Year 3	2026	2.5	**20**	1.4	0.9
Year 4	2027	2.4	**19**	1.4	0.9
Year 5	2028	2.2	**18**	1.3	0.8
Year 6	2029	2.2	**17**	1.3	0.8
Year 7	2030	2.1	**16**	1.3	0.8
Year 8	2031	2.1	**16**	1.2	0.7
Year 9	2032	2.1	**16**	1.2	0.7
Year 10	2033	2.0	**15**	1.2	0.7
Year 11	2034	2.0	**15**	1.2	0.7
Year 12	2035	1.9	**14**	1.1	0.6
Year 13	2036	1.9	**14**	1.1	0.6
Year 14	2037	1.9	**14**	1.1	0.6
Year 15	2038	1.9	**13**	1.1	0.6

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		lb/day			
Year 2	2025	35	**291**	26	14
Year 3	2026	32	**262**	19	12
Year 4	2027	31	**245**	18	11
Year 5	2028	30	**233**	17	11
Year 6	2029	29	**224**	17	10
Year 7	2030	28	**216**	16	10
Year 8	2031	27	**211**	16	10
Year 9	2032	27	**204**	16	9
Year 10	2033	27	**198**	16	9
Year 11	2034	26	**192**	15	9
Year 12	2035	26	**187**	15	9
Year 13	2036	25	**179**	15	8
Year 14	2037	25	**177**	15	8
Year 15	2038	25	**174**	14	8
BAAQMD Threshold[1]		54	54	82	54

Notes:

1. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines. For PM, this includes exhaust emissions only. Fugitive emissions are controlled by BAAQMD Best Management Practices.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District

CAP - criteria air pollutants

lb - pound

PM - particulate matter

ROG - reactive organic gases

yr - year

Table 47
Mitigated Construction CAP Emissions
Sediment Augmentation Program
Santa Clara County, CA

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		ton/yr			
Year 2	2025	0.72	**5.5**	1.4	0.55
Year 3	2026	0.66	**4.9**	0.93	0.47
Year 4	2027	0.66	**4.9**	0.94	0.47
Year 5	2028	0.64	**4.8**	0.93	0.46
Year 6	2029	0.63	**4.7**	0.93	0.46
Year 7	2030	0.63	**4.7**	0.92	0.46
Year 8	2031	0.63	**4.8**	0.93	0.46
Year 9	2032	0.64	**4.8**	0.94	0.47
Year 10	2033	0.63	**4.7**	0.94	0.47
Year 11	2034	0.62	**4.7**	0.93	0.46
Year 12	2035	0.62	**4.6**	0.93	0.46
Year 13	2036	0.62	**4.7**	0.93	0.46
Year 14	2037	0.63	**4.7**	0.94	0.47
Year 15	2038	0.63	4.9	0.94	0.47

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		lb/day			
Year 2	2025	9.4	**72**	19	7.2
Year 3	2026	8.6	**64**	12	6.0
Year 4	2027	8.6	**64**	12	6.1
Year 5	2028	8.5	**63**	12	6.1
Year 6	2029	8.4	**62**	12	6.1
Year 7	2030	8.3	**62**	12	6.0
Year 8	2031	8.3	**62**	12	6.0
Year 9	2032	8.3	**62**	12	6.1
Year 10	2033	8.3	**62**	12	6.1
Year 11	2034	8.2	**61**	12	6.1
Year 12	2035	8.1	**61**	12	6.1
Year 13	2036	8.1	**61**	12	6.0
Year 14	2037	8.2	**61**	12	6.1
Year 15	2038	8.1	**63**	12	6.1
BAAQMD Threshold[1]		54	54	82	54

Notes:

1. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines. For PM, this includes exhaust emissions only. Fugitive emissions are controlled by BAAQMD Best Management Practices.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District

CAP - criteria air pollutants

lb - pound

PM - particulate matter

ROG - reactive organic gases

yr - year

Table 48
Unmitigated Construction GHG Emissions
Sediment Augmentation Program
Santa Clara County, CA

Construction Year		CO_2	CH_4	N_2O	CO_2e
		MT/yr			
Year 2	2025	6,900	0.24	0.072	6,928
Year 3	2026	6,412	0.23	0.054	6,434
Year 4	2027	6,398	0.23	0.054	6,420
Year 5	2028	6,295	0.22	0.053	6,316
Year 6	2029	6,251	0.22	0.052	6,272
Year 7	2030	6,221	0.22	0.052	6,242
Year 8	2031	6,275	0.22	0.052	6,296
Year 9	2032	6,351	0.22	0.053	6,373
Year 10	2033	6,315	0.22	0.052	6,336
Year 11	2034	6,246	0.22	0.052	6,267
Year 12	2035	6,207	0.22	0.051	6,227
Year 13	2036	6,244	0.22	0.051	6,264
Year 14	2037	6,322	0.22	0.052	6,343
Year 15	2038	6,350	0.22	0.059	6,373

Abbreviations:

GHG - greenhouse gases
CO_2e - CO_2-equivalent emissions
yr - year
MT - metric tonne

Table 49
Mitigated Construction GHG Emissions
Sediment Augmentation Program
Santa Clara County, CA

Construction Year		CO_2	CH_4	N_2O	CO_2e
		MT/yr			
Year 2	2025	6,900	0.24	0.072	6,928
Year 3	2026	6,412	0.23	0.054	6,434
Year 4	2027	6,398	0.23	0.054	6,420
Year 5	2028	6,295	0.22	0.053	6,316
Year 6	2029	6,251	0.22	0.052	6,272
Year 7	2030	6,221	0.22	0.052	6,242
Year 8	2031	6,275	0.22	0.052	6,296
Year 9	2032	6,351	0.22	0.053	6,373
Year 10	2033	6,315	0.22	0.052	6,336
Year 11	2034	6,246	0.22	0.052	6,267
Year 12	2035	6,207	0.22	0.051	6,227
Year 13	2036	6,244	0.22	0.051	6,264
Year 14	2037	6,322	0.22	0.052	6,343
Year 15	2038	6,350	0.22	0.059	6,373

Abbreviations:

GHG - greenhouse gases
CO_2e - CO_2-equivalent emissions
yr - year
MT - metric tonne

Table 50
Unmitigated Construction CAP Emissions
Anderson Dam Seismic Retrofit & Conservation Measures
Santa Clara County, CA

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		ton/yr			
Year 1	2024	54	19	5.6	4.3
Year 2	2025	17	184	7.4	6.3
Year 3	2026	16	172	6.6	5.8
Year 4	2027	19	199	7.5	6.6
Year 5	2028	16	170	6.7	5.8
Year 6	2029	21	206	7.5	6.7
Year 7	2030	7.3	58	3.5	3.1
Year 8	2031	3.5	26	1.8	1.4
Year 9	2032	2.1	16	1.2	0.72
Year 10	2033	2.0	15	1.2	0.70
Year 11	2034	2.0	15	1.2	0.67
Year 12	2035	1.9	14	1.1	0.65
Year 13	2036	1.9	14	1.1	0.63
Year 14	2037	1.9	14	1.1	0.63
Year 15	2038	1.9	13	1.1	0.62

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		lb/day			
Year 1	2024	**398**	**138**	41	32
Year 2	2025	**104**	**1,133**	46	38
Year 3	2026	**97**	**1,057**	41	36
Year 4	2027	**106**	**1,127**	42	38
Year 5	2028	**99**	**1,048**	41	35
Year 6	2029	**132**	**1,270**	46	41
Year 7	2030	50	**394**	24	21
Year 8	2031	46	**346**	24	18
Year 9	2032	27	**204**	16	9.4
Year 10	2033	27	**198**	16	9.1
Year 11	2034	26	**192**	15	8.8
Year 12	2035	26	**187**	15	8.6
Year 13	2036	25	**179**	15	8.2
Year 14	2037	25	**177**	15	8.2
Year 15	2038	25	**174**	14	8.0
BAAQMD Threshold[1]		54	54	82	54

Notes:

1. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines. For PM, this includes exhaust emissions only. Fugitive emissions are controlled by BAAQMD Best Management Practices.

Abbreviations:

ROG - reactive organic gases

PM - particulate matter

CAP - criteria air pollutants

BAAQMD - Bay Area Air Quality Management District

yr - year

lb - pound

Table 51
Mitigated Construction CAP Emissions
Anderson Dam Seismic Retrofit & Conservation Measures
Santa Clara County, CA

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		ton/yr			
Year 1	2024	9.1	3.7	5.1	3.8
Year 2	2025	5.3	42	2.3	1.4
Year 3	2026	5.3	29	1.7	1.2
Year 4	2027	6.3	43	2.0	1.5
Year 5	2028	5.6	35	2.2	1.4
Year 6	2029	7.0	59	2.5	1.8
Year 7	2030	2.1	16	2.3	1.3
Year 8	2031	1.0	7.6	1.3	0.69
Year 9	2032	0.64	4.8	0.94	0.47
Year 10	2033	0.63	4.7	0.94	0.47
Year 11	2034	0.62	4.7	0.93	0.46
Year 12	2035	0.62	4.6	0.93	0.46
Year 13	2036	0.62	4.7	0.93	0.46
Year 14	2037	0.63	4.7	0.94	0.47
Year 15	2038	0.63	4.9	0.94	0.47

Construction Year		ROG	NOx	PM_{10}	$PM_{2.5}$
		lb/day			
Year 1	2024	**67**	28	37	28
Year 2	2025	32	**258**	14	8.3
Year 3	2026	32	**180**	11	7.5
Year 4	2027	36	**245**	11	8.3
Year 5	2028	34	**213**	13	8.7
Year 6	2029	43	**360**	15	11
Year 7	2030	14	**107**	16	8.5
Year 8	2031	14	**99**	17	9.0
Year 9	2032	8.3	**62**	12	6.1
Year 10	2033	8.3	**62**	12	6.1
Year 11	2034	8.2	**61**	12	6.1
Year 12	2035	8.1	**61**	12	6.1
Year 13	2036	8.1	**61**	12	6.0
Year 14	2037	8.2	**61**	12	6.1
Year 15	2038	8.1	**63**	12	6.1
BAAQMD Threshold[1]		54	54	82	54

Notes:

1. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines. For PM, this includes exhaust emissions only. Fugitive emissions are controlled by BAAQMD Best Management Practices.

Abbreviations:

ROG - reactive organic gases

PM - particulate matter

CAP - criteria air pollutants

BAAQMD - Bay Area Air Quality Management District

yr - year

lb - pound

Table 52
Unmitigated Construction GHG Emissions
Anderson Dam Seismic Retrofit & Conservation Measures
Santa Clara County, CA

Construction Year		CO_2	CH_4	N_2O	CO_2e
		MT/yr			
Year 1	2024	4,040	46	0.066	5,215
Year 2	2025	33,129	1.3	0.30	33,250
Year 3	2026	32,972	1.3	0.30	33,093
Year 4	2027	41,091	1.6	0.40	41,248
Year 5	2028	36,285	1.4	0.35	36,423
Year 6	2029	49,979	1.9	0.56	50,192
Year 7	2030	19,543	0.72	0.22	19,627
Year 8	2031	10,125	0.37	0.085	10,159
Year 9	2032	6,351	0.22	0.053	6,373
Year 10	2033	6,315	0.22	0.052	6,336
Year 11	2034	6,246	0.22	0.052	6,267
Year 12	2035	6,207	0.22	0.051	6,227
Year 13	2036	6,244	0.22	0.051	6,264
Year 14	2037	6,322	0.22	0.052	6,343
Year 15	2038	6,350	0.22	0.059	6,373

Abbreviations:

GHG - greenhouse gases
CO_2e - CO_2-equivalent emissions
CH_4 - methane
yr - year
MT - metric tonne
N_2O - nitrous oxide

Table 53
Mitigated Construction GHG Emissions
Anderson Dam Seismic Retrofit & Conservation Measures
Santa Clara County, CA

Construction Year		CO_2	CH_4	N_2O	CO_2e
		MT/yr			
Year 1	2024	4,040	7.8	0.066	4,254
Year 2	2025	33,129	1.3	0.30	33,250
Year 3	2026	32,972	1.3	0.30	33,093
Year 4	2027	41,091	1.6	0.40	41,248
Year 5	2028	36,285	1.4	0.35	36,423
Year 6	2029	49,979	1.9	0.56	50,192
Year 7	2030	19,543	0.72	0.22	19,627
Year 8	2031	10,125	0.37	0.085	10,159
Year 9	2032	6,351	0.22	0.053	6,373
Year 10	2033	6,315	0.22	0.052	6,336
Year 11	2034	6,246	0.22	0.052	6,267
Year 12	2035	6,207	0.22	0.051	6,227
Year 13	2036	6,244	0.22	0.051	6,264
Year 14	2037	6,322	0.22	0.052	6,343
Year 15	2038	6,350	0.22	0.059	6,373

Abbreviations:

GHG - greenhouse gases
CO_2e - CO_2-equivalent emissions
CH_4 - methane
yr - year
MT - metric tonne
N_2O - nitrous oxide

Table 54
Exposure Parameters
Anderson Dam Seismic Retrofit and Conservation Measures
Santa Clara County, CA

Receptor Type	Receptor Age Group[1]	Exposure Parameters						
		Daily Breathing Rate (DBR)[2]	Annual Exposure Duration (ED)[3]	Fraction of Time at Home (FAH)	Exposure Frequency (EF)[4]	Averaging Time (AT)	Intake Factor, Inhalation (If_{inh})	Age Sensitivity Factor (ASF)[5,6]
		(L/kg-day)	(years)	(unitless)	(days/year)	(days)	(m^3/kg-day)	(unitless)
Resident	3rd Trimester	361	1	1	350	25,550	0.0049	10
	Age 0 -<2 Years	1090	1	1			0.015	10
	Age 2 -<9 Years	631	1	1			0.0086	3
	Age 2 -<16 Years	572	1	1			0.0078	3

Notes:

1. Age bin 2 -<9 Years will be used where applicable, and age bin 2 -<16 Years will be conservatively used for ages 9 -<16 Years.
2. Daily breathing rates for residents reflect default breathing rates from Cal/EPA 2015 as follows:
   95th percentile 24-hour daily breathing rate for age 3rd trimester and 0 -<2 years
   80th percentile 24-hour daily breathing rate for age 2 -<9 years
3. Annual exposure duration represents one full year.
4. Exposure frequency reflects default residential exposure frequency from Cal/EPA 2015.
5. Age sensitivity factors account for an "anticipated special sensitivity to carcinogens" of infants and children as recommended in the OEHHA Technical Support Document (Cal/EPA 2009) and current OEHHA guidance (Cal/EPA 2015). This approach is consistent with the cancer risk adjustment factor calculations recommended by BAAQMD (BAAQMD 2016).
6. Adjustment factor is applicable to each receptor type listed for the age group relevant to that receptor type.

Abbreviations:

AT - averaging time
Cal/EPA - California Environmental Protection Agency
DBR - daily breathing rate
ED - exposure duration
EF - exposure frequency
IF_{inh} - intake factor
FAH - fraction of time at home
kg - kilogram
L - liter

Reference:

BAAQMD. 2016. Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines. January.
BAAQMD. 2020. Health Risk Assessment (HRA) Modeling Protocol. December.
Cal/EPA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

Table 55
Age Sensitivity Weighted Intake Factors by Year and Age Bin
Anderson Dam Seismic Retrofit and Conservation Measures
Santa Clara County, CA

Year[1]	Resident				
	Fraction of Year in Age Bin[2]				Age Sensitivity Weighted Intake Factor by Year, Inhalation[3,4]
	3rd Trimester	0-2	2-9	9-16	(m^3/kg-day)
Year 1	0.25	0.75			0.124
Year 2		1			0.149
Year 3		0.25	0.75		0.057
Year 4			1		0.026
Year 5			1		0.026
Year 6			1		0.026
Year 7			1		0.026
Year 8			1		0.026
Year 9			1		0.026
Year 10			0.25	0.75	0.024
Year 11				1	0.024
Year 12				1	0.024
Year 13				1	0.024
Year 14				1	0.024
Year 15				1	0.024

Notes:

1. Exposure begins at the start of construction in Year 1.
2. The exposure duration for all years is 1, as the health risk assessment is based on annual emissions.
3. The Intake Factors have been multiplied by the Age Sensitivity Factors and weighted by the exposure duration for each age bin.
4. Intake Factors are based on exposure assumptions in Table 54.

Abbreviations:

IF - intake factor

m^3 - cubic meter

kg - kilogram

References:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

Table 56
Construction Health Risk Results
Anderson Dam Seismic Retrofit
Santa Clara County, CA

PMI/MEI Risks[1,2]				$PM_{2.5}$ Concentration ($\mu g/m^3$)
Risk Type	**Cancer Risk [in a million]**	**Chronic HI**	**Acute HI**	
Unmitigated	81	0.081	15	1.7
Mitigated	17	0.017	3.7	0.58
BAAQMD Threshold[2]	10	1	1	0.3
Above Threshold?	**Yes**	No	**Yes**	**Yes**

Unmitigated PMI/MEI Risk Location				$PM_{2.5}$
Risk Type	**Cancer**	**Chronic**	**Acute**	
UTMx	621,528	621,068	622,048	622,342
UTMy	4,114,015	4,113,995	4,113,655	4,113,618
Year of Max Risk	N/A	2027	2029	2029

Mitigated PMI/MEI Risk Location				$PM_{2.5}$
Risk Type	**Cancer**	**Chronic**	**Acute**	
UTMx	621,528	621,068	622,048	620,828
UTMy	4,114,015	4,113,995	4,113,655	4,113,995
Year of Max Impact	N/A	2027	2029	2027

Notes:

1. Cancer risk, non-cancer chronic hazard, and $PM_{2.5}$ concentration were analyzed at the location of the maximally exposed individual (MEI). Acute hazard was analyzed at the offsite point of maximum impact (PMI).

2. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines.

Abbreviations:

PMI - point of maximum impact
MEI - maximally exposed individual
UTM - Universal Transverse Mercator coordinate system
PM - particulate matter
$\mu g/m^3$ - microgram per cubic meter

References:

2023 CEQA Statute and Guidelines. Available online at: https://www.califaep.org/docs/CEQA_Handbook_2023_final.pdf

Table 57
Construction Health Risk Results
Ogier Ponds Conservation Measure
Santa Clara County, CA

PMI/MEI Risks[1,2]				$PM_{2.5}$ Concentration ($\mu g/m^3$)
Risk Type	**Cancer Risk [in a million]**	**Chronic HI**	**Acute HI**	
Unmitigated	2.8	0.012	0.0039	0.19
Mitigated	0.8	0.0037	0.0039	0.065
BAAQMD Threshold[2]	10	1	1	0.3
Above Threshold?	No	No	No	No

Unmitigated PMI/MEI Risk Location				$PM_{2.5}$
Risk Type	**Cancer**	**Chronic**	**Acute**	
UTMx	616,128	617,028	617,028	616,128
UTMy	4,115,374	4,115,094	4,115,094	4,115,374
Year of Max Risk	N/A	2029	2029	2030

Mitigated PMI/MEI Risk Location				$PM_{2.5}$
Risk Type	**Cancer**	**Chronic**	**Acute**	
UTMx	616,128	617,028	617,028	616,128
UTMy	4,115,374	4,115,094	4,115,094	4,115,374
Year of Max Impact	N/A	2029	2029	2030

Notes:

1. Cancer risk, non-cancer chronic hazard, and $PM_{2.5}$ concentration were analyzed at the location of the maximally exposed individual (MEI). Acute hazard was analyzed at the offsite point of maximum impact (PMI).

2. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines.

Abbreviations:

PMI - point of maximum impact
MEI - maximally exposed individual
UTM - Universal Transverse Mercator coordinate system
PM - particulate matter
$\mu g/m^3$ - microgram per cubic meter

References:

2023 CEQA Statute and Guidelines. Available online at: https://www.califaep.org/docs/CEQA_Handbook_2023_final.pdf

Table 58
Construction Health Risk Results
Phase 2 Coyote Percolation Dam Conservation Measure
Santa Clara County, CA

PMI/MEI Risks[1,2]				$PM_{2.5}$ Concentration ($\mu g/m^3$)
Risk Type	**Cancer Risk [in a million]**	**Chronic HI**	**Acute HI**	
Unmitigated	0.26	0.0013	0.017	0.039
Mitigated	0.064	3.2E-04	0.017	0.016
BAAQMD Threshold[2]	10	1	1	0.3
Above Threshold?	No	No	No	No

Unmitigated PMI/MEI Risk Location				$PM_{2.5}$
Risk Type	**Cancer**	**Chronic**	**Acute**	
UTMx	609,648	609,648	609,928	609,648
UTMy	4,121,654	4,121,654	4,121,674	4,121,654
Year of Max Risk	N/A	2028	2027	2028

Mitigated PMI/MEI Risk Location				$PM_{2.5}$
Risk Type	**Cancer**	**Chronic**	**Acute**	
UTMx	609,648	609,648	609,928	609,648
UTMy	4,121,654	4,121,654	4,121,674	4,121,654
Year of Max Impact	N/A	2028	2027	2028

Notes:

1. Cancer risk, non-cancer chronic hazard, and $PM_{2.5}$ concentration were analyzed at the location of the maximally exposed individual (MEI). Acute hazard was analyzed at the offsite point of maximum impact (PMI).

2. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines.

Abbreviations:

PMI - point of maximum impact
MEI - maximally exposed individual
UTM - Universal Transverse Mercator coordinate system
PM - particulate matter
$\mu g/m^3$ - microgram per cubic meter

References:

2023 CEQA Statute and Guidelines. Available online at: https://www.califaep.org/docs/CEQA_Handbook_2023_final.pdf

Table 59
Construction Health Risk Results
Sediment Augmentation Program
Santa Clara County, CA

PMI/MEI Risks[1,2]				$PM_{2.5}$ Concentration ($\mu g/m^3$)
Risk Type	**Cancer Risk [in a million]**	**Chronic HI**	**Acute HI**	
Unmitigated	38	0.015	0.0064	0.30
Mitigated	12	0.0039	0.0064	0.12
BAAQMD Threshold[2]	10	1	1	0.3
Above Threshold?	**Yes**	No	No	No

Unmitigated PMI/MEI Risk Location				$PM_{2.5}$
Risk Type	**Cancer**	**Chronic**	**Acute**	
UTMx	618,968	618,968	618,968	620,988
UTMy	4,113,979	4,113,979	4,114,079	4,114,015
Year of Max Risk	N/A	2025	2025	2025

Mitigated PMI/MEI Risk Location				$PM_{2.5}$
Risk Type	**Cancer**	**Chronic**	**Acute**	
UTMx	618,968	618,968	618,968	620,988
UTMy	4,113,979	4,113,979	4,114,079	4,114,015
Year of Max Impact	N/A	2025	2025	2025

Notes:

1. Cancer risk, non-cancer chronic hazard, and $PM_{2.5}$ concentration were analyzed at the location of the maximally exposed individual (MEI). Acute hazard was analyzed at the offsite point of maximum impact PMI).

2. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines.

Abbreviations:

PMI - point of maximum impact
MEI - maximally exposed individual
UTM - Universal Transverse Mercator coordinate system
PM - particulate matter
$\mu g/m^3$ - microgram per cubic meter

References:

2023 CEQA Statute and Guidelines. Available online at: https://www.califaep.org/docs/CEQA_Handbook_2023_final.pdf

Table 60
Construction Health Risk Results
Anderson Dam Seismic Retrofit and Conservation Measures
Santa Clara County, CA

PMI/MEI Risks[1,2]				$PM_{2.5}$ Concentration ($\mu g/m^3$)
Risk Type	**Cancer Risk [in a million]**	**Chronic HI**	**Acute HI**	
Unmitigated	82	0.094	15	1.7
Mitigated	21	0.021	3.7	0.64
BAAQMD Threshold[2]	10	1	1	0.3
Above Threshold?	**Yes**	No	**Yes**	**Yes**

Mitigated PMI/MEI Risk Location				$PM_{2.5}$
Risk Type	**Cancer**	**Chronic**	**Acute**	
UTMx	621,068	621,108	622,048	621,108
UTMy	4,113,995	4,113,995	4,113,655	4,113,995
Year of Max Impact	N/A	2027	2029	2027

Unmitigated PMI/MEI Risk Location				$PM_{2.5}$
Risk Type	**Cancer**	**Chronic**	**Acute**	
UTMx	621,068	621,128	622,048	622,342
UTMy	4,113,995	4,113,995	4,113,655	4,113,618
Year of Max Impact	N/A	2027	2029	2027

Notes:

1. Cancer risk, non-cancer chronic hazard, and $PM_{2.5}$ concentration were analyzed at the location of the maximally exposed individual (MEI). Acute hazard was analyzed at the offsite point of maximum impact (PMI).

2. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines.

Abbreviations:

PMI - point of maximum impact
MEI - maximally exposed individual
UTM - Universal Transverse Mercator coordinate system
PM - particulate matter
$\mu g/m^3$ - microgram per cubic meter

References:

2023 CEQA Statute and Guidelines. Available online at: https://www.califaep.org/docs/CEQA_Handbook_2023_final.pdf

Table 61
Cumulative Construction Health Risk Results
Anderson Dam Seismic Retrofit and Conservation Measures
Santa Clara County, CA

Unmitigated MEI Risks[1,2,3]			$PM_{2.5}$ Concentration ($\mu g/m^3$)
Risk Type	**Cancer Risk [in a million]**	**Chronic HI**	
Project	82	0.094	1.7
Stationary Sources[4]	0	0	0
Major Roadways[5]	0.44	0.0018	0.014
Major Railways[5]	0	0	0
Cumulative Risk	83	0.095	**1.7**
BAAQMD Threshold[2]	100	10	0.8
Above Threshold?	No	No	**Yes**

Mitigated MEI Risks[1,2,3]			$PM_{2.5}$ Concentration ($\mu g/m^3$)
Risk Type	**Cancer Risk [in a million]**	**Chronic HI**	
Project Risk	21	0.021	0.64
Stationary Sources[4]	0	0	0
Major Roadways[5]	0.44	0.0018	0.016
Major Railways[5]	0	0	0
Cumulative Risk	21	0.022	0.65
BAAQMD Threshold[2]	100	10	0.8
Above Threshold?	No	No	No

Notes:

1. Cancer risk, non-cancer chronic hazard, and $PM_{2.5}$ concentration were analyzed at the location of the maximally exposed individual (MEI).
2. Thresholds are from BAAQMD California Environmental Quality Act (CEQA) Guidelines.
3. Project MEI locations are located greater than 1,000 feet away from any existing permitted stationary sources.
4. Stationary source data was obtained from a BAAQMD data request (dated 3/7/2022). No stationary sources are located within 1000 feet of the Project MEI locations.
5. Roadways and Railway risk values were obtained from BAAQMD's Roadway Screening Analysis Calculator. No railway is located near the Project MEI locations.

Abbreviations:

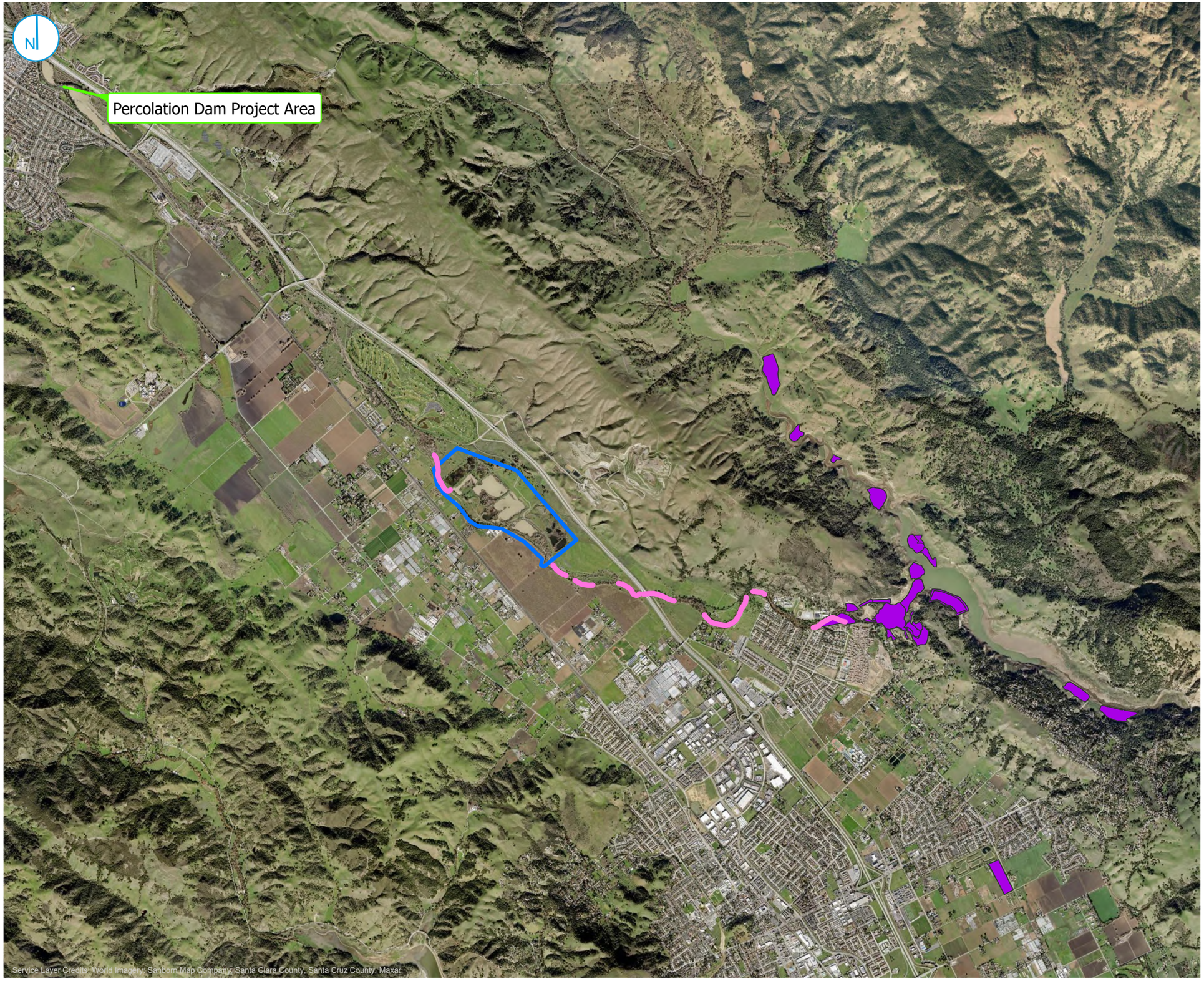
MEI - maximally exposed individual
PM - particulate matter
UTM - Universal Transverse Mercator coordinate system
$\mu g/m^3$ - microgram per cubic meter

References:

2023 CEQA Statute and Guidelines. Available online at: https://www.califaep.org/docs/CEQA_Handbook_2023_final.pdf

BAAQMD. 2022. Roadway Screening Analysis Calculator. December. Available at: https://data.bayareametro.gov/. Accessed April 6, 2023.

FIGURES



LEGEND

- Seismic Retrofit Work Areas
- Percolation Dam Project Area
- Ogier Ponds Project Area
- Gravel Augmentation Sites

0 500 1,000 2,000 3,000 Meters

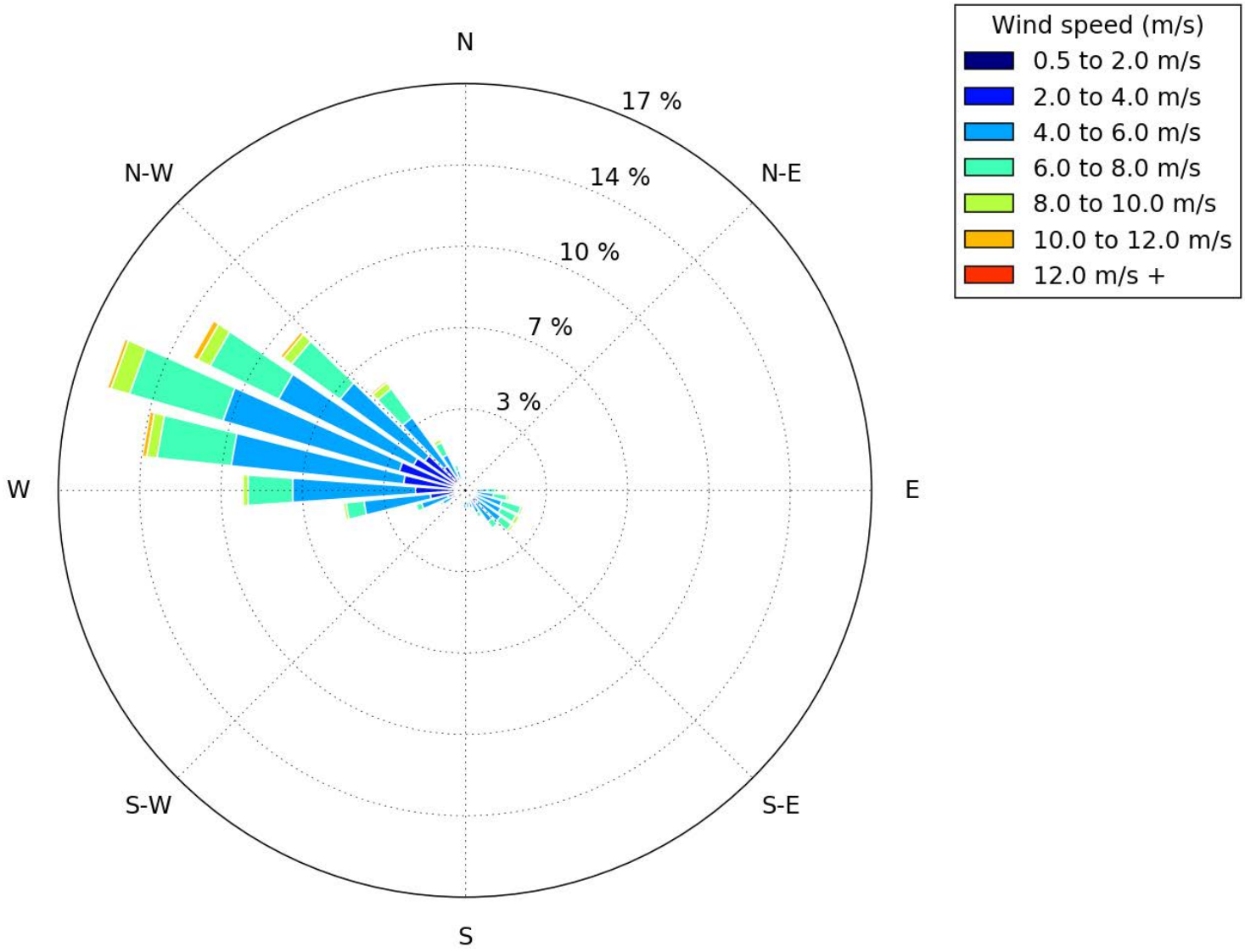
OVERVIEW OF PROJECT WORK AREAS

Anderson Dam Seismic Retrofit
Santa Clara County, California

FIGURE 01

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL



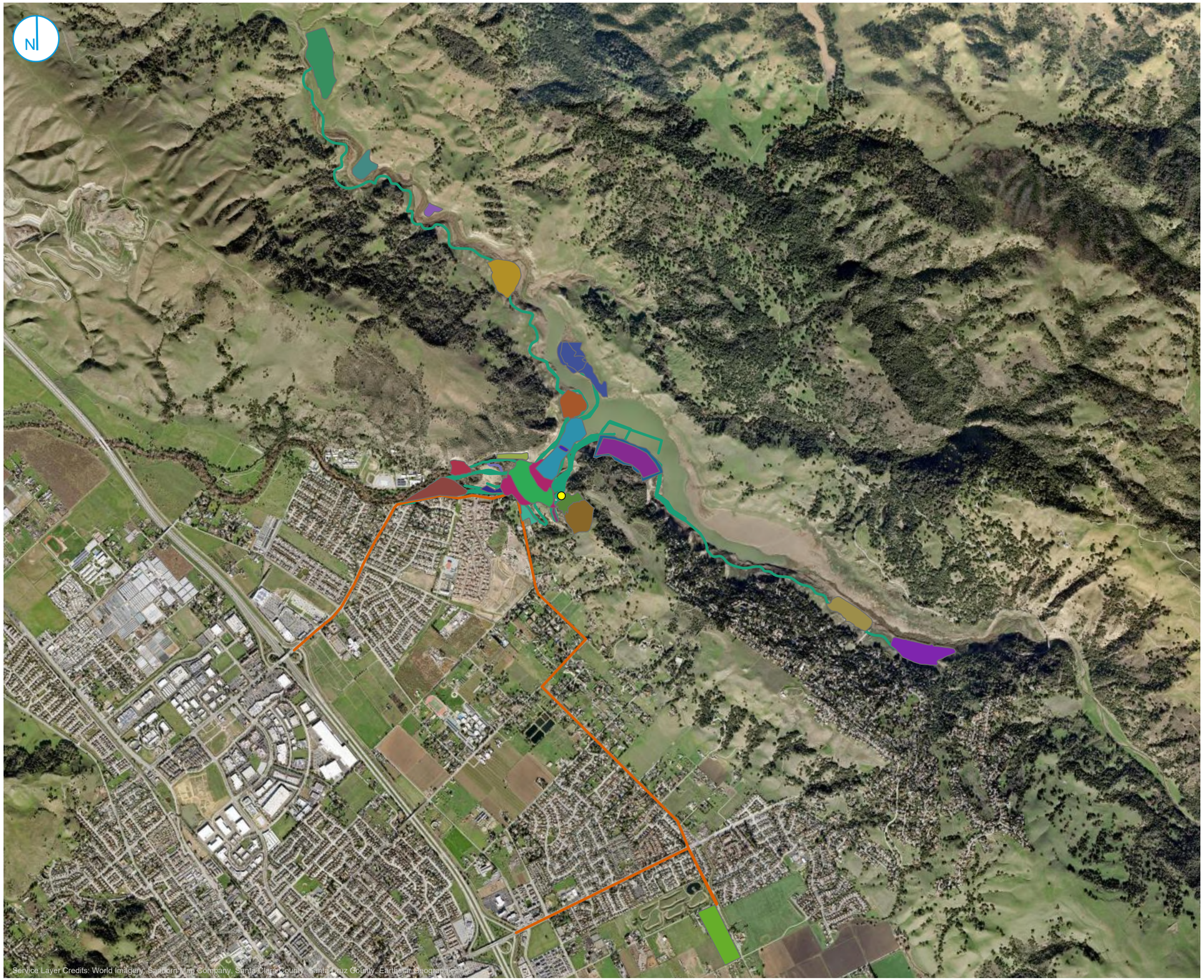
EVALUATION OF SITE WINDS

FIGURE 02

Anderson Dam Seismic Retrofit
Santa Clara County, California

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL



LEGEND

- Basalt Hill Borrow Area
- Cofferdam
- Dredging
- Excavation
- Embankment
- Packwood Gravel Borrow Pit
- Reservoir Disposal Area
- Spillway
- Staging Area 1
- Staging Area 2
- Staging Area 3
- Staging Area 4
- Staging Area 5
- Stockpile Area B
- Stockpile Area C
- Stockpile Area D
- Stockpile Area E
- Stockpile Area H
- Stockpile Area I
- Stockpile Area J
- Stockpile Area K (North)
- Stockpile Area K (South)
- Stockpile Area L
- Access/Hauling Road
- Highway Site Access
- Spillway Construction Access
- Generator

0 500 1,000 Meters

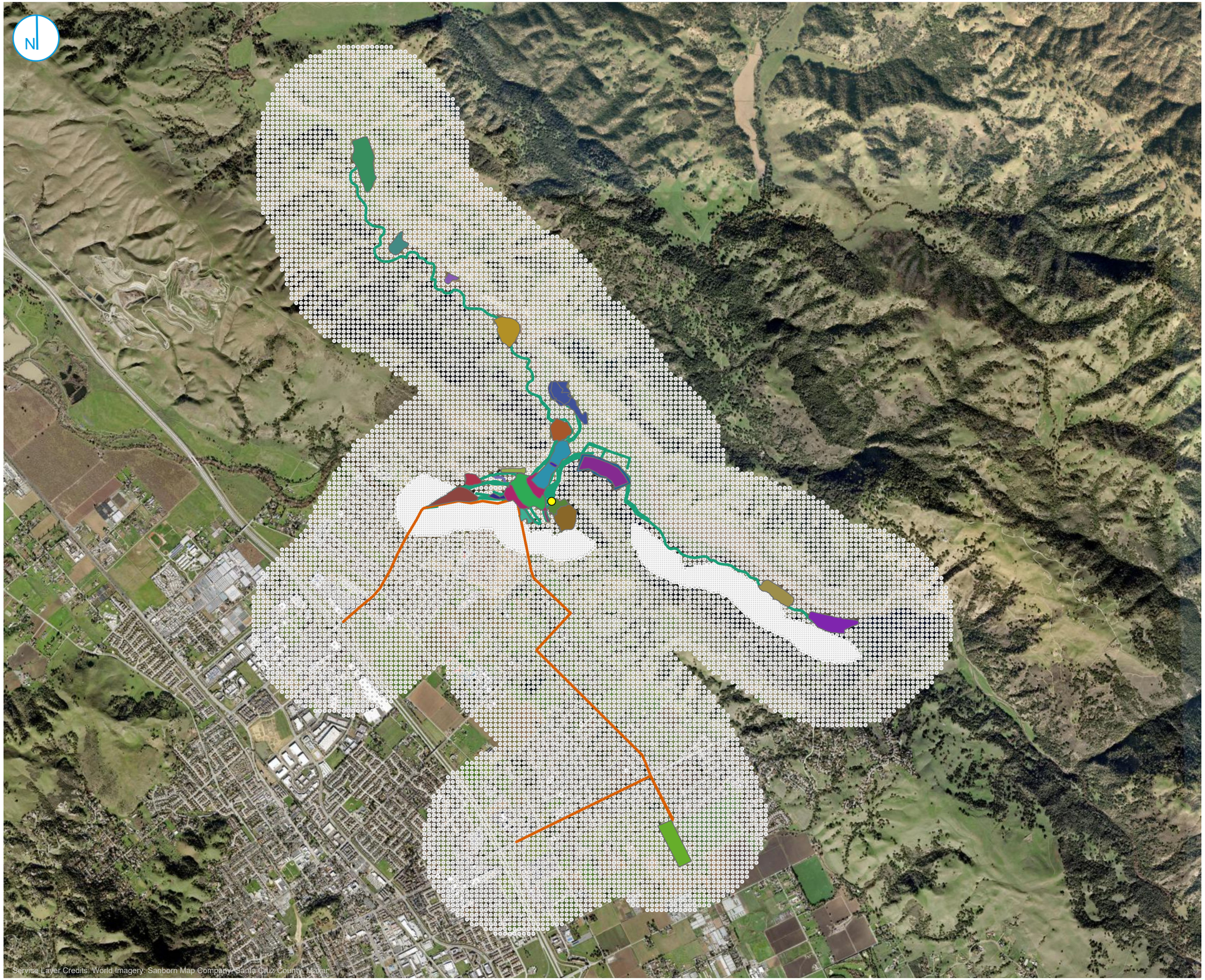
SEISMIC RETROFIT CONSTRUCTION MODELED SOURCES

Anderson Dam Seismic Retrofit
Santa Clara County, California

FIGURE 03

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL



LEGEND

- Basalt Hill Borrow Area
- Cofferdam
- Dredging
- Excavation
- Embankment
- Packwood Gravel Borrow Pit
- Reservoir Disposal Area
- Spillway
- Staging Area 1
- Staging Area 2
- Staging Area 3
- Staging Area 4
- Staging Area 5
- Stockpile Area B
- Stockpile Area C
- Stockpile Area D
- Stockpile Area E
- Stockpile Area H
- Stockpile Area I
- Stockpile Area J
- Stockpile Area K (North)
- Stockpile Area K (South)
- Stockpile Area L
- Access/Hauling Road
- Highway Site Access
- Spillway Construction Access
- Receptors
- Generator

0 500 1,000 2,000 Meters

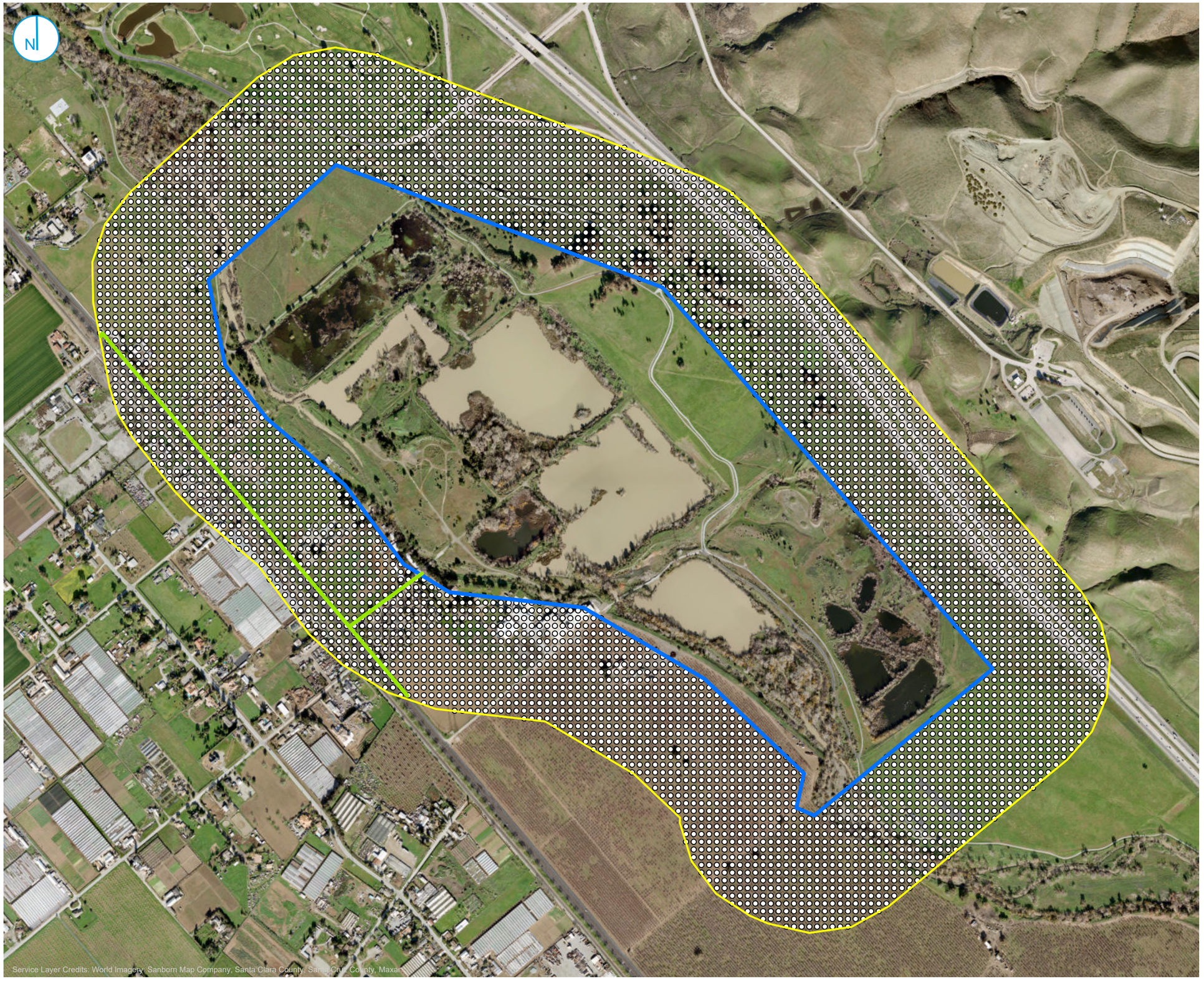
SEISMIC RETROFIT MODELED RECEPTOR LOCATIONS

Anderson Dam Seismic Retrofit
Santa Clara County, California

FIGURE 04

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL



LEGEND

- Modeling Extent
- Haul Routes
- Project Area
- Receptors

0 250 500 Meters

OGIER PONDS CONSERVATION MEASURE MODELED SOURCES AND RECEPTORS

Anderson Dam Seismic Retrofit
Santa Clara County, California

FIGURE 05

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL



LEGEND

- Modeling Extent
- Haul Routes
- Project Area
- Receptors

0 50 100 Meters

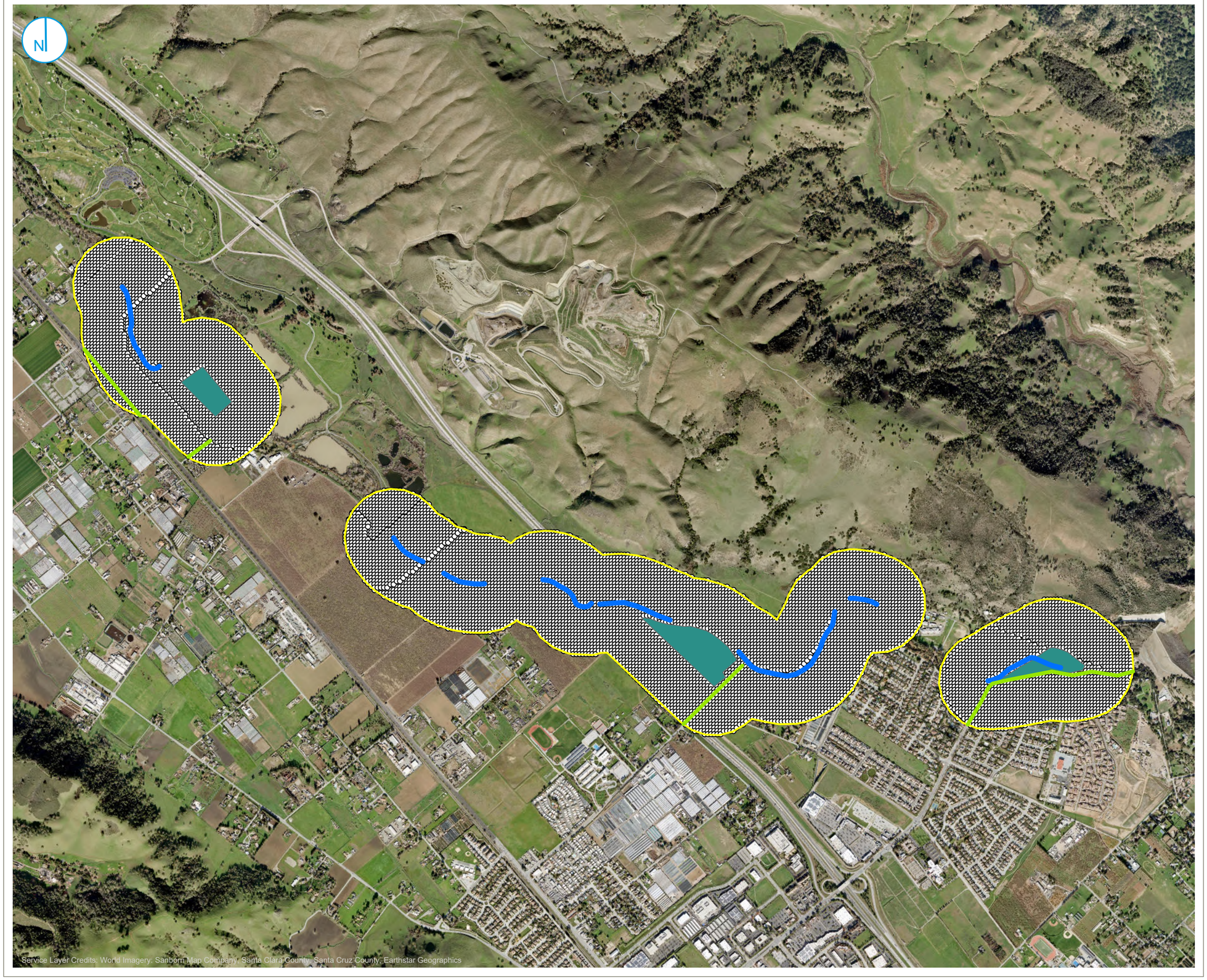
PHASE 2 COYOTE PERCOLATION DAM MODELED SOURCES AND RECEPTORS

Anderson Dam Seismic Retrofit
Santa Clara County, California

FIGURE 06

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL



LEGEND

- Modeling Extent
- Receptors
- Staging Areas
- Gravel Augmentation Sites
- Haul Routes

0 500 1,000 Meters

SEDIMENT AUGMENTATION PROGRAM MODELED SOURCES AND RECEPTORS

Anderson Dam Seismic Retrofit
Santa Clara County, California

FIGURE 07

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL



LEGEND

- Mitigated Acute HI
- Mitigated Cancer Risk
- Mitigated Chronic HI and PM2.5 Concentration
- Unmitigated Acute HI
- Unmitigated Cancer Risk
- Unmitigated Chronic HI
- Unmitigated PM2.5 Concentration

0 100 200 Meters

MAXIMALLY EXPOSED INDIVIDUALS

Anderson Dam Seismic Retrofit
Santa Clara County, California

FIGURE 08

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL

Appendix M

Noise and Vibration Impact Assessment

Prepared by
Ramboll Americas Engineering Solutions, Inc.

Project Number
1690032004

Date
April 7, 2023
Revised: July 12, 2024

ANDERSON DAM SEISMIC RETROFIT PROJECT

NOISE & VIBRATION IMPACT ASSESSMENT

RAMBOLL Bright ideas. Sustainable change.

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Appendix 5 – Blasting Analysis

Acronyms and Abbreviations

ADSRP or Project	Anderson Dam Seismic Retrofit Project
ANSI	American National Standards Institute
ASTM	ASTM International
CadnaA	Computer Aided Noise Abatement software from DataKustik GmbH
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
DSOD	California Department of Water Resources Division of Safety of Dams
dB	Decibel
DMP	Santa Clara Valley Water Dam Maintenance Program
DNL	Day-night average sound level
EIR	Environmental Impact Report
FAHCE	Fish and Aquatic Habitat Collaborative Effort
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
ft	feet
FTA	Federal Transit Authority
GBV	Ground-borne vibration
Hz	hertz
in/sec	inches per second
ISEE	International Society of Explosives Engineers
ISO	International Organization for Standardization
L_{AEQ}	A-weighted time-average sound level
lb	pound
m	meter
mph	miles per hour
NED	National Elevation Dataset
OSHA	Occupational Safety and Health Administration
OSMRE	Office of Surface Mining and Reclamation Enforcement
Pa	pascal (newton per meter squared)
PPV	peak particle velocity
psi	pounds per square inch
Ramboll	Ramboll Americas Engineering Solutions, Inc.
SLM	sound level meter
TNT	Trinitrotoluene
TNTe	Trinitrotoluene equivalent
USBM	US Bureau of Mines
USEPA	United States Environmental Protection Agency
VdB	Decibels of vibration velocity

1. INTRODUCTION

The proposed Anderson Dam Seismic Retrofit Project (Project) involves retrofitting and upgrading Anderson Dam and associated facilities, designed to meet Federal Energy Regulatory Commission (FERC) and California Department of Water Resources Division of Safety of Dams (DSOD) requirements. The Project will include construction work at and around Anderson Dam as well as four conservation measures: Sediment Augmentation Program (downstream of the dam), Ogier Ponds Conservation Measure (approximately 3 miles northwest of the dam), Phase 2 Coyote Percolation Dam Conservation Measure (approximately 9 miles northwest of the dam), and North Channel Extension (downstream of the existing Anderson Dam outlet structure). Noise-sensitive receptors include residences and William F. James Boys Ranch ("Boys Ranch"), a juvenile detention center.

Project construction will take place over approximately seven years, and construction of the conservation measures areas will take up to 14 years. Site preparation and the start of tunneling for the low-level outlet works (LLOW) will occur in Year 1. Excavation and rebuilding of Anderson Dam will take place from years 2 to 6, and construction at the conservation measures areas will take place from years 2 to 15. Each year of construction has been divided into activities based on locations of activity and equipment used.

Anderson Dam is owned by the Santa Clara Valley Water District (Valley Water). The California Environmental Quality Act (CEQA) Guidelines require an environmental assessment for potential impacts to surrounding properties during construction and during normal operations once construction is complete. The CEQA Guidelines include several noise-related assessment items.

This technical report provides a summary of noise regulations relevant to Project construction, an analysis of existing conditions, and an assessment of potential noise impacts on noise-sensitive receptors. Operation of Anderson Dam and the conservation measures following construction of the proposed Project would remain essentially unchanged from historical operation. No new long-term operational sources would emit noise or vibration beyond existing conditions; therefore, this technical report evaluates construction noise but does not evaluate future maintenance and operations activities.

The appendix provides additional detail on the noise and vibration environmental setting, methodology and assumptions, and provides the results of the noise and vibration assessment modeling and calculations described in this section.

This technical report has been updated since its original publication to reflect changes to the Project and provide additional information. These changes include extending work hours (including nighttime work), adding some weekend days, and beginning tunnelling for the LLOW in Year 1 rather than Year 2. Other changes were made to the report clarify existing information and to include two additional sensitive receptors.

2. NOISE & VIBRATION PRINCIPLES AND TERMINOLOGY

This report uses several terms common to noise and vibration analysis. The following section provides a brief summary of acoustic principles and terminology to familiarize the reader.

2.1 Sound

Sound is the transmission of energy in the form of fluctuating pressure waves from a vibrating source through an elastic medium, such as air, that is detectable by the human ear. The pressure fluctuates above and below atmospheric pressure. The amplitude of the pressure fluctuation is typically described in terms of decibels (dB), while the rate of fluctuation per unit time (frequency) is described in hertz (Hz).

The decibel is a logarithmic ratio of a given sound pressure to a reference sound pressure. A logarithmic ratio is used for decibels since human hearing is roughly logarithmic, rather than linear. The reference sound pressure is roughly equal to the threshold of human hearing. Sound pressure levels below the human threshold of hearing are less than 0 dB, while levels above the human threshold of hearing are greater than 0 dB. Differences in sound level are also described in decibels. A 3-dB difference is considered "just noticeable", a 5-dB difference is considered "clearly noticeable", while a 10-dB difference is perceived as a doubling (or halving) in loudness. Table 2-1 provides a list of common noise sources, their sound level, and their subjective loudness.

Because the decibel is logarithmic, a doubling of sound energy from a noise source produces a 3-dB increase in sound level from that source, not a doubling of the loudness of the sound (which requires a 10-dB increase). For example, if traffic along a road is causing a 60 dB sound level at some nearby location, doubling the amount traffic on this same road would cause the sound level at this same location to increase to 63 dB. Such an increase might not be discernible in a complex acoustical environment.

The range of frequencies a healthy human ear can hear is approximately 20 Hz to 20,000 Hz. The human ear is not equally sensitive to all frequencies across the audible frequency spectrum. The human ear is most sensitive to mid frequencies (the frequency range associated with speech) and is less sensitive at low frequencies and very high frequencies. To account for this, frequency weighting networks have been developed to approximate the human ear's frequency response at different sound pressure levels. The A-weighting network is used to approximate the frequency response of the human ear at normal sound levels. Measurements using the A-weighting network are described in terms of A-weighted decibels, often abbreviated colloquially as dBA or dB(A).

Table 2-1. Typical Sound Pressure Levels Associated with Common Noise Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	Indoor
140	Deafening	Jet aircraft at 75 feet (ft)	-
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 ft	-
120	Threshold of feeling	-	Hard rock band
110	Extremely Loud	Jet flyover at 1000 ft	-
100	Very Loud	auto horn at 10 ft	-
90		jackhammer at 50 ft	noisy factory
80	Loud	Diesel truck (40 miles per hour (mph)) at 50 ft, noisy urban street	Garbage disposal, cafeteria with sound-reflecting surfaces
70	Moderately Loud	Busy highway at 100 ft	vacuum cleaner
60	Moderate	-	Face-to-face conversation
50	Quiet	Small town	Open office area, quiet dishwasher
40			
30	Very quiet	-	Bedroom, typical residence (without TV or sound system)
20		Rustling leaves	Audiometric testing room, whisper
10	Just audible	-	Human breathing
0	Threshold of hearing	-	-

Adapted from Architectural Acoustics, M. David Egan, 1988, and EPA, 1974.

2.2 Sound Level Metrics

To better characterize changes in sound levels over time, several sound level metrics have been developed. The following is a summary of some of the more common metrics.

- Sound environments often vary in level over time. The equivalent-continuous sound level, L_{EQ}, is the steady-state sound level over a given time period that has the same total sound energy as the time-varying sound level measured over that same time period. L_{EQ} is the time-averaged sound energy of a measurement.

- The Day-Night Level, abbreviated as either DNL or L_{DN}, is an equivalent-continuous sound pressure level for a 24-hour period that includes a 10-dB penalty from 10:00 PM to 7:00 AM to reflect people's increased sensitivity to noise at night.

2.3 Noise and its Effects on People

Noise is sound that is considered undesirable or unpleasant. The effects of noise on people depends on a variety of factors, including the type of noise source, the context of the noise, and the sensitivity of the person.

How noticeable a noise source is depends on the following factors:

- The sound level. Louder noise tends to be more annoying. In addition, noise sources that change in sound level over time are more noticeable than those that do not vary over time.
- The duration. Noise that is fairly steady over time tends to be less noticeable, while short, impulsive noises are more noticeable.
- The frequency spectrum. Broadband noise – noise that contains sound energy at many frequencies – is not as noticeable than noise that contains discrete tones. For example, the tone from a backup beeper is more noticeable than noise from a fan, even if they are producing the same overall sound level.
- Masking effects. Noise from one source can be masked – made less noticeable – by noise from one or more louder sources.

The extent to which a noise affects people can vary from subjective (causing annoyance) to physical (causing hearing loss). Where noise is loud enough to cause hearing loss, regulations such as those developed by Occupational Safety and Health Administration (OSHA) have been adopted to mitigate hearing loss. In most environments, noise is not sufficiently loud to cause hearing loss but may still cause annoyance or impact people's productivity and general well-being. Note that the degree of annoyance caused by a given noise varies from person to person.

2.4 Environmental Noise

Environmental noise refers to noise the propagates outdoors. The way in which sound propagates outdoors and the descriptors used to differentiate types of sound and noise sources are summarized below.

2.4.1 Outdoor Sound Propagation

The attenuation of sound over distance outdoors depends on the type of source and environmental factors. In the free field (i.e., no obstructions for the sound), sound from a source that can be considered a point spreads hemispherically, resulting in a sound attenuation rate of 6 dB per doubling of distance. Point sources include, for example, fans and individual vehicles such as trucks. Sound from a line source spreads in the shape of a half cylinder, with a sound attenuation rate of 3 dB per doubling of distance. The most common type of line source is a highway. While highways have many point sources (vehicles), the constant stream of traffic results in the collection of point sources acting as a line source.

The environmental factors that affect the spread of sound outdoors include the following:

- Atmospheric effects. At short distances, atmospheric effects are negligible. However, at large distances, atmospheric effects can significantly impact the propagation of sound.
  - Air absorption. Air absorbs a small amount of sound, primarily at high frequencies. The amount of sound air absorbs depends primarily on the relative humidity, but it also depends on temperature and pressure to a lesser extent. Air absorption can typically be ignored at distances of 100 m or less. At greater distances (e.g., 10,000 m), air absorption has a significant effect that must be accounted for. Air can also refract sound (bend the sound waves in a different direction) when there is a vertical temperature gradient in the atmosphere (i.e., the temperature changes with altitude). Sound waves will refract away from cooler temperatures and towards warmer temperatures.
  - Wind. Wind can also play a role in sound propagation over large distances. Sound refracts in the direction the wind is traveling. The sound traveling downwind propagates more efficiently, resulting in less attenuation, while sound traveling upwind propagates less efficiently, resulting in more attenuation
- Ground absorption. The amount of sound the ground absorbs varies based on the surface. For example, asphalt and bodies of water are more reflective, while soft, porous ground absorbs more sound.
- Vegetation. The amount of sound vegetation absorbs is typically low. However, sound traveling through 100 feet of dense woods or forest can be reduced up to 6 dB.
- Obstructions. Obstructions, such as buildings or hills, which break the line-of-sight between a noise source and receptor reduce sound levels by shielding the receptor from the source.
- Reflections. While obstructions between a source and receptor can reduce sound levels at the receptor, reflections from nearby surfaces (such as a wall or the façade of a building) that do not obstruct the line between the source and receptor can actually increase noise levels. For example, in an urban environment, the densely concentrated buildings create a "canyon effect," where sound bouncing between the buildings can increase noise levels.

2.4.2 Environmental Noise Descriptors

Several descriptors can be used to differentiate types of sound and noise based on the context. Two descriptors relevant to this Project are defined below.

- **Ambient sound**. American National Standards Institute (ANSI) S12.9-2013/Part 1 defines ambient sound as
  > *at a specified time, the all-encompassing sound associated with a given environment, being usually a composite of sound from many sources from many directions, near and far, including the specific sound source(s) of interest.*
- **Ambient noise**. ASTM International (ASTM) C634-13 (R2021) defines ambient noise as
  > *the composite of airborne sound from many sources near and far associated with a given environment. No particular sound is singled out for interest.*

2.5 Vibration

Vibration is the transmission of energy in the form of waves through the ground, man-made structures, or other solid objects. As with sound, the frequencies of vibration are described in hertz (Hz). The amplitude of vibration is typically described either as peak particle velocity (PPV) in units of inches per second (in/sec) or in decibels of vibration velocity, abbreviated as VdB.

Vibration is perceived tactilely, whether through feet or hands or through the whole body while sitting or lying down. Like noise, vibration can be a source of annoyance and can cause sleep disturbance.

Most perceptible indoor vibration is caused by sources within buildings, such as equipment operation, movement of people, or slamming doors. Typical outdoor sources are heavy construction equipment and activities (such as blasting and pile driving), steel-wheeled trains, and heavy trucks on rough roads or offroad. It is unusual for vibration from sources such as buses and trucks on smooth roads to be perceptible, even in nearby locations.

Table 2-2 summarizes common sources of groundborne vibration velocity levels and average response to vibration by a person at rest in quiet surroundings (tolerance to vibration increases considerably during physical activity). The duration of the vibration event affects human response, as does its frequency of occurrence: increases in both result in decreased tolerance. Typical background vibration levels in residential areas are usually 50 VdB or lower, well below the threshold (65 VdB) of perception for most humans.

Table 2-2. Typical Vibration Levels Associated and Associated Average Responses

Human or Structural Response	Vibration Velocity Level (VdB)	Typical Sources (50 feet from source)
Threshold for minor cosmetic damage to fragile buildings	100	Blasting, pile driving, vibratory compaction equipment
Difficulty with tasks such as reading a video or computer screen	90	Heavy tracked vehicles (bulldozers, cranes, drill rigs)
Threshold for residential annoyance for infrequent events (e.g., commuter rail)	80	Freight rail, typical Commuter rail, upper range
	70	Rapid transit, upper range
Threshold for residential annoyance for frequent events (e.g., rapid transit)	60	Commuter rail, typical
Approximate threshold for human perception of vibration	50	Bus or truck over bump or on rough roads
		Rapid transit, typical
Limit for vibration sensitive equipment		Typical bus or truck on public road

Source: Federal Transit Administration, 2018

2.6 Ground-borne Noise

Ground-borne noise is noise that is generated by vibration in the ground transmitted to building structures and then to the air within buildings. It is perceived as a low-frequency rumbling. The extent to which ground vibration is perceived as noise depends on the frequency and amplitude of the vibration, as well as the acoustical characteristics of the building environment.

Groundborne noise is quantified by the A-weighted sound level inside the building and is generally 25 to 40 dBA lower than the vibration velocity level in VdB. Groundborne vibration levels of 65 VdB can result in groundborne noise levels up to 40 dBA, which can disturb sleep. Groundborne vibration levels of 85 VdB can result in groundborne noise levels up to 60 dBA,

which can be annoying to daytime noise sensitive land uses such as schools (Federal Transit Administration, 2018).

2.7 Blasting

During blasting activity, the majority of the energy of detonations is consumed by rock breakage and movement. However, a small amount of energy is transmitted past the blasting area through vibration and air overpressure.

The total energy released by the detonation of an explosive is typically provided in terms of Trinitrotoluene equivalent (TNTe). Various types of explosives have varying effectiveness factors compared to TNT. Limits for safe air overpressure and vibration from blasting are given in terms of TNTe per delay.

2.7.1 Vibration

Blasting results in groundborne vibration propagating from the blasting area. Blasting creates vibration waves in the ground of varying amplitude, frequency, and speed. Like other forms of groundborne vibration, the frequencies are described in hertz (Hz). The amplitudes are typically described in terms of PPV in/sec. The two most significant factors influencing the amplitude of vibration are the weight of charge and distance from the charge, though factors including timing between charges, geology, and charge confinement also play a role.

Vibration from blasting of sufficient amplitude can cause structures to respond, resulting in rattling within buildings, and excessive vibration from blasting has the potential to cause damage to structures. However, proper planning and monitoring of vibration can mitigate risk to nearby buildings.

2.7.2 Overpressure

Blasting creates vibrations in the air referred to as air overpressure. Air overpressure is the change in air pressure from normal atmospheric pressure generated by a blast. Air overpressure propagates as a pressure wave in the form of compression (positive pressure) followed by rarefaction (negative pressure). Like sound waves, air overpressure can be described in terms of pascals (Pa) or the sound equivalent in decibels (dB).

Much of the acoustic energy from air overpressure is below the range of human hearing (<20 Hz). The portion of an air overpressure below the range of human hearing is perceived as a sudden gust of wind, sometimes referred to as an "airblast" or "air concussion." While most of the airblast energy is below the range of human hearing, it can cause structures to respond, resulting in rattling within buildings.

Factors that influence air overpressure include charge-weight per delay, depth of burial, volume of displaced rock, delay time intervals, type of explosive, atmospheric conditions, and topography.

3. REGULATORY SETTING

The following sections summarize the noise-related laws, regulations, and policies relevant to the Project. For an overview of laws, regulations, and policies relevant to State CEQA Guidelines and the resulting significance thresholds for the Project, see §5.1.

3.1 Federal and International Laws, Regulations, and Policies

3.1.1 U.S. Environmental Protection Agency (USEPA)

In 1972, the Noise Control Act (42 United States Code [U.S.C.] § 4901 et seq.) was passed by Congress to promote noise environments in support of public health and welfare. It also established the U.S. Environmental Protection Agency Office of Noise Abatement and Control to coordinate federal noise control activities. The agency established guidelines for noise levels that would be considered safe for community exposure without the risk of adverse health or welfare effects. The agency found that to prevent hearing loss over the lifetime of a receptor, the yearly average L_{EQ} should not exceed 70 dBA, and the L_{DN} should not exceed 55 dBA in outdoor activity areas or 45 dBA indoors to prevent interference and annoyance. In addition, based on available sleep criteria data, the agency's Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Safety Margin of Safety identified an interior nighttime level of 35 dBA as acceptable in bedrooms (USEPA 1974). In 1982, the agency phased out the office's funding as part of a shift in federal noise control policy to transfer the primary responsibility of regulating noise to state and local governments.

While the Office of Noise Abatement and Control no longer exists, the Noise Control Act has been used as a resource in developing state and local standards for environmental noise.

3.1.2 U.S. Federal Transit Administration (FTA)

The Federal Transit Administration provides guidelines for assessing the potential for adverse community reaction from construction activity. For detailed analysis, the criteria are an 8-hour L_{EQ} of 80 dBA during the day and 70 dBA during nighttime at residential receptors. The FTA states that if these criteria are exceeded, there may be adverse community reaction.

The Federal Transit Administration has adopted vibration criteria for assessment of vibration from construction and operational activities, both for human perception and damage to structures (Transit Noise and Vibration Impact Assessment, 2018). The criteria are summarized in Table 3 and Table 4. These criteria are frequently used as thresholds of significance for CEQA projects.

Table 3. Construction Vibration Damage Criteria

Building Category/Structural Category	PPV, in/sec	Approximate L_V (VdB re 1 µin/sec rms)
I. Reinforced concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Table 4. Indoor Ground-Borne Vibration Impact Criteria for General Vibration Assessment

Land Use Category	Ground-Borne Vibration Impact Levels (VdB re 1 µin/sec rms)		
	Frequent Events[a)]	Occasional Events[b)]	Infrequent Events[c)]
Category 1: Buildings where vibration would interfere with interior operations	65 VdB[d)]	65 VdB[d)]	65 VdB[d)]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB

[a)] More than 70 events per day

[b)] 30-70 events per day

[c)] Fewer than 30 events per day

[d)] From FTA, 2018: "This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. For equipment that is more sensitive, a Detailed Vibration Analysis must be performed."

3.2 State Laws, Regulations, and Policies

3.2.1 California Government Code

California Government Code section 65302 requires each local government entity to implement a noise element as part of its general plan. In addition, the California Governor's Office of Planning and Research has developed guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure. The Cities of San José and Morgan Hill and the County of Santa Clara have adopted noise elements.

3.2.2 California Department of Transportation (Caltrans)

Caltrans' Transportation and Construction Vibration Guidance Manual provides guidelines for determining thresholds for construction vibration and methods to control vibration. Chapter 11 is dedicated to air overpressure and ground vibration from blasting. The relevant section on criteria for air overpressure and ground vibration does not provide any requirements for Caltrans projects but does include discussion of their effects on people and structures and a summary of limits provided by the US Bureau of Mines (USBM) and the Office of Surface Mining and Reclamation Enforcement (OSMRE).

The manual outlines the conclusions of USBM RI 8507 "Structure Response and Damage Produced by Ground Vibration from Surface Mine Blasting", including the following:

- The potential for damage to residential structures is greater with low-frequency blast vibration (below 40 Hz) than with high frequency blast vibration (40 Hz and above).
- The type of residential construction is a factor in the vibration amplitude required to cause damage.
- For low-frequency blast vibration, a limit of 0.75 in/sec for modern drywall construction and 0.50 in/sec for older plaster-on-lath construction was proposed. For frequencies above 40 Hz, a limit of 2.0 in/sec for all types of construction was proposed.

Regarding air overpressure, the manual states that USBM RI 8485 recommends a maximum safe overpressure of 0.014 pounds per square inch (psi) (134 dB, linear) for residential structures. In addition, the manual provides the following table from the OSMRE, which provides limits based on the frequency response of the recording device used to measure air overpressure:

Table 5. OSMRE Air Overpressure Limits

Building Category/Structural Category	Limit
Lower limit of 0.1 Hz	134 dB
Lower limit of 2.0 Hz	133 dB
Lower limit of 6.0 Hz	129 dB
C-weighted, slow response*	105 dBC

* To be used only with prior approval of OSMRE

According to the manual, since most modern seismographs with air overpressure recording capability have a frequency response from 2-250 Hz, the limit of 133 dB is appropriate.

3.3 Regional Laws, Regulations, and Policies

3.3.1 County of Santa Clara Code of Ordinances

The County of Santa Clara Noise Ordinance is included in Chapter VIII, Control of Noise and Vibration in the County Code of Ordinances. The intent of the ordinance is to control unnecessary, excessive, and annoying noise and vibration and to prohibit the noise and vibration generated from or by all sources. The ordinance includes exterior and interior noise limits, prohibits specified noise-generating activities, establishes motor vehicle noise limits, and special

provisions, including exemptions for construction activities and demolition activities. It is also the intent of the County to maintain quiet in those areas that exhibit low noise levels and to implement programs aimed at reducing noise in those areas where noise levels are above acceptable values. Specific acceptable noise levels established in the ordinance are provided below in §5.1, which discusses regulations relevant to the Project significance criteria.

3.3.2 County of Santa Clara General Plan

The County of Santa Clara General Plan's Safety and Noise Element (2015) contains the following policies and implementation recommendations (indicated with "(i)") relevant to Project noise and vibration:

Policy C-HS 24: Environments for all residents of County of Santa Clara free from noises that jeopardize their health and well-being should be provided through measures which promote noise and land use compatibility.

Policy C-HS 25: Noise impacts from public and private projects should be mitigated.

Policy C-HS(i) 23: Project design review should assess noise impacts on surrounding land uses. (Implementors: County and cities)

Policy C-HS(i) 24: Where necessary, construct sound walls or other noise mitigations. (Implementors: County, cities, and public agencies.)

Policy C-HS(i) 25: Prohibit construction in areas which exceed applicable interior and exterior standards, unless suitable control measures can be implemented. (Implementors: County and cities)

Policy C-HS(i) 26: Require project-specific noise studies to assess actual and protected dB noise contours for proposed land uses likely to generate significant noise. (Implementors: County and cities)

Policy C-HS(i) 27: Take noise compatibility impacts into account in developing local land use plans. (Implementors: County and cities)

Policy C-HS 26: New development in areas of noise impact (areas subject to sound levels of 55 DNL or greater) should be approved, denied, or conditioned so as to achieve a satisfactory noise level for those who will use or occupy the facility (as defined in "Noise Compatibility Standards for Land Use" and "Maximum Interior Noise Levels For Intermittent Noise").

Policy C-HS(i) 28: Incorporate acoustic site planning into the design of new development, particularly large scale, mixed use, or master planned development, through measures which may include: a. separation of noise sensitive buildings from noise generating sources; b. use of natural topography and intervening structure to shield noise sensitive land uses; and c. adequate sound proofing within the receiving structure. (Implementors: County, cities, architects and developers).

Table 6. Santa Clara County Noise Compatibility Standards for Land Use

Land Use	Exterior Noise Exposure (DNL in Decibels)							
	45	50	55	60	65	70	75	80
Residential								
Commercial								
Hotel								
Other								
Industrial								
Public or Semi-Public Facilities								
Church, Hospital, and Nursing								
Home								
Schools and Libraries								
Civic Buildings and Other								
Open Space *								
Agriculture								
Parks, Open Space Reserves								
Wildlife Refuges, etc.								
Effect on Humans at this Noise Level	Maximum noise for undisturbed sleep - EPA.		Voice level which permits conversation at 3 meter (10 ft).				Potentially hazardous to health - EPA	

Noise Compatibility Evaluation

Satisfactory **Cautionary** **Unacceptable**

* For open space use, there are no critical noise levels listed. Homes in agricultural areas are not subject to "Residential" standards. Public buildings in parks and open spaces areas shall meet noise standards as listed under "Public or Semi-Public Facilities". For open space use, the maximum level of noise which a new land use may impose on neighboring open space shall be the upper limit of the "Satisfactory Noise Level"

3.3.3 City of San José Municipal Code

§ 20.100.450 of the San José Municipal Code contains the City's restrictions on hours for construction, including the following:

> *Unless otherwise expressly allowed in a Development Permit or other planning approval, no applicant or agent of an applicant shall suffer or allow any construction activity on a site located within 500 feet of a residential unit before 7:00 am or 7:00 pm, Monday through Friday, or at any time on weekends.*

§ 20.30.700 states groundborne vibration (GBV) must not be perceptible (without instruments) at the property lines of residentially-zoned districts.

3.3.4 City of San José General Plan

The City of San José 2040 General Plan (2011, amended 2022) contains the following policies relevant to Project noise and vibration:

Goal EC-1 – Community Noise Levels and Land Use Compatibility

Minimize the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies.

Policy EC-1.1: Locate new development in areas where noise levels are appropriate for the proposed uses. Consider federal, state and City noise standards and guidelines as a part of new development review. Applicable standards and guidelines for land uses in San José include:

Interior Noise Levels

The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Include appropriate site and building design, building construction and noise attenuation techniques in new development to meet this standard. For sites with exterior noise levels of 60 dBA DNL or more, an acoustical analysis following protocols in the City-adopted California Building Code is required to demonstrate that development projects can meet this standard. The acoustical analysis shall base required noise attenuation techniques on expected Envision General Plan traffic volumes to ensure land use compatibility and General Plan consistency over the life of this plan.

Exterior Noise Levels

The City's acceptable exterior noise level objective is 60 dBA DNL or less for residential and most institutional land uses (Table EC-1). The acceptable exterior noise level objective is established for the City, except in the environs of the San José International Airport and the Downtown, as described below:

- For new multi-family residential projects and for the residential component of mixed-use development, use a standard of 60 dBA DNL in usable outdoor activity areas, excluding balconies and residential stoops and porches facing existing roadways.

Some common use areas that meet the 60 dBA DNL exterior standard will be available to all residents. Use noise attenuation techniques such as shielding by buildings and structures for outdoor common use areas. On sites subject to aircraft overflights or adjacent to elevated roadways, use noise attenuation techniques to achieve the 60 dBA DNL standard for noise from sources other than aircraft and elevated roadway segments.

- For single family residential uses, use a standard of 60 dBA DNL for exterior noise in private usable outdoor activity areas, such as backyards.

Table 7. City of San José Land Use Compatibility Guidelines for Community Noise

Land Use Category	Exterior Noise Exposure (DNL in Decibels) 55	60	65	70	75	80
1. Residential, Hotels and Motels, Hospitals and Residential Care [1]						
2. Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds						
3. Schools, Libraries, Museums, Meeting Halls, Churches						
4. Office Buildings, Business Commercial, and Professional Offices						
5. Sports Arena, Outdoor Spectator Sports						
6. Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters						

[1] Noise mitigation to reduce interior noise levels pursuant to Policy EC-1.1 is required

Normally Acceptable

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable

Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

Unacceptable

New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

Policy EC-1.2: Minimize the noise impacts of new development on land uses sensitive to increased noise levels (Categories 1, 2, 3 and 6) by limiting noise generation and by requiring use of noise attenuation measures such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would:

- Cause the DNL at noise sensitive receptors to increase by five dBA DNL or more where the noise levels would remain "Normally Acceptable"; or
- Cause the DNL at noise sensitive receptors to increase by three dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.

Policy EC-1.3: Mitigate noise generation of new nonresidential land uses to 55 dBA DNL at the property line when located adjacent to existing or planned noise sensitive residential and public/quasi-public land uses.

Policy EC-1.4: Include appropriate noise attenuation techniques in the design of all new General Plan streets projected to adversely impact noise sensitive uses.

Policy EC-1.6: Regulate the effects of operational noise from existing and new industrial and commercial development on adjacent uses through noise standards in the City's Municipal Code.

Policy EC-1.7: Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:

- Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

Goal EC-2 – Vibration

Minimize vibration impacts on people, residences, and business operations.

Policy EC-2.1: Near light and heavy rail lines or other sources of ground-borne vibration, minimize vibration impacts on people, residences, and businesses through the use of setbacks and/or structural design features that reduce vibration to levels at or below the guidelines of the Federal Transit Administration. Require new development within 100 feet of rail lines to demonstrate prior to project approval that vibration experienced by residents and vibration sensitive uses would not exceed these guidelines.

Policy EC-2.2: Require new sources of ground-borne vibration, such as transit along fixed rail systems or the operation of impulsive equipment, to minimize vibration impacts on existing sensitive land uses to levels at or below the guidelines of the Federal Transit Administration.

Policy EC-2.3: Require new development to minimize continuous vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, including ruins and ancient monuments or building that are documented to be structurally weakened, a continuous vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize

the potential for cosmetic damage to a building. A continuous vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction. Equipment or activities typical of generating continuous vibration include but are not limited to: excavation equipment; static compaction equipment; vibratory pile drivers; pile-extraction equipment; and vibratory compaction equipment. Avoid use of impact pile drivers within 125 feet of any buildings, and within 300 feet of historical buildings, or buildings in poor condition. On a project-specific basis, this distance of 300 feet may be reduced where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction. Transient vibration impacts may exceed a vibration limit of 0.08 in/sec PPV only when and where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction.

Policy EC-2.4: Consider the effects of ground-borne vibration in the analysis for potential Land Use / Transportation Diagram changes.

3.3.5 City of Morgan Hill Code of Ordinances

Chapter 8.28 of the Morgan Hill Code of Ordinances contains the City's noise ordinance. The noise ordinance provides regulations related to construction noise. §8.28.040 states that construction activities are prohibited other than between the hours of 7 am and 6 pm, Monday through Friday and between the hours of 9 am and 6 pm on Saturday, unless public works projects or determination from chief building official or city council allowing for hours outside of this timing. The Code states that construction activities may not occur on Sundays or federal holidays. The Code defines construction activities as including but not limited to excavation, grading, paving, demolition, construction, alteration or repair of any building, site, street or highway, delivery or removal of construction material to a site, or movement of construction materials on a site.

§18.76.090.A. limits noise levels to those listed in Table 8. However, §18.76.090.B. exempts noise generated by temporary construction, demolition, and vehicles that enter and leave a site (e.g., construction equipment, trucks).

Table 8. City of Morgan Hill Code of Ordinances Maximum Noise Levels

Receiving Land Use	Maximum Noise Level at Lot Line of Receiving Use
Industrial and Wholesale	70 dBA
Commercial	65 dBA
Residential or Public/Quasi Public	60 dBA

§18.76.130 prohibits GBV that is perceptible without instruments at the lot line but exempts temporary construction, demolition, and vehicles that enter and leave a lot (e.g., construction equipment, trucks).

3.3.6 City of Morgan Hill General Plan

The City of Morgan Hill 2035 General Plan (2016) Safety, Services, and Infrastructure Element (Chapter 9) contains the following goals and policies relevant to Project noise:

Goal SSI-8: Prevention of noise from interfering with human activities or causing health problems.

Policy SSI-8.1: Exterior Noise Level Standards. Require new development projects to be designed and constructed to meet acceptable exterior noise level standards (see Table SSI-1), as follows:

- Apply a maximum exterior noise level of 60 dBA L_{DN} in residential areas where outdoor use is a major consideration (e.g., backyards in single-family housing developments and recreation areas in multi-family housing projects). Where the City determines that providing an L_{DN} of 60 dBA or lower cannot be achieved after the application of reasonable and feasible mitigation, an L_{DN} of 65 dBA may be permitted.
- Indoor noise levels should not exceed an L_{DN} of 45 dBA in new residential housing units.

- Noise levels in new residential development exposed to an exterior L_{DN} 60 dBA or greater should be limited to a maximum instantaneous noise level (e.g., trucks on busy streets, train warning whistles) in bedrooms of 50 dBA. Maximum instantaneous noise levels in all other habitable rooms should not exceed 55 dBA. The maximum outdoor noise level for new residences near the railroad shall be 70 dBA L_{DN}, recognizing that train noise is characterized by relatively few loud events. The impact of a proposed development project on existing land uses should be evaluated in terms of the potential for adverse community response based on significant increase in existing noise levels, regardless of compatibility guidelines.

Policy SSI-8.2: Impact Evaluation. The impact of a proposed development project on existing land uses should be evaluated in terms of the potential for adverse community response based on significant increase in existing noise levels, regardless of compatibility guidelines.

Policy SSI-8.6: Stationary Noise Level Standards. Consider noise levels produced by stationary noise sources associated with new projects significant if they substantially exceed existing ambient noise levels.

3.4 Non-Regulatory Industry Standards

Limits for air overpressure and vibration from blasting activity are not provided in Federal, State, or Local regulations. However, thresholds established by the International Society of Explosives Engineers are available.

3.4.1 International Society of Explosives Engineers

Criteria for air overpressure and vibration damage from blasting activity are found in the International Society of Explosives Engineers (ISEE) Blasters' Handbook, 18th Edition.

3.4.1.1 Air Overpressure

The ISEE Blasters Handbook includes damage criteria for air overpressure, summarized in Table 9.

Table 9. Typical Air Overpressure Damage Criteria

Potential Damage	Air Overpressure Level		
	KPa	psi	dB
Structural damage possible	20.7	3.0	180
General window breakage	6.9	1.0	171
Occasional window breakage	0.69	0.1	151
Damage threshold at high frequencies	0.2	0.029	140
No damage at low frequencies	0.010	0.0145	134

While Table 9 provides damage criteria for air overpressure, the ISEE Blaster Handbook prescribes a limit of 133 dBL at the location of any building, and notes that "the limit of 133 decibels is primarily based on perception and has no potential to cause damage to buildings."

3.4.1.2 Vibration

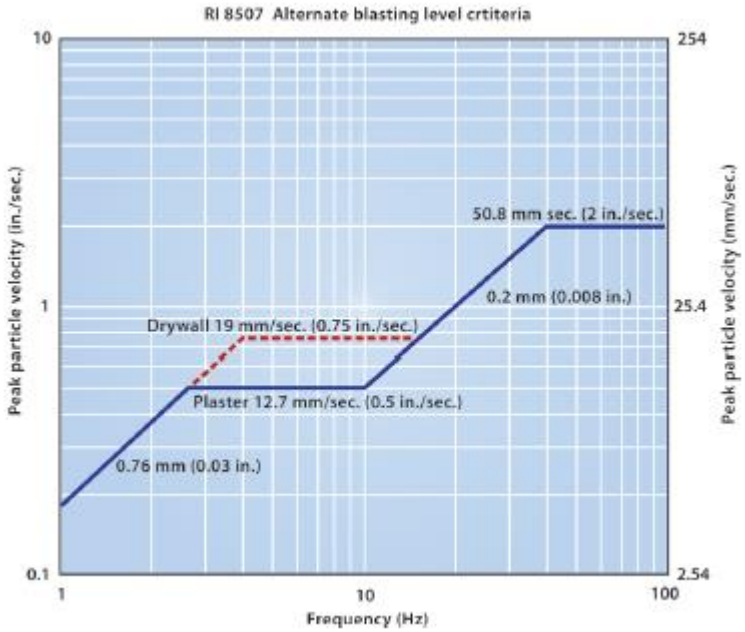
The ISEE Blasters Handbook provides the following ground vibration criteria regarding damage to common residential construction materials.

Table 10. Blasting Vibration Damage Criteria for Residential Construction Materials

Vibration Level	Range of Common Residential Criteria and Effects
12.7 mm/s (0.5 in./sec.)	Threshold of damage in plaster-on-lath construction for low frequency vibrations.
19.1 mm/s (0.75 in./sec.)	Threshold of damage in sheetrock construction for low frequency vibrations.
50.8 mm/s (2.0 in./sec.)	Threshold of damage in sheetrock construction for high frequency vibrations near construction and quarry blasting.
137 mm/s (5.4 in./sec.)	Threshold of minor damage to typical residential structures at high frequency sites, including concrete masonry units.
183 mm/s (7.2 in./sec.)	Threshold of major damage to typical residential structures at high frequency sites.
229 mm/s (9 in./sec.)	About 90% probability of minor damage from construction or quarry blasting. Structural damage to some houses. Depends on vibration source, character of the vibrations and the house.
508 mm/s (20 in./sec.)	For close-in construction blasting, minor damage to nearly all houses, structural damage to some. For low frequency vibrations, structural damage to most houses.
>2540 mm/s (>100 in./sec.)	Threshold for damage to concrete pads, driveways, and walkways.

Note that the vibration levels in Table 10 are for frequencies of approximately 3 Hz and above. The ISEE handbook notes that these criteria are generally conservative and are "designed to prevent threshold damage (extensions of existing hairline cracks) to residential structures." The handbook also provides the following blasting criteria, which accounts for vibration amplitude at various frequencies.

Figure 3.1. Vibration Criteria for Blast Vibration Monitoring



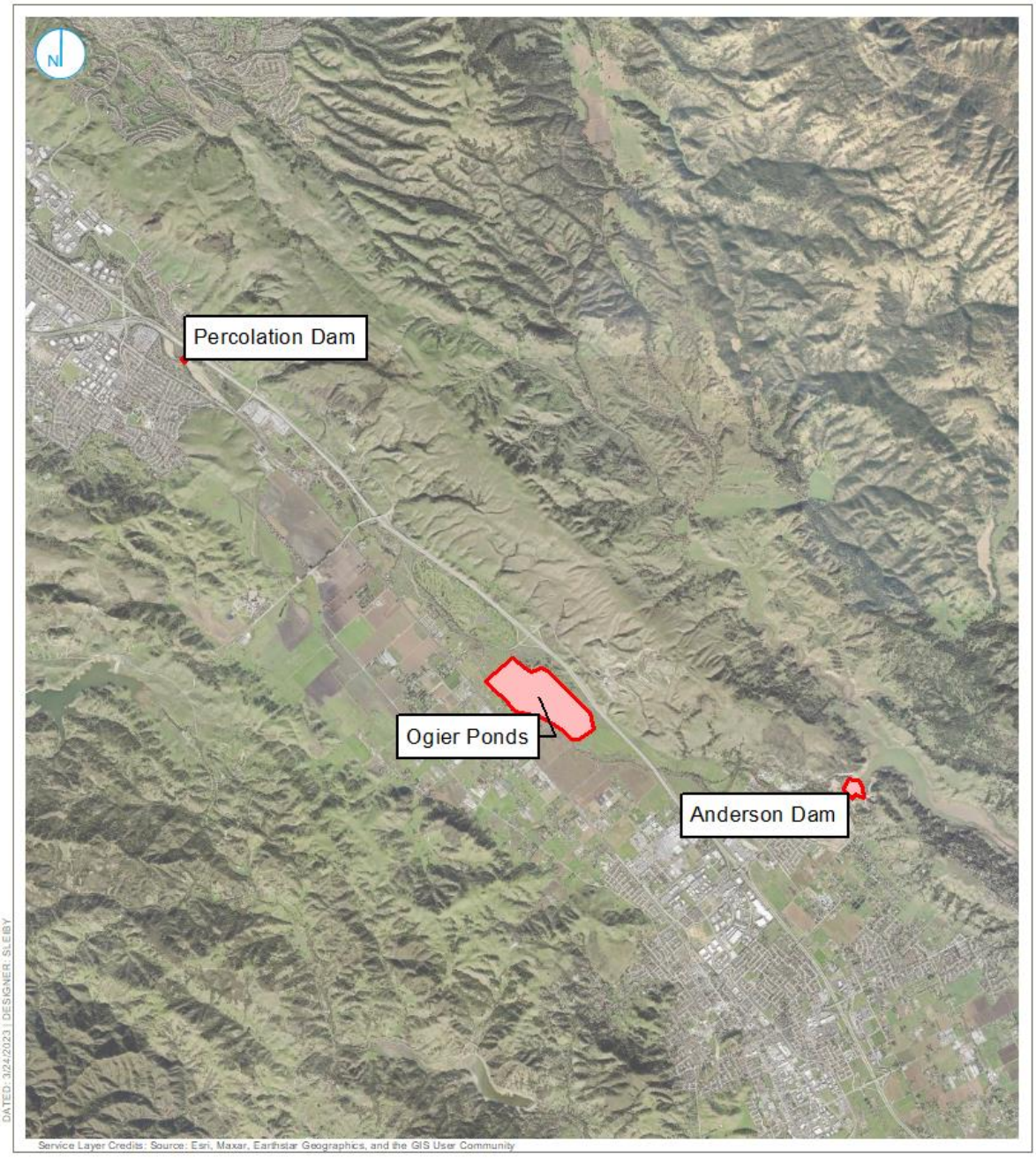
Source: International Society of Explosives Engineers, *Blasters' Handbook*, 18th Edition, taken from US Bureau of Mines, *RI 8507*, 1980.

4. ENVIRONMENTAL SETTING

4.1 Anderson Dam and Anderson Lake Area

Anderson Dam and Reservoir is a major water supply facility located adjacent to the City of Morgan Hill, about 18 miles southeast of San José. The existing dam is an earth dam located on the south side of the reservoir. The reservoir is fed by Coyote Creek to the southeast. The creek continues west of the dam towards Ogier Ponds. The reservoir has been drained to deadpool in preparation of the Project and will be completely drained during Project construction.

Figure 4.1. Project Area



4.1.1 Noise-Sensitive Receptors

Surrounding land uses with sensitive receptors include single-family residential, a juvenile correctional facility, and recreational uses. Residential homes and recreational trails along the southwestern bank of the reservoir (i.e., near stockpile areas D and K) and in the south area of the dam are within the City of Morgan Hill and unincorporated Santa Clara County. The juvenile correctional facility is located within the City of San José. There are no noise-sensitive uses located northwest of the dam, within the vicinity of several stockpile areas (areas H, I, J, and L).

Recreational uses at southeastern bank of the reservoir are located within the County of Santa Clara, and recreational uses in northwestern bank and the northern dam area are within the City of San José. Recreational uses that border the Project area including the Anderson Lake County Park to the southwest which includes hiking trails and boating activities within the Project area, the Live Oak Picnic Area also to the southwest, and Rosendin Park to the southeast. These recreational areas will be closed during construction.

4.2 Conservation Measures Areas

4.2.1 Ogier Ponds Conservation Measure

Surrounding land uses with sensitive receptors include single-family residential and recreational uses. Residential homes are located southwest of the site at Parkway Lakes RV Park. Sensitive receptors also include users of the trails near Ogier Ponds, such as the Coyote Creek Trail.

Ogier Ponds is itself a recreational area, which will be closed during construction.

4.2.2 Sediment Augmentation Program

Surrounding land uses with sensitive receptors include single-family residential, a juvenile correctional facility, and recreational uses. Residential homes are located south of Coyote Creek across Cochrane Road.

4.2.3 Phase 2 Coyote Percolation Dam Conservation Measure

Surrounding land uses with sensitive receptors include single-family residential and recreational uses. Residential homes are located southwest of the percolation dam across Forsum Road. The recreational area is Metcalf Park, which includes a trailhead for Coyote Creek Trail.

4.2.4 North Channel Extension and Maintenance Activities at the Live Oak Restoration Reach

Surrounding land uses with sensitive receptors include single-family residential, a juvenile correctional facility, and recreational uses. Residential homes are located south of Coyote Creek across Cochrane Road. Residential communities are also located north of US 101, approximately 0.1 miles from the Project Area. Sensitive receptors also include users of the trails that are adjacent to Coyote Creek, such as the Coyote Creek Trail.

4.3 Existing Ambient Noise Environment

To quantify the existing ambient noise environment for the purpose of assessing potential impacts from construction noise, Ramboll conducted a site visit in June 2022. The ambient noise level survey included continuous monitoring at eleven (11) near Anderson Dam, Coyote Creek, Ogier Ponds, and the percolation dam. Weather was clear throughout the measurements.

Over the 24-hour ambient survey period, the measured ambient noise levels varied from DNL 45 dB to DNL 64 dB. The louder measurement locations were more exposed to traffic noise, including both local and highway traffic, while the quieter measurement locations were partially to mostly shielded from traffic noise.

4.3.1 Measurement Procedures

Ramboll conducted a site visit from 13 June to 17 June 2022. 24-hour ambient sound level measurements were made at eight locations around Anderson Dam, one location at Ogier Ponds, and two locations near the percolation dam using six Larson Davis LxT sound level meters (SLMs), which meet ANSI S1.4 requirements for a Type 1 sound level meter. The locations for measurements were chosen based on the locations of future construction activity and the locations of noise-sensitive receptors. The measurements were made in general conformance to ANSI S12.9-1992/Part 2.

The sound level meters were placed in weather-resistant cases, while the microphones were placed on tripods approximately 5 feet above grade. Figure 4.2 shows an example installation.

Figure 4.2. Example Sound Level Meter Deployment



4.3.2 Anderson Dam

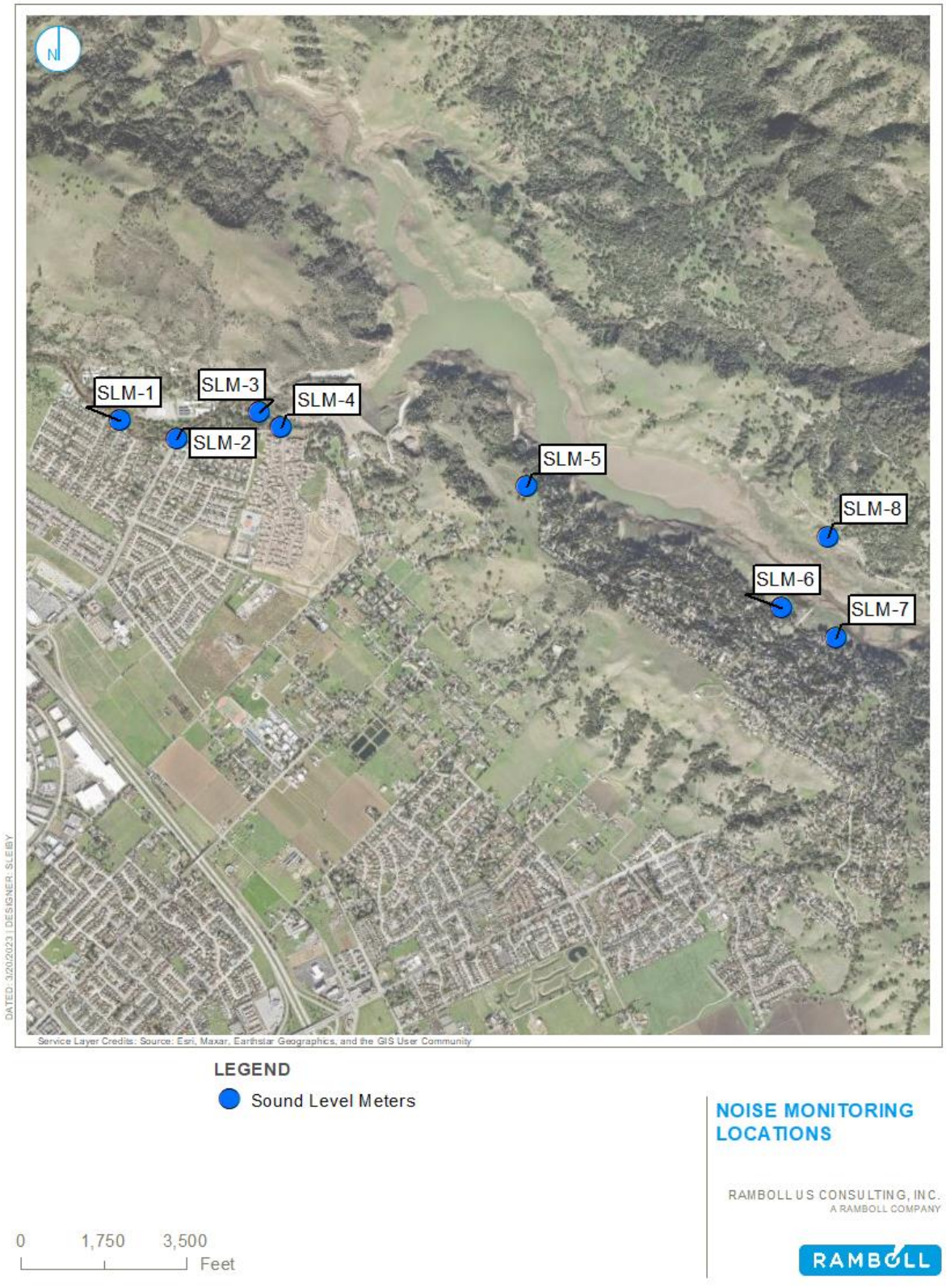
Measurement Locations

Measurements were conducted at eight locations around Anderson Dam. The measurement locations were chosen based on the locations of future construction activity and the locations of existing noise-sensitive receptors. The measurement locations are shown in Figure 4.3 and are described in Table 11.

Table 11. Descriptions of Measurement Locations at Anderson Dam

Tag	Location	Measurement Period	Nearest Noise-Sensitive Receptor(s)	Nearest Area(s) of Construction Activity
SLM-1	~60 ft east of Malaguerra Ave and Sycamore Ave intersection	7:00am 06/15/2022 - 8:00am 06/16/2022	Residences along Malaguerra Ave	Staging Area 1, Stockpile Area E, Sediment Augmentation Program
SLM-2	~60 ft northeast of Cochrane Rd-Malaguerra Ave intersection	9:00am 06/16/2022 - 10:00am 06/17/2022	Residences along Cochrane Rd and Malaguerra Ave, juvenile correctional facility	Staging Area 1, Stockpile Area E
SLM-3	Northeast corner of Live Oak Picnic Area near Coyote Creek	9:00am 06/16/2022 - 10:00am 06/17/2022	Residences along Cochrane Rd, juvenile correctional facility	Staging Area 1, Stockpile Area E, North Channel Extension
SLM-4	~80 ft northwest of Cochrane Rd-Via Sebastian intersection	7:00am 06/15/2022 - 8:00am 06/16/2022	Residences along Cochrane Rd	Staging Area 4, Staging Area 1
SLM-5	Southeast corner of Rosendin Park	10:00am 06/15/2022 - 10:00am 06/16/2022	Residences along Holiday Dr	Basalt Hill Borrow Area, Stockpile Area D
SLM-6	Southeast end of lake basin, south side	9:00am 06/15/2022 - 10:00am 06/16/2022	Residences along Holiday Dr	Stockpile K (North)
SLM-7	Southeast end of lake basin, south side	9:00am 06/15/2022 - 10:00am 06/16/2022	Residences along Holiday Dr	Stockpile K (South)
SLM-8	Southeast end of lake basin, north side along E Dunne Ave	10:00am 06/15/2022 - 10:00am 06/16/2022	Residences north of E Dunne Ave	Stockpile K (North and South)

Figure 4.3. Noise Monitoring Locations for Anderson Dam



Results

The results of the measurements are summarized in Table 12.

Table 12. Measurement Results by Location at Anderson Dam

Tag	L_{DN}
SLM-1	50
SLM-2	61
SLM-3	50
SLM-4	54
SLM-5	45
SLM-6	46
SLM-7	48
SLM-8	50

The primary sources of noise were local roads, with insects, birds, and wind also contributing to the noise environment. Based on our observations on site, the intersection of Cochrane Road and Malaguerra Avenue saw more traffic than other road sections near the Project site. As a result, the ambient noise levels measured at SLM-2 were higher than the other monitoring locations. While SLM-2 is located within the City of Morgan Hill limits, it was the only monitoring location by Anderson Dam that would be considered "conditionally acceptable" for residential land uses under the City of San José General Plan. SLM-3 and SLM-4 had partial line-of-sight to the on-going Federal Energy Regulatory Commission Order of Compliance Project (FOCP) activities. Sound levels at SLM-4 were higher than SLM-3 due to traffic along Cochrane Road. Monitoring locations SLM-5 through SLM-6 were shielded from local traffic and had the lowest ambient noise levels.

4.3.3 Ogier Ponds

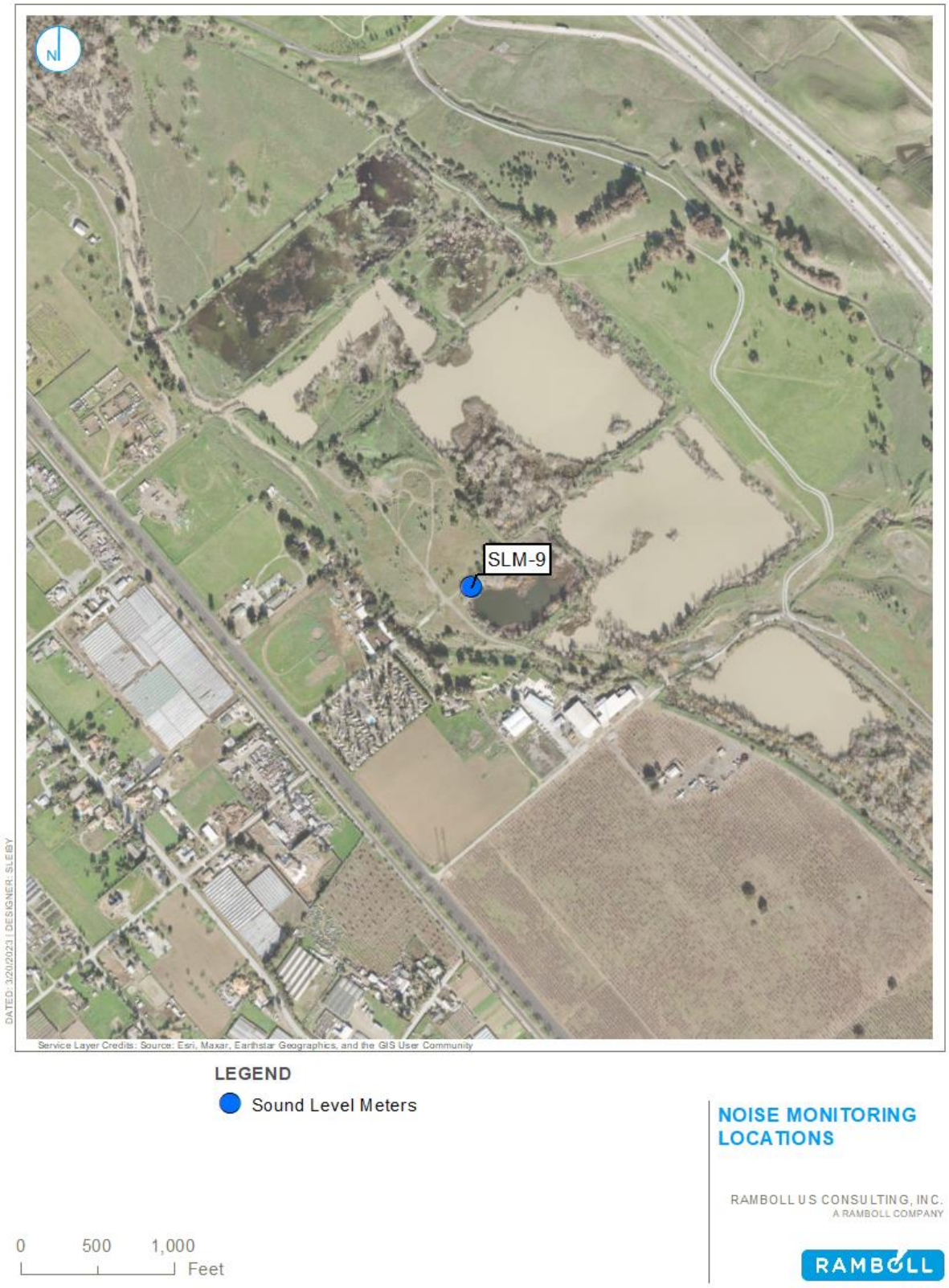
Measurement Locations

Measurements were conducted at one location at Ogier Ponds. The measurement location was chosen based on the locations of future construction activity and the locations of existing noise-sensitive receptors. The measurement location is shown in Figure 4.4 and are described in Table 13.

Table 13. Description of Measurement Location at Ogier Ponds

Tag	Location	Measurement Period	Nearest Noise-Sensitive Receptor(s)	Nearest Area(s) of Construction Activity
SLM-9	Near Ogier Ave, ~170 ft beyond Barnhart Ave	9:00pm 06/13/2022 - 9:00pm 06/14/2022	Parkway Lakes RV Park	Ogier Ponds

Figure 4.4. Noise Monitoring Location for Ogier Ponds



Results

The results of the measurements are summarized in Table 14.

Table 14. Measurement Results at Ogier Ponds

Tag	L_{DN}
SLM-9	57

The primary source of noise was traffic along US-101, with noise from Monterey Highway, insects, birds, and farm animals also contributing to the noise environment.

4.3.4 Phase 2 Coyote Percolation Dam Conservation Measure

Measurement Locations

Measurements were conducted at two locations near the Phase 2 Coyote Percolation Dam Conservation Measure (Percolation Dam). The measurement locations were chosen based on the locations of future construction activity and the locations of existing noise-sensitive receptors. The measurement locations are shown in Figure 4.5 and are described in Table 15.

Table 15. Descriptions of Measurement Locations at Phase 2 Coyote Percolation Dam Conservation Measure

Tag	Location	Measurement Period	Nearest Noise-Sensitive Receptor(s)	Nearest Area(s) of Construction Activity
SLM-10	Along Coyote Creek Trail, ~500 ft west of Percolation Dam	7:00pm 06/13/2022 - 12:00pm 06/14/2022	Metcalf Park, residences along Forsum Rd	Percolation Dam
SLM-11	~80 ft west of Percolation Dam	7:30pm 06/13/2022 - 7:30pm 06/14/2022	Metcalf Park, residences along Forsum Rd	Percolation Dam

Figure 4.5. Noise Monitoring Location for Phase 2 Coyote Percolation Dam Conservation Measure



Results
The results of the measurements are summarized in Table 16.

Table 16. Measurement Results by Location at Phase 2 Coyote Percolation Dam Conservation Measure

Tag	L_{DN}
SLM-10	62
SLM-11	64

The ambient noise levels at the two measurement locations were generally higher than the measurement locations at Ogier Ponds and Anderson Dam. The dominant source of noise at the percolation dam is US-101. Local traffic along Forsum Road and activity at Metcalf Park also contributed to the noise environment.

5. METHODOLOGY AND APPROACH TO IMPACT ANALYSIS

5.1 Thresholds of Significance

5.1.1 Significance Criteria

For the purposes of this analysis, the proposed Project would result in a significant noise or vibration impact if it would result in:

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, or generate a substantial incremental increase in noise levels;
b) Generation of excessive ground-borne vibration or ground-borne noise 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.

Note that the Project is not located within an airport land use plan and there are no public airports or public use airports within two miles of the Project. Also, there are no private airstrips within the Project vicinity. The nearest public or public use airport is the San Martin Airport, approximately five miles south of the Project area. Therefore, there would be no impact from Significance Criteria c), which is not considered further in this analysis.

5.1.2 Specific Thresholds of Significance

This analysis applies the following noise and vibration thresholds. Some of these thresholds are based on standards in local government noise ordinances since they represent noise levels acceptable to the local community, consistent with CEQA Guidelines Appendix G (Question XIII[a]). However, Valley Water is exempt from compliance with the local noise ordinances under either Government Code Secs. 53091(d) or (e) (which state that county or city building and zoning ordinances do not apply to the construction of facilities for water storage or transmission), or for non-building and zoning ordinances, under Hall v. Taft (1956) 47 Cal. 2d 177,189 (which holds that water districts are exempt from municipal police power regulation).

5.1.2.1 Noise

CONSTRUCTION

Project development could have a significant impact to noise-sensitive receptors in San José and Morgan Hill if temporary construction noise exposed noise-sensitive receivers to significantly adverse noise levels. As neither the City of San José nor the City of Morgan Hill have quantitative construction noise limits, for purposes of analyzing impacts from the Project at noise-sensitive receptors located in San José and Morgan Hill, this analysis has adopted FTA construction noise criteria. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction in its Transit and Noise Vibration Impact Assessment Manual. For residential uses in San José and Morgan Hill, the daytime noise threshold is an 8-hour time-average sound level (L_{AEQ}) of 80 dBA. To assess potential nighttime construction noise impacts, recommendations from the USEPA's Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Safety Margin of Safety is used. As noted in Section 3.1.1, an interior nighttime level of 35 dBA is considered acceptable (USEPA 1974). Assuming a 15-dBA reduction with a windows-open condition, an exterior noise level of 50 dBA L_{EQ} would be required to maintain an acceptable interior noise environment of 35 dBA. Therefore, for residential uses in San José and Morgan Hill, the nighttime construction noise threshold is 50 dBA L_{EQ}.

For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays from 7:00 a.m. to 7:00 p.m. and 50 dBA at all other times at single-family residences, or if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 65 dBA on weekdays and Saturdays from 7:00 a.m. to 7:00 p.m. and 55 dBA at all other times at multi-family residences, per the County of Santa Clara Municipal Code.

For increases over ambient sound levels from construction noise, the relevant regulations do not provide thresholds. For this EIR, Valley Water has established a threshold of 10 dBA DNL increase above ambient noise levels to assess temporary construction noise impacts at residential receptors.

The City of San José, the City of Morgan Hill, and Santa Clara County do not have quantitative limits for air overpressure from blasting activity. However, Caltrans has provided guidelines. Per Caltrans recommendations, air overpressure from blasting resulting in noise would be significant if it exceeds 133 dB at a sensitive receptor building.

OPERATION

Operational stationary source noise is addressed qualitatively since most equipment under the Project would replace equipment existing under baseline conditions. Noise generated by intermittent release of water at the gateshaft during emergency conditions would be located away from nearby sensitive receptors and is addressed qualitatively.

CONSTRUCTION AND OPERATION TRAFFIC

Construction and operational roadway vehicle noise impacts were analyzed using the Envision San José 2040 General Plan (2011) noise standards and the City of Morgan Hill 2035 General Plan (2016) noise standards. Roadway vehicle noise impacts would be significant where such noise causes an increase of 5 dBA DNL where ambient noise levels are below 60 dBA DNL or

causes an increase of 3 dBA DNL where ambient noise levels are 60 dBA DNL or greater. While the applicability of these traffic noise thresholds may be intended for assessing permanent traffic noise increase impacts, this Technical Report conservatively applies these thresholds to Project construction traffic noise as well. In lieu of quantified roadway vehicle noise thresholds in Santa Clara County, the same noise thresholds are applied to sensitive receptors in unincorporated Santa Clara County.

5.1.2.2 Vibration

CONSTRUCTION AND OPERATION

As the City of San José, the City of Morgan Hill, and Santa Clara County do not have quantitative construction vibration limits, criteria from the FTA are used to evaluate potential construction vibration impacts related to potential building damage and indoor human annoyance impacts from construction. Construction vibration impacts of the project would be significant if vibration levels exceed the FTA criteria for building damage (see Table 3). Construction vibration impacts of the project would be significant if vibration levels exceed the FTA criterion for indoor human annoyance of 72 VdB at sensitive receptors.

In addition, potential damage to structures from blasting would be significant if vibration levels exceed 0.1884 in/sec PPV at 1 Hz, 0.5 in/sec PPV at 3 Hz to 40 Hz, and 2.0 in/sec PPV at 40 Hz and above.

Table 17 summarizes relevant significance thresholds for the assessment of noise and vibration impact related to the Project.

Table 17. Thresholds of Significance

CEQA Significance Criteria	Noise/Vibration Source	Significance Threshold	Source / Agency
a)	Construction Noise	Maximum hourly L_{AEQ} noise level for stationary construction equipment noise affecting single-family residences is 60 dBA on weekdays and Saturdays from 7:00 a.m. to 7:00 p.m., and 50 dBA at all other times.	County of Santa Clara Code
	Construction Noise	Maximum hourly L_{AEQ} noise level for stationary construction equipment noise affecting multi-family residences is 65 dBA on weekdays and Saturdays from 7:00 a.m. to 7:00 p.m., and 55 dBA at all other times.	County of Santa Clara Code
	Construction Noise	Maximum 8-hour L_{AEQ} of 80 dBA during the day	FTA, 2018
	Construction Noise	Maximum L_{AEQ} of 50 dBA at night	USEPA, 1974
	Construction Noise	Maximum of 10 dBA DNL above ambient sound level	Valley Water

CEQA Significance Criteria	Noise/Vibration Source	Significance Threshold	Source / Agency
	Blasting Air Overpressure	Damage to structures from blasting: 133 dBL for air overpressure	ISEE, Caltrans
	Construction Roadway Noise	Cause an increase in DNL of 5 dB or more where noise levels would remain "normally acceptable" (60 dBA for residential receptors); cause an increase in DNL of 3 dB or more where noise levels would equal or exceed "normally acceptable" (60 dBA for residential receptors)	City of San José General Plan
b)	Construction Vibration	Vibration impact: 72 VdB	FTA, 2018
	Construction Vibration	Damage to structures: 0.12-0.5 in/sec PPV depending on building materials	FTA, 2018
	Blasting Vibration	Damage to structures from blasting: 0.1884 in/sec PPV at 1Hz, 0.5 in/sec PPV at ~3Hz-40 Hz, 2.0 in/sec PPV 40Hz and above	ISEE, Caltrans

5.2 Project Construction

5.2.1 Construction Plan for the Seismic Retrofit Component

Construction activities would occur intermittently on the Project site and could expose sensitive receptors to temporary or extended duration increases in noise and vibration. Project construction also is anticipated to result in temporary increases in truck traffic noise along routes for hauling of material from borrow and stockpile areas, as well as along off-site roadways.

Construction equipment includes the use of air compressors, backhoes, concrete trucks, cranes, dump trucks, drum rollers, excavators, flatbed trucks, front end loaders, graders, pavers, tractors/dozers, conveyors, vibratory rollers, light carts, portable generators, rock crushers, and water trucks. Project construction activities would be completed using a combination of these types of off-road and portable construction equipment.

Each phase of construction was evaluated separately to identify the potential for impact from each phase with consideration of the factors identified above, specific to each geographic area. Overlapping construction activities were evaluated when activities would overlap in time in the same vicinity. Table 18 provides a brief summary of construction phases, equipment and activities identified in each phase, duration of each phase, and the noise-sensitive receptor areas potentially affected by each construction phase for the seismic retrofit. A more detailed summary of this information and information on the conservation measures construction plan can be found in Appendix 3.

Table 18. Noise Assessment by Seismic Retrofit Construction Phase

Construction Phase	Activities	Duration (months)	Noise-Sensitive Receptor Areas Potentially Affected
Year 1	Construction of haul roads and prepare stockpile areas, dredging at dam toe, and begin tunneling for the LLOW	9	Residences near Staging Areas 1-4 and Stockpile Area E, juvenile detention center, Holiday Lake Estates residences near Stockpile Area K, residences along truck routes
Year 2 (Stage 1a)	Construction of cofferdam, bypass pump system, excavation of upstream and downstream portals, tunnel excavation	12	Residences near Staging Areas 1, 4, Stockpile Area E, and excavation area; juvenile detention center; Holiday Lake Estates residences near Stockpile Area K; residences along truck routes
Year 3 (Stage 1b)	Excavation, demolish spillway, excavation and foundation preparation, HLOW tunnel excavation and lining, gate shaft excavation and lining	12	Residences near Staging Areas 1-4 and excavation area, juvenile detention center, Holiday Lake Estates residences near Stockpile Area K, residences along truck routes
Year 4	Hauling filler and drain material to site, excavation, fill, excavation and foundation preparation, construction of spillway structure, MEP installation, installation of water treatment system	12	Residences near Staging Areas 1-4 and excavation area, juvenile detention center, Holiday Lake Estates residences near Stockpile Area K, residences along truck routes
Year 5 (Stage 3a)	Hauling filler and drain material to site; excavation; fill; excavation, blasting, and hauling of material; construction of spillway structure, sloping intake structure, CIP tunnel; excavate downstream portal trench; downstream MEP installation, water treatment system	12	Residences near Staging Areas 1, 4; juvenile detention center; residences along Barnard Rd; western end of Holiday Lake estates; residences along truck routes
Year 6 (Stage 3b)	Hauling filler and drain material to site; excavation; construct bypass pump system; conveying bypass flows; fill; excavation, blasting, and hauling of material; excavate sloping intake structure; construct pipe supports, lining; MEP installation	12	Residences near Staging Areas 1, 4, and Stockpile Area E, juvenile detention center, residences along Barnard Rd residences near Stockpile Area K, western end of Holiday Lake estates, residences along truck routes
Year 7	Construction of concrete lined channel, restoring parking areas, construction of permanent access roads	10	Residences near Staging Areas 1-4 and excavation area, residences along truck routes

Construction activities would be conducted Monday through Saturday, with limited Sunday work. Sunday work would include up to 12 Sundays in Years 1 through 3, up to 40 Sundays in Year 4, and up to 12 Sundays in Years 5 through 7. Nighttime construction work could occur during excavation and fill of the dam, tunneling for outlet works, paving activities on Cochrane Road, construction of the spillway and conversion of the existing Stage 1 Diversion System into Stage 2 Diversion System, and support production. The nighttime work could occur during all seven years of construction.

5.2.2 Noise Analysis Approach

Noise emissions predicted to occur during construction of the proposed Project were predicted at the nearest sensitive receivers to the project site using the Computer Aided Noise Abatement (CadnaA) software (Datakustik, 2023). The CadnaA environmental noise prediction software enables complete noise modeling of complex facilities using sound propagation factors as adopted by International Organization for Standardization (i.e., ISO 9613, ISO 17534). CadnaA considers distance, topography, intervening structures, atmospheric attenuation, ground effects, and vegetation when estimating sound levels from specific sources at distant receptor locations.

The software tool allows for input of user-defined sound levels for noise sources such as construction equipment. Equipment estimated for each phase of construction were based on assumptions and equipment lists detailed in Appendix 3. Included are stationary or mostly stationary equipment such as generators, excavators, and drill rigs, and mobile equipment such as loaders, graders, and haul trucks. Source sound level data were estimated based on construction equipment noise data published by the U.S. Federal Highway Administration, the Federal Transit Administration, and manufacturers. Where sound data was not available, sound levels were estimated based on horsepower ratings. The construction equipment sound levels are shown in Table 19.

Table 19. Example Construction Equipment Noise Levels

Equipment	L_{ASmax} @ 50 ft
Air Compressor	80
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	82
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	80
Paver	85
Pile-driver (Impact)	101
Pile-driver (Sonic)	95
Pneumatic Tool	85
Pump	77
Rail Saw	90
Rock Drill	95
Roller	85
Saw	76
Scarifier	83
Scraper	85
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	84

Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment,* September 2018.

Noise emissions from construction activities will vary depending on the type of equipment in use, how many pieces of equipment are operating at any one time, the proximity of equipment to a noise receptor location (i.e., mobile equipment can be moved around a construction site), and the duration of equipment use. In addition, some equipment or activities, such as a pile driving and jackhammering, generate "impulsive" noise emissions (i.e., impact noise). The assessment of construction noise impacts included consideration of these factors. Impacts from blasting are considered separately.

For the purposes of modeling noise from construction equipment and activities, representative noise sources were placed at representative geographic locations within each construction area. Equipment and activity locations were estimated based on the list of construction equipment by phase, activity, and work area plans provided by Valley Water.

Following the assessment of noise impacts, a review was completed of whether noise control measures (i.e., EIR mitigation measures) were warranted. The assessment of control measures was based on sound levels in exceedance of the applicable limits to construction noise and exceedance of applicable temporary or long-term increases over ambient noise levels.

5.2.3 Vibration Analysis Approach

Project-related construction vibration was evaluated using methods identified in the FTA guidance document. Except for pile-driving activities and blasting, groundborne vibration generated by most construction activities typically range from between approximately 0.003 PPV and 0.21 PPV, when measured at 25 feet from the source. Vibration levels for typical construction equipment are shown in Table 20.

Table 20. Example Vibration Source Levels for Construction Equipment

Equipment		PPV_{ref} at 25 ft (in/sec)	Approximate Lv* at 25 ft
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper range	0.734	105
	Typical	0.17	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	In soil	0.008	66
	In rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large Bulldozer		0.089	87
Caisson Drilling		0.089	87
Loaded Trucks		0.076	86
Jackhammer		0.035	79
Small Bulldozer		0.003	58

Notes:
* RMS velocity in decibels, VdB re 1 micro-in/sec.

Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment,* September 2018.

The calculated vibration levels at each receptor using the above methods were then compared to the impact levels in Table 3 and the structural damage thresholds in Table 4 as identified by the FTA. Construction vibration to receptors more than 500 feet from the edge of the construction

sites were not considered. Groundborne vibration and groundborne noise dissipate rapidly over distance and would be minimal at distances greater than 500 feet.

5.2.4 Blasting Analysis Approach

Air overpressure and vibration from blasting at the residential receptor nearest to the Basalt Hill Borrow Area was evaluated using methods found in the ISEE Blasters' Handbook, 18th Edition. The significance thresholds for blasting identified in Table 17 were used as limits to calculate the maximum allowable charge per delay.

5.3 Post-Construction Operations and Maintenance

Operation of the Anderson Dam following construction of the Project would involve implementation of the Fish and Aquatic Habitat Collaborative Effort (FAHCE) rule curves and pulse flows, which would not result in generation of additional noise or vibration sources compared to the existing conditions baseline. Additionally, Valley Water would maintain the newly retrofitted Anderson Dam and Reservoir per Valley Water's existing Dam Maintenance Program (DMP). Maintenance of Anderson Dam facilities was previously evaluated in the Final DMP Environmental Impact Report (EIR) prepared in January 2012 (SCH No. 2011082077; Valley Water 2012). Operational stationary noise sources such as an emergency backup generator proposed at the Diversion Control Structure and air release valves at the LLOW Control Structure and gate shaft are compared to the noise environment under baseline conditions.

6. IMPACT ANALYSIS AND CONTROL MEASURES

6.1 Impact NOI-1: 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?

6.1.1 Seismic Retrofit Construction

6.1.1.1 Analysis

On-Site Activity

To assess on-site construction noise levels, the activity or activities with the highest total noise levels (noise levels of all equipment for that activity) for each year were selected to represent worst-case scenarios for each year of construction. For similar activities across multiple years (e.g., dam excavation and fill activities from Year 2 to Year 6), the year with the loudest activity was selected. For example, Year 4 and Year 5 are not explicitly called out in the construction noise level tables (Table 21 through Table 25), as noise levels in those years are substantially similar to the noise levels in Year 6 given the similar construction activities. The resulting phases assessed were as follows:

- Year 1, Construction of Haul Roads and Preparation of Stockpile Areas, Begin Tunneling of LLOW
- Year 2, Excavation of Downstream Portal
- Year 3, Excavation and Foundation Preparation of Spillway, Construction of Tie-Back Wall at Cochrane Road
- Year 6, Dam Excavation and Fill

- Year 7, Restoration of Parking Areas and Construction of Permanent Access Roads

The results of our analysis using the CadnaA model are summarized in Table 21 through Table 25. Two receptors (R-31 and R-32) have been added to represent receptors near the dam within unincorporated Santa Clara County. Additional information regarding equipment noise levels and calculations is provided in Appendix 3.

Table 21. Seismic Retrofit Construction Equipment Noise Level Predictions, Year 1 Construction of Haul Roads and Preparation for Stockpile Areas, Begin Tunnelling of LLOW

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[3], DNL	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-1	61	57	62	71	No	62 / 35	80 / 50	No
R-2	50	68	68	60	Yes	72 / 34	80 / 50	No
R-3	61	71	71	71	No	72 / 35	80 / 50	No
R-4	54	69	69	64	Yes	75 / 38	80 / 50	No
R-5	54	66	67	64	Yes	73 / 39	80 / 50	No
R-6	54	61	62	64	No	68 / 41	80 / 50	No
R-7	54	58	60	64	No	65 / 42	80 / 50	No
R-8	49[2]	57	57	59	No	64 / 49	60[4] / 50	Yes
R-9	49[2]	52	54	59	No	58 / 50	60[4] / 50	Yes
R-10	45	33	45	55	No	41 / 31	80 / 50	No
R-11	46	35	46	56	No	44 / 34	80 / 50	No
R-12	48	<30	48	58	No	39 / <30	80 / 50	No
R-13	50	36	50	60	No	45 / 35	80 / 50	No
R-31	49[2]	59	60	59	Yes	66 / 42	60[4] / 50	Yes
R-32	49[2]	58	58	59	No	64 / 43	60[4] / 50	Yes

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] Linear interpolation of ambient noise levels at SLM-4 and SLM-5.

[3] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

[4] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime and any time on Sunday.

Table 22. Seismic Retrofit Construction Equipment Noise Level Predictions, Year 2 Excavation of Downstream Portal

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[3], DNL	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-1	61	61	64	71	No	62 / 62	80 / 50	Yes
R-2	50	70	70	60	Yes	67 / 67	80 / 50	Yes
R-3	61	70	71	71	No	67 / 67	80 / 50	Yes
R-4	54	71	71	64	Yes	70 / 70	80 / 50	Yes
R-5	54	68	68	64	Yes	69 / 69	80 / 50	Yes
R-6	54	69	69	64	Yes	70 / 70	80 / 50	Yes
R-7	54	68	68	64	Yes	69 / 69	80 / 50	Yes
R-8	49[2]	66	66	59	Yes	66 / 66	60[4] / 50	Yes
R-9	49[2]	58	58	59	No	58 / 58	60[4] / 50	Yes
R-10	45	34	45	55	No	35 / 35	80 / 50	No
R-11	46	<30	46	56	No	<30 / <30	80 / 50	No
R-12	48	<30	48	58	No	<30 / <30	80 / 50	No
R-13	50	<30	50	60	No	<30 / <30	80 / 50	No
R-31	49[2]	69	69	59	Yes	69 / 69	60[4] / 50	Yes
R-32	49[2]	72	72	59	Yes	74 / 74	60[4] / 50	Yes

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] Linear interpolation of ambient noise levels at SLM-4 and SLM-5.

[3] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

[4] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime and any time on Sunday.

Table 23. Seismic Retrofit Construction Equipment Noise Level Predictions, Year 3 Excavation and Foundation Preparation of Spillway, Construction of Tie-Back Wall at Cochrane Road

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[3], DNL	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-1	61	65	66	71	No	66 / 66	80 / 50	Yes
R-2	50	71	71	60	Yes	69 / 69	80 / 50	Yes
R-3	61	72	72	71	Yes	71 / 71	80 / 50	Yes
R-4	54	73	73	64	Yes	72 / 72	80 / 50	Yes
R-5	54	73	73	64	Yes	73 / 73	80 / 50	Yes
R-6	54	74	74	64	Yes	76 / 76	80 / 50	Yes
R-7	54	73	73	64	Yes	74 / 74	80 / 50	Yes
R-8	49[2]	73	73	59	Yes	75 / 75	60[4] / 50	Yes
R-9	49[2]	63	63	59	Yes	64 / 64	60[4] / 50	Yes
R-10	45	33	45	55	No	33 / 33	80 / 50	No
R-11	46	33	46	56	No	35 / 35	80 / 50	No
R-12	48	<30	48	58	No	<30 / <30	80 / 50	No
R-13	50	39	50	60	No	41 / 41	80 / 50	No
R-31	49[2]	74	74	59	Yes	75 / 75	60[4] / 50	Yes
R-32	49[2]	77	77	59	Yes	79 / 79	60[4] / 50	Yes

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] Linear interpolation of ambient noise levels at SLM-4 and SLM-5.

[3] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

[4] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime and any time on Sunday.

Table 24. Seismic Retrofit Construction Equipment Noise Level Predictions, Years 6 Dam Excavation and Fill

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[3], DNL	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-1	61	63	65	71	No	62 / 62	80 / 50	Yes
R-2	50	74	74	60	Yes	72 / 72	80 / 50	Yes
R-3	61	78	78	71	Yes	73 / 73	80 / 50	Yes
R-4	54	76	76	64	Yes	73 / 73	80 / 50	Yes
R-5	54	73	73	64	Yes	73 / 73	80 / 50	Yes
R-6	54	69	69	64	Yes	69 / 69	80 / 50	Yes
R-7	54	67	67	64	Yes	68 / 68	80 / 50	Yes
R-8	49[2]	64	64	59	Yes	65 / 65	60[4] / 50	Yes
R-9	49[2]	59	59	59	No	58 / 58	60[4] / 50	Yes
R-10	45	56	56	55	Yes	56 / 56	80 / 50	Yes
R-11	46	58	58	56	Yes	57 / 57	80 / 50	Yes
R-12	48	61	62	58	Yes	63 / 63	80 / 50	Yes
R-13	50	51	54	60	No	52 / 52	80 / 50	Yes
R-31	49[2]	68	68	59	Yes	68 / 68	60[4] / 50	Yes
R-32	49[2]	70	70	59	Yes	72 / 72	60[4] / 50	Yes

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] Linear interpolation of ambient noise levels at SLM-4 and SLM-5.

[3] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

[4] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime and any time on Sunday.

Table 25. Seismic Retrofit Construction Equipment Noise Level Predictions, Year 7 Restoration of Parking Areas and Construction of Permanent Access Roads

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[3], DNL	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-1	61	63	65	71	No	62 / 62	80 / 50	Yes
R-2	50	73	73	60	Yes	72 / 72	80 / 50	Yes
R-3	61	74	74	71	No	74 / 74	80 / 50	Yes
R-4	54	74	74	64	Yes	75 / 75	80 / 50	Yes
R-5	54	72	72	64	No	73 / 73	80 / 50	Yes
R-6	54	70	70	64	No	70 / 70	80 / 50	Yes
R-7	54	68	68	64	No	67 / 67	80 / 50	Yes
R-8	49[2]	68	68	59	Yes	67 / 67	60[4] / 50	Yes
R-9	49[2]	59	60	59	No	58 / 58	60[4] / 50	Yes
R-10	45	33	45	55	No	33 / 33	80 / 50	No
R-11	46	<30	46	56	No	<30 / <30	80 / 50	No
R-12	48	<30	48	58	No	<30 / <30	80 / 50	No
R-13	50	35	50	60	No	37 / 37	80 / 50	No
R-31	49[2]	69	69	59	Yes	69 / 69	60[4] / 50	Yes
R-32	49[2]	72	72	59	Yes	74 / 74	60[4] / 50	Yes

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] Linear interpolation of ambient noise levels at SLM-4 and SLM-5.

[3] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

[4] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime and any time on Sunday.

As shown in the tables above, the significance threshold based on a 10-dB increase in DNL above the existing ambient noise level would be exceeded at Receptors R-2, R-4, R-5, and R-32 during Year 1; at Receptors R-2, R-4 through R-8, R-31, and R-32 during Year 2; at Receptors R-2 through R-9, R-31, and R-32 during Year 3; at Receptors R-2 through R-8, R-10 through R-12, R-31, and R-32 during Year 6; and at Receptors R-2, R-4, R-8, R-31, and R-32 during Year 7. The daytime hourly average noise level threshold of 80 dBA for receptors in Morgan Hill would not be exceeded, while the daytime hourly average noise level threshold of 60 dBA for receptors in unincorporated Santa Clara County would be exceeded at Receptors R-8, R-31, and R-32 in Year 1, Year 2, Year 6, and Year 7; and at Receptors R-8, R-9, R-31, and R-3 in Year 3. The nighttime hourly average noise level threshold of 50 dBA for all receptors would not be exceeded at any receptors during Year 1. The threshold would be exceeded at Receptors R-1 through R-9, R-31, and R-32 during Year 2, Year 3, and Year 7, and at all receptors during Year 6. Sunday work would exceed the Santa Clara County Sunday threshold of 50 dBA at Receptors R-8, R-9, R-31, and R-32 during Year 2, Year 3, Year 6, and Year 7.

OFF-SITE ACTIVITY

During construction, off-site noise sources consist of daily truck deliveries of rocks, aggregate, and soil to the Project site, shuttle bus trips for workers between Staging Area 5 and Staging Area 4, and worker vehicle trips to and from staging areas. Noise-sensitive receptors consist of residences near the road segments being used. Delivery of materials to the Project site is limited to the hours of 7:00am to 8:00pm.

An approximately 0.8-mile section of Cochrane Road between Malaguerra Avenue and Coyote Road would be fully or partially closed to through traffic during construction. Vehicles would be routed through a detour along Peet Road, Half Road, Elm Road, and East Main Road.

Predicted Project-related vehicle counts were compared to 2015 traffic data for the City of Morgan Hill (Morgan Hill, 2015). Changes in traffic along US 101 from Project-related traffic were assumed to be negligible. The estimated noise levels for Years 1, 3, and 6 are provided in Table 26 through Table 28. The years were chosen as Year 1 represents typical Project-related activity, Year 3 represents greatest nighttime worker activity (worker vehicle and shuttle bus trips), and Year 6 represents greatest daytime and nighttime truck activity.

The estimated noise levels include the following assumptions, which are generally conservative:

- 2015 Traffic Data
    - 90% of traffic occurs during the day (7:00am to 10:00pm)
    - 10% of traffic occurs at night (10:00pm to 7:00am)
    - 2015 traffic did not include any trucks, buses, or motorcycles
- Project Traffic
    - 100% of truck traffic occurs during the day (7:00am to 8:00pm)
    - The daily maximum estimates were used for analysis

In addition, the areas between US 101 and the Project site have seen significant development since 2015. A traffic study for the Project may yield higher traffic counts, and thus higher existing traffic noise.

Table 26. Off-Site Seismic Retrofit Construction Road Noise at 50 feet, Year 1

Route	Road Segment	Existing Non-Project Traffic, DNL	Overall with Project[1], DNL	Significance Threshold, DNL[4]	Exceed Threshold?
1a – Trucks and Worker Vehicles	Cochrane Rd – US 101 to Peet[2]	58	58	63	No
	Cochrane Rd – Peet to Curve	57	57	62	No
	Cochrane Rd – Malaguerra Curve to Staging Area 1	51	48	56	No
1b – Trucks and Worker Vehicles	Peet – Cochrane Rd to Half Rd	47	52	52	No[5]
	Half Rd – Peet to Cochrane Rd	36	49	41	Yes
	Cochrane Rd – Half Rd to Staging Area 4	45	51[3]	50	Yes
2 – Worker Vehicles to Staging Area 5	E Dunne Ave – US 101 to Hill Rd	61	62	64	No
	Hill Rd – E Dunne Ave to San Pedro Ave	56	56	61	No
3 – Shuttle Bus Route from Staging Area 5 to Staging Area 4	Hill Rd – Diana Ave to San Pedro Ave	56	56	61	No
	Hill Rd – E Main Ave to Diana Ave	55	55	60	No
	E Main Ave – Hill Rd to Cochrane Rd	45	49	50	No
	Cochrane Rd – E Main Ave to Half Rd	45	49	50	No

[1] Overall with Project is the cumulative level of Project Traffic plus Non-Project Traffic.

[2] This road segment is shared with Route 1b.

[3] Includes traffic noise from Project shuttle buses.

[4] Roadway vehicle noise impacts would be significant where such noise causes an increase of 5 dBA DNL where ambient noise levels are below 60 dBA DNL or causes an increase of 3 dBA DNL where ambient noise levels are 60 dBA DNL or greater.

[5] This result appears to be 5 dB or more above the ambient due to rounding

Table 27. Off-Site Seismic Retrofit Construction Road Noise at 50 feet, Year 3

Route	Road Segment	Non-Project Traffic, DNL	Overall with Project[1], DNL	Significance Threshold[4]	Exceed Threshold?
1a – Trucks and Worker Vehicles	Cochrane Rd – US 101 to Peet[2]	58	59	63	No
	Cochrane Rd – Peet to Curve	57	57	62	No
	Cochrane Rd – Malaguerra Curve to Staging Area 1	51	53	56	No
1b – Trucks and Worker Vehicles	Peet – Cochrane Rd to Half Rd	47	53	52	Yes
	Half Rd – Peet to Cochrane Rd	36	48	41	Yes
	Cochrane Rd – Half Rd to Staging Area 4	45	54[3]	50	Yes
2 – Worker Vehicles to Staging Area 5	E Dunne Ave – US 101 to Hill Rd	61	62	64	No
	Hill Rd – E Dunne Ave to San Pedro Ave	56	58	61	No
3 – Shuttle Bus Route from Staging Area 5 to Staging Area 4	Hill Rd – Diana Ave to San Pedro Ave	56	57	61	No
	Hill Rd – E Main Ave to Diana Ave	55	56	60	No
	E Main Ave – Hill Rd to Cochrane Rd	45	52	50	Yes
	Cochrane Rd – E Main Ave to Half Rd	45	52	50	Yes

[1] Overall with Project is the cumulative level of Project Traffic plus Non-Project Traffic.

[2] This road segment is shared with Route 1b.

[3] Includes traffic noise from Project shuttle buses.

[4] Roadway vehicle noise impacts would be significant where such noise causes an increase of 5 dBA DNL where ambient noise levels are below 60 dBA DNL or causes an increase of 3 dBA DNL where ambient noise levels are 60 dBA DNL or greater.

Table 28. Off-Site Seismic Retrofit Construction Road Noise at 50 feet, Year 6

Route	Road Segment	Non-Project Traffic, DNL	Overall with Project[1], DNL	Significance Threshold[4]	Exceed Threshold?
1a – Trucks and Worker Vehicles	Cochrane Rd – US 101 to Peet[2]	58	59	63	No
	Cochrane Rd – Peet to Curve	57	58	62	No
	Cochrane Rd – Malaguerra Curve to Staging Area 1	51	53	56	No
1b – Trucks and Worker Vehicles	Peet – Cochrane Rd to Half Rd	47	54	52	Yes
	Half Rd – Peet to Cochrane Rd	36	49	41	Yes
	Cochrane Rd – Half Rd to Staging Area 4	45	54[3]	50	Yes
2 – Worker Vehicles to Staging Area 5	E Dunne Ave – US 101 to Hill Rd	61	62	64	No
	Hill Rd – E Dunne Ave to San Pedro Ave	56	57	61	No
3 – Shuttle Bus Route from Staging Area 5 to Staging Area 4	Hill Rd – Diana Ave to San Pedro Ave	56	57	61	No
	Hill Rd – E Main Ave to Diana Ave	55	56	60	No
	E Main Ave – Hill Rd to Cochrane Rd	45	51	50	Yes
	Cochrane Rd – E Main Ave to Half Rd	45	51	50	Yes

[1] Overall with Project is the cumulative level of Project Traffic plus Non-Project Traffic.

[2] This road segment is shared with Route 1b.

[3] Includes traffic noise from Project shuttle buses.

[4] Roadway vehicle noise impacts would be significant where such noise causes an increase of 5 dBA DNL where ambient noise levels are below 60 dBA DNL or causes an increase of 3 dBA DNL where ambient noise levels are 60 dBA DNL or greater.

As shown in the tables above, there would be a significant impact during all 3 years for the road segments of Route 1b for worker vehicles and trucks. There would also be a significant impact from detour traffic along E Main Avenue between Hill Road and Cochrane Road and on Cochrane Road between E Maine Avenue and Half Road (Route 3). Finally, during Year 6 there is also a significant impact along the section of Cochrane Road closed to through traffic, mainly due to truck noise (Route 3).

6.1.1.2 Recommended Control Measures

ON-SITE AND OFF-SITE ACTIVITY

To reduce the impact of noise from on-site and off-site activity, the following control measures are recommended:

NOI-1 Implement Construction Noise Reduction Measures

Valley Water will include the following construction noise reduction measures in the Construction Management Plan:

- At least 30 days prior to the start of construction activities, all off-site businesses and residents within 500 feet of the Project Area will be notified of the planned construction activities. The notification will include a brief description of the Project, the activities that would occur, the hours when construction would occur, and the construction period's overall duration. The notification will include the telephone numbers of Valley Water's and the contractor's authorized representatives that are assigned to respond in the event of a noise complaint.
- At least 30 days prior to the start of construction activities, a sign will be posted at each construction site entrance, or other conspicuous location, that includes a 24-hour telephone number for project information, and a procedure in which a construction manager will respond to and investigate noise complaints and take corrective action, if necessary, in a timely manner. The sign will have a minimum dimension of 48 inches wide by 24 inches high with a one-inch minimum font height and will also include contact information for Valley Water staff. The sign will be placed five feet above ground level.
- If a construction noise complaint(s) is registered and if Valley Water or its contractor are not available to make noise measurements, Valley Water will retain a noise consultant to conduct noise measurements at the properties that registered the complaint. The noise measurements will be conducted for a minimum of one hour. Valley Water will prepare a letter report summarizing the measurements, calculation data used in determining impacts, and potential measures to reduce noise levels to the maximum extent feasible.
- Prior to the start of and for the duration of construction, the contractor will properly maintain and tune all construction equipment in accordance with the manufacturer's recommendations to minimize noise emissions.
- Prior to use of any construction equipment, the contractor will fit all equipment with properly operating mufflers, air intake silencers, and engine shrouds no less effective than as originally equipped by the manufacturer.
- Material hauling and deliveries will be coordinated by the construction contractor to reduce the potential of trucks waiting to unload for protracted periods of time.
- To the extent feasible, hydraulic equipment will be used instead of pneumatic impact tools, and electric powered equipment will be used instead of diesel-powered equipment.
- Stationary noise sources (e.g., generators) will be located as far from sensitive receptors as practicable, and they will be muffled and enclosed within temporary sheds, or insulation barriers.
- The use of bells, whistles, alarms, and horns will be restricted to safety warning purposes only.
- Signs will be posted at the job site entrance(s), within the on-site construction zones, and along queueing lanes (if any) to reinforce the prohibition of unnecessary engine idling. All other equipment will be turned off if not in use for more than five minutes. The construction manager will be responsible for enforcing this.

NOI-2 Implement Seismic Retrofit Construction Noise Reduction Measures

Valley Water and/or its contractor will implement the following noise mitigation measures as part of the Seismic Retrofit construction component:

- For Staging Area 1 and Stockpile Area E, as much as is feasible, limit activity of construction equipment within 300 feet of Receptor R-2 and residences across Cochrane Road.
- Install temporary noise barriers between Staging Area 1/Stockpile Area E and noise-sensitive receptors. The barriers will be at least 18 feet high and have no cracks or gaps, except where access is required (e.g., options for noise barriers include field-constructed wood or masonry walls, manufactured noise curtains [e.g., Kinetics KBC], and semi-truck trailers) and provide a minimum noise reduction of 15 dBA.
- For track drill rigs, install manufacturer-provided or third-party noise reduction systems, or install a sound barrier between the track drill rigs and noise-sensitive receptors to reduce noise levels to 86 dBA at 50 feet.
- Limit activity at Stockpile Areas K North and South to daytime (7:00am to 5:00pm) hours as feasible.
- To reduce off-site construction noise, the following measures will be implemented:
  - Route truck traffic and worker vehicles along Route 1a and avoid Route 1b to the extent feasible.
  - Temporarily reduce the posted speed limits along E Main Avenue between Hill Road and Cochrane Road and on Cochrane Road between E Mane Avenue and Half Road by 5 mph below the speed limit.
  - Reduce worker vehicle and truck speeds along the section of Cochrane Road closed to through traffic from the currently posted speed limit 45 mph to 35 mph.
- Prior to the start of construction, Valley Water will retain a qualified acoustical consultant to conduct construction noise monitoring during the nighttime work of Project construction at select locations in the surrounding community. The number and location of monitoring positions will be determined by Valley Water in consultation with the acoustical consultant. All sound level meters used during monitoring will satisfy the American National Standards Institute (ANSI) standard of Type 2 instrumentation or higher. All measurements shall be at least 5 feet above the ground and away from reflective surfaces. The noise monitoring data and results will be submitted in a memorandum to Valley Water on a weekly basis along with comparison to the 50 dBA L_{eq} nighttime construction noise limit. If exceedances of the construction noise limit are found, the construction contractor will modify construction techniques and equipment to reduce the construction noise below the 50 dBA L_{eq} limit, to the degree feasible.

6.1.2 Ogier Ponds Conservation Measure Construction

6.1.2.1 Analysis

ON-SITE ACTIVITY

To assess on-site construction noise levels, several phases were selected based on total noise levels, number of pieces of equipment, and proximity to noise-sensitive receptors to represent phases of greatest activity. The following phases were assessed:

- Construction of the Haul Roads and Preparation of Stockpile Areas (Year 1)

- Dewater Pond 1 (Year 1)
- Pond 1 Fill Borrow Hill Excavation (Year 1)
- Pond 1 Fill Import from Basalt Hill Excavation (Year 1)
- Spillway (Year 2)

For the purposes of noise modeling, locations of equipment were generally distributed around the site, with some sources concentrated at certain locations (e.g., dump trucks filling Pond 1). The results of our analysis using the CadnaA model are summarized in Table 29 through Table 33. Additional information regarding equipment noise levels and calculations is provided in Appendix 3.

Table 29. Ogier Ponds Conservation Measure Construction Equipment Noise Level Predictions, Construction of Haul Roads and Preparation of Stockpile Areas

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[2]	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-14	57	49	58	67	No	57 / -	80 / 50	No
R-15	57	59	61	67	No	67 / -	80 / 50	No
R-16	57	65	66	67	No	73 / -	80 / 50	No
R-17	57	63	64	67	No	71 / -	80 / 50	No
R-18	57	63	64	67	No	71 / -	80 / 50	No
R-19	57	62	63	67	No	70 / -	80 / 50	No
R-20	57	62	63	67	No	69 / -	60[3] / 50	Yes

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

[3] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime.

Table 30. Ogier Ponds Conservation Measure Construction Equipment Noise Level Predictions, Dewater Pond 1

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[2]	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-14	57	44	57	67	No	51 / -	80 / 50	No
R-15	57	48	57	67	No	55 / -	80 / 50	No
R-16	57	52	58	67	No	59 / -	80 / 50	No
R-17	57	55	59	67	No	62 / -	80 / 50	No
R-18	57	58	61	67	No	65 / -	80 / 50	No
R-19	57	63	64	67	No	70 / -	80 / 50	No
R-20	57	64	65	67	No	71 / -	60[3] / 50	Yes

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

[3] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime.

Table 31. Ogier Ponds Conservation Measure Construction Equipment Noise Level Predictions, Pond 1 Fill Borrow Hill Excavation

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[2]	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-5	54	51	56	59	No	57 / -	80 / 50	No
R-6	54	54	57	59	No	59 / -	80 / 50	No
R-7	54	56	58	59	No	61 / -	80 / 50	No
R-8	49	58	58	54	Yes	62 / -	60[3] / 50	Yes
R-9	49	50	52	54	No	56 / -	60[3] / 50	No

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

[3] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime.

Table 32. Ogier Ponds Conservation Measure Construction Equipment Noise Level Predictions, Pond 1 Fill Import from Basalt Hill Excavation

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[2]	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-14	57	45	57	67	No	52 / -	80 / 50	No
R-15	57	55	59	67	No	62 / -	80 / 50	No
R-16	57	58	61	67	No	66 / -	80 / 50	No
R-17	57	57	60	67	No	64 / -	80 / 50	No
R-18	57	59	61	67	No	67 / -	80 / 50	No
R-19	57	61	62	67	No	68 / -	80 / 50	No
R-20	57	66	67	67	No	74 / -	60[3] / 50	Yes

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

[3] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime.

Table 33. Ogier Ponds Conservation Measure Construction Equipment Noise Level Predictions, Spillway

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[2]	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-14	57	54	59	67	No	48 / -	80 / 50	No
R-15	57	58	61	67	No	60 / -	80 / 50	No
R-16	57	62	63	67	No	65 / -	80 / 50	No
R-17	57	66	66	67	No	69 / -	80 / 50	No
R-18	57	69	69	67	Yes	72 / -	80 / 50	No
R-19	57	74	74	67	Yes	75 / -	80 / 50	No
R-20	57	74	74	67	Yes	70 / -	60[3] / 50	Yes

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

[3] For noise-sensitive receptors located in unincorporated Santa Clara County, construction noise impacts would be significant if maximum hourly L_{AEQ} noise levels from stationary construction equipment noise exceed 60 dBA on weekdays and Saturdays during the daytime and 50 dBA during the nighttime.

As shown in the tables above, the significance threshold based on the existing ambient noise level was exceeded at one or more locations for each phase of activity, while the significance threshold based on absolute construction noise levels was not exceeded at any location.

OFF-SITE ACTIVITY

During construction, off-site noise sources consist primarily of daily truck deliveries of rocks, aggregate, and soil to the Ogier Ponds Conservation Measure site from the Basalt Hill Borrow Area, with worker vehicles traveling to and from the site also contributing. Noise-sensitive receptors consist of residences near the road segments being used.

Predicted Project-related vehicle counts were compared to 2015 traffic data for the City of Morgan Hill (Morgan Hill, 2015). Changes in traffic along US 101 from Project-related traffic were assumed to be negligible. The estimated noise levels for Year 6 Pond 1 Fill – Borrow Hill excavation, Year 6 Pond 1 Fill Import – Basalt Hill excavation, and Year 7 Import of materials from Holiday Lakes Estates Bench Excavation are provided in Table 34 through Table 36. The other phases of Ogier Ponds Conservation Measure work would result in fewer than one truck delivery per hour on average, which would have a less than significant impact.

Table 34. Ogier Ponds Conservation Measure Off-Site Construction Road Noise at 50 feet, Year 6, Pond 1 Fill – Borrow Hill Excavation

Road Segment	Non-Project Traffic, DNL	Overall with Project[1], DNL	Significance Threshold[2], DNL	Exceed Threshold?
Cochrane Rd – Staging Area 1 to Malaguerra	51	63	56	Yes
Cochrane Road – Malaguerra to Peet Rd	57	63	62	Yes
Cochrane Rd – Peet Rd to US 101	58	63	63	No
Cochrane Rd – US 101 to Monterey Hwy	63	66	66	No[3]
Monterey Hwy – Cochrane Rd to Barnhart Ave	64	67	67	No[3]

[1] Overall with Project is the cumulative level of Project Traffic plus Non-Project Traffic.

[2] Roadway vehicle noise impacts would be significant where such noise causes an increase of 5 dBA DNL where ambient noise levels are below 60 dBA DNL or causes an increase of 3 dBA DNL where ambient noise levels are 60 dBA DNL or greater

[3] This result appears to be 3 dB or more above the ambient due to rounding.

[4] To Ramboll's knowledge, traffic data for Barnhart Avenue is not available and therefore is not included.

Table 35. Ogier Ponds Conservation Measure Off-Site Construction Road Noise at 50 feet, Year 6, Pond 1 Fill – Basalt Hill Excavation

Road Segment	Non-Project Traffic, DNL	Overall with Project[1], DNL	Significance Threshold[2], DNL	Exceed Threshold?
Cochrane Rd – Staging Area 1 to Malaguerra	51	60	56	Yes
Cochrane Road – Malaguerra to Peet Rd	57	61	62	No
Cochrane Rd – Peet Rd to US 101	58	61	63	No
Cochrane Rd – US 101 to Monterey Hwy	63	65	66	No
Monterey Hwy – Cochrane Rd to Barnhart Ave	64	66	67	No

[1] Overall with Project is the cumulative level of Project Traffic plus Non-Project Traffic.

[2] Roadway vehicle noise impacts would be significant where such noise causes an increase of 5 dBA DNL where ambient noise levels are below 60 dBA DNL or causes an increase of 3 dBA DNL where ambient noise levels are 60 dBA DNL or greater

[3] To Ramboll's knowledge, traffic data for Barnhart Avenue is not available and therefore is not included.

Table 36. Ogier Ponds Conservation Measure Off-Site Construction Road Noise at 50 feet, Year 7, Import and Sort Creek Materials from Bench Excavation

Road Segment	Non-Project Traffic, DNL	Overall with Project[1], DNL	Significance Threshold[2], DNL	Exceed Threshold?
Cochrane Rd – Staging Area 1 to Malaguerra	51	56	56	No
Cochrane Road – Malaguerra to Peet Rd	57	59	62	No
Cochrane Rd – Peet Rd to US 101	58	59	63	No
Cochrane Rd – US 101 to Monterey Hwy	63	64	66	No
Monterey Hwy – Cochrane Rd to Barnhart Ave	64	65	67	No

[1] Overall with Project is the cumulative level of Project Traffic plus Non-Project Traffic.

[2] Roadway vehicle noise impacts would be significant where such noise causes an increase of 5 dBA DNL where ambient noise levels are below 60 dBA DNL or causes an increase of 3 dBA DNL where ambient noise levels are 60 dBA DNL or greater

[3] To Ramboll's knowledge, traffic data for Barnhart Avenue is not available and therefore is not included.

6.1.2.2 Recommended Control Measures

ON-SITE ACTIVITY

To reduce the impact of noise from on-site and off-site activity, the following noise control measure is recommended:

NOI-3 Implement Ogier Ponds CM Construction Noise Reduction Measures

Valley Water and/or its contractor should implement the following noise mitigation measures as part of the Ogier Ponds CM construction component:

- Install temporary noise barriers between regions of significant activity and noise-sensitive receptors. The barriers will be at least 12 feet high and have no cracks or gaps, except where access is required (e.g., options for noise barriers include field-constructed wood or masonry walls, manufactured noise curtains [e.g., Kinetics KBC]), and semi-truck trailers) and provide a minimum noise reduction of 15 dBA.
- To reduce off-site construction noise, the following measures will be implemented:
  - Reduce truck speeds along the section of Cochrane Road closed to through traffic from the currently posted speed limit of 45 mph to 35 mph.
  - Require trucks to reduce their speed along Cochrane Road between Malaguerra Road and US-101 to 5 mph below the posted speed limit.

6.1.3 Phase 2 Coyote Percolation Dam Conservation Measure Construction

6.1.3.1 Analysis

ON-SITE ACTIVITY

For the Phase 2 Coyote Percolation Dam Conservation Measure, areas of mobile equipment vibration for construction activity consist of work at the dam, the staging area, and the haul road between the dam and staging area. The results are summarized in Table 37 and Table 38.

Table 37. Phase 2 Coyote Percolation Dam Conservation Measure Construction Equipment Noise Level Predictions, Haul Roads & Preparation of Stockpile Areas

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-21	62	59	64	72	No	70 / -	80 / 50	No
R-22	62	59	64	72	No	69 / -	80 / 50	No
R-23	64	63	66	74	No	73 / -	80 / 50	No
R-24	64	61	66	74	No	72 / -	80 / 50	No
R-25	64	57	65	74	No	67 / -	80 / 50	No

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

Table 38. Phase 2 Coyote Percolation Dam Conservation Measure Construction Equipment Noise Level Predictions, Roughened Ramp

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-21	62	62	65	72	No	69 / -	80 / 50	No
R-22	62	52	62	72	No	60 / -	80 / 50	No
R-23	64	55	64	74	No	63 / -	80 / 50	No
R-24	64	50	64	74	No	58 / -	80 / 50	No
R-25	64	44	64	74	No	52 / -	80 / 50	No

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

As shown in the tables above, the significance thresholds are not exceeded at the nearest sensitive receptors. Therefore, noise from construction activity for Phase 2 Coyote Percolation Dam Conservation Measure would have a less than significant impact.

OFF-SITE ACTIVITY

Haul trips and worker trips related to construction of the Phase 2 Coyote Percolation Dam CM would be minimal. Therefore, off-site construction noise impacts related to Phase 2 Coyote Percolation Dam CM would be less than significant.

6.1.4 Sediment Augmentation Program Construction

6.1.4.1 Analysis

ON-SITE ACTIVITY

The Sediment Augmentation Program along Coyote Creek with take place for up to 15 years. The area of work spans from the Ogier Ponds Conservation Measure staging area to Staging Area 1 for the seismic retrofit, approximately four miles of Coyote Creek. Based on the availability of data, we made the following assumptions and additions:

- Assumed the equipment lists and activities for each year were the same
- Added motor graders to the equipment list
- Assumed the haul routes would be constructed along the river

The nearest sensitive receptors are the William James Boys Ranch and residences near Coyote Creek. The results of the analysis are summarized in Table 39 through Table 41.

Table 39. Sediment Augmentation Program Construction Equipment Noise Level Predictions, Haul Roads & Preparation of Stockpile Areas

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[2], DNL	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-3	61	63	65	71	No	71 / -	80 / 50	No
R-2	50	67	67	60	Yes	75 / -	80 / 50	No
R-1	61	55	62	71	No	64 / -	80 / 50	No
R-26	50	58	59	60	No	68 / -	80 / 50	No
R-27	50	56	57	60	No	66 / -	80 / 50	No
R-28	57	55	59	67	No	64 / -	80 / 50	No
R-29	57	49	58	67	No	59 / -	80 / 50	No
R-30	57	41	57	67	No	50 / -	80 / 50	No
R-18	57	26	57	67	No	35 / -	80 / 50	No
R-17	57	25	57	67	No	34 / -	80 / 50	No
R-16	57	22	57	67	No	30 / -	80 / 50	No

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

Table 40. Sediment Augmentation Program Construction Equipment Noise Level Predictions, Creek Bypass

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[2], DNL	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-3	61	31	61	71	No	40 / -	80 / 50	No
R-2	50	33	50	60	No	41 / -	80 / 50	No
R-1	61	35	61	71	No	44 / -	80 / 50	No
R-26	50	45	51	60	No	54 / -	80 / 50	No
R-27	50	45	51	60	No	53 / -	80 / 50	No
R-28	57	52	58	67	No	60 / -	80 / 50	No
R-29	57	53	58	67	No	62 / -	80 / 50	No
R-30	57	45	57	67	No	54 / -	80 / 50	No
R-18	57	57	60	67	No	64 / -	80 / 50	No
R-17	57	53	58	67	No	40 / -	80 / 50	No
R-16	57	56	60	67	No	60 / -	80 / 50	No

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

Table 41. Sediment Augmentation Program Construction Equipment Noise Level Predictions, Dewater

Noise-Sensitive Receptor	Ambient, DNL	Project Construction, DNL	Overall with Project[1], DNL	Significance Threshold[2], DNL	Exceed Threshold?	Project Construction, Max 1-hr L_{AEQ} Day / Night	Significance Threshold, Day / Night	Exceed Threshold?
R-3	61	28	61	71	No	36 / -	80 / 50	No
R-2	50	31	50	60	No	39 / -	80 / 50	No
R-1	61	32	61	71	No	40 / -	80 / 50	No
R-26	50	40	50	60	No	48 / -	80 / 50	No
R-27	50	41	50	60	No	49 / -	80 / 50	No
R-28	57	47	57	67	No	55 / -	80 / 50	No
R-29	57	56	60	67	No	64 / -	80 / 50	No
R-30	57	38	57	67	No	47 / -	80 / 50	No
R-18	57	53	59	67	No	61 / -	80 / 50	No
R-17	57	28	57	67	No	36 / -	80 / 50	No
R-16	57	52	58	67	No	60 / -	80 / 50	No

[1] Overall with Project is the cumulative level of Project construction plus ambient levels.

[2] A significance threshold of 10 dBA over ambient is used for assessing on-site construction equipment noise.

The results show that the noise impact at most sensitive receptors will be less than significant. The exceptions are receptors near Staging Area 1, where the significance threshold based on the existing ambient noise level was exceeded.

OFF-SITE ACTIVITY

Haul trips and worker trips related to construction of the Sediment Augmentation Program would be minimal. Therefore, off-site construction noise impacts related to the Sediment Augmentation Program would be less than significant.

6.1.4.2 Recommended Control Measures

To reduce noise levels at sensitive receptors around the Sediment Augmentation Program, implementation of noise control measure NOI-1 above is recommended.

6.1.5 North Channel Extension

Work on the North Channel Extension would be downstream of the existing Anderson Dam outlet structure. Equipment for the work would include a bulldozer, motor grader, excavator, loader, dump truck, water truck, pumps, and supporting vehicles. The work would coincide with Year 1 and Year 7 of the seismic retrofit construction and would be significantly smaller in scale. As a result, the noise analysis and control measures for the seismic retrofit construction would also apply to the North Channel Extension. Therefore, no additional noise analysis has been conducted specific to the North Channel Extension.

6.1.6 Operations and Maintenance

As discussed in Section 5.3, post-construction operations and maintenance of the Anderson Dam Facilities and Conservation Measures, as well as the Anderson Dam Seismic Retrofit Project (ADSRP) and FAHCE Adaptive Management Program, would result in negligible sources of noise. A diesel generator is proposed at the new outlet works which would replace an existing diesel generator in the same general area north of Via Sebastian. Noise from the proposed generator would generate similar noise levels to the existing generator due to occasional testing and in the case of power loss. In addition, air release valves are proposed at the LLOW, which would intermittently generate noise. However, noise from the air release valves is anticipated to be similar to noise levels generated by the existing AMF facility air release valves, which would be replaced with the Project. The existing facility and proposed facility are located in the same general area north of Cochrane Road. Finally, the gateshaft located at northern end of the top of the dam would potentially produce noise from the infrequent release of water during water level events. However, at a distance of approximately 1,000 feet from the nearest residences south of Cochrane Road, noise levels would not be significant. Therefore, operational noise impacts would be less than significant, and no mitigation is required.

6.1.7 Combined Impacts from Project Multiple Project Components

Based on our analysis, combined noise impacts from multiple project components are not expected. While some of the work for various areas will occur simultaneously (e.g., seismic retrofit construction and sediment augmentation in Year 2), phases with greater activity and greater associated noise are not expected to overlap in such a way as to result in a significant impact.

6.2 Impact NOI-2: Generation of excessive groundborne vibration or groundborne noise levels?

6.2.1 Seismic Retrofit Construction

6.2.1.1 Analysis

ON-SITE ACTIVITY

Vibration from construction equipment was considered activity areas within 500 feet of any sensitive receptors. The following activity areas were more 500 feet from any sensitive receptors, and therefore were not considered:

- Basalt Hill Borrow Area (BHBA)
- Coffer Dam
- Dredging
- Packwood Gravel Borrow Area
- Reservoir Disposal Area
- Spillway
- Boat ramp parking area
- Dam toe parking area
- Staging Area 3
- Stockpile Area B
- Stockpile Area C
- Stockpile Area D
- Stockpile Area H
- Stockpile Area L

The results of our analysis for construction activity areas within 500 feet of sensitive receptors, based on FTA calculation guidelines, are summarized in Table 42. For a more detailed analysis of vibration for each piece of equipment at each activity area, see Appendix 4.

Table 42. On-Site Seismic Retrofit Construction Equipment Vibration

Receptor	Activity Area	Distance	Maximum Vibration			Significance Thresholds		Exceed Structural Damage Threshold?	Exceed Indoor Impact Threshold?
			Amplitude (PPV, in/sec)	Level (VdB)	Source	Structural Damage (PPV, in/sec)	Indoor Impact (VdB)		
R-6	Excavation	480	0.002	56	Padfoot roller	0.2	72	No	No
	Staging Area 4	340	0.004	60	Road-header	0.2	72	No	No
R-1	Staging Area 4	270	0.006	63	Padfoot roller	0.2	72	No	No
R-4	Staging Area 1	180	0.011	69	Padfoot roller	0.2	72	No	No
	Stockpile Area E	290	0.005	62	Padfoot roller	0.2	72	No	No
R-2	Staging Area 1	120	0.020	74	Padfoot roller	0.2	72	No	Yes
	Stockpile Area E	250	0.007	64	Padfoot roller	0.2	72	No	No
Nearby Vineyard	Staging Area 2	180	0.005	61	Loader	0.2	75	No	No
R-11	Stockpile Area K - North	320	0.005	61	Padfoot roller	0.2	72	No	No
R-12	Stockpile Area K - South	310	0.005	62	Padfoot roller	0.2	72	No	No
R-32	Staging Area 4	110	0.023	75	Padfoot roller	0.2	72	No	Yes

As shown in Table 42, the only locations with a significant impact are R-2 and R-32, where the indoor impact was exceeded by 2 VdB and 3 VdB, respectively.

OFF-SITE ACTIVITY

Off-site vibration sources consist of haul trucks, worker vehicles, and bus shuttles traveling to and from the site. The most significant vibration would come from the trucks. However, according to FTA's Transit Noise and Vibration Impact Assessment Manual, vibration from trucks along roadways is unlikely to be perceptible, even if the receptor is close to a major roadway (FTA, 2018).

GROUNDBORNE NOISE

For typical construction activity, airborne noise levels are much higher than groundborne noise levels. According to the FTA's Transit Noise and Vibration Impact Assessment Manual, groundborne noise is typically only an issue for underground activity where there is no airborne noise path or for buildings with significant sound insulation such as recording studios (FTA, 2018). As a result, groundborne noise is not considered further.

6.2.1.2 Recommended Control Measures

To reduce vibration at nearby sensitive receptors, we recommend implementing the following control measure:

NOI-4 Seismic Retrofit and Sediment Augmentation Program Construction Vibration Reduction

Valley Water and/or its contractor should implement the following vibration mitigation measures for the Seismic Retrofit and Sediment Augmentation Program construction:

- Use of oscillatory or static rollers (which maintains constant contact with the ground) in lieu of vibratory rollers (which lifts off and pounds the ground) for compaction near residential structures (within 150 feet).

6.2.2 Ogier Ponds Conservation Measure

6.2.2.1 Analysis

ON-SITE ACTIVITY

The area of activity comprising the Ogier Ponds Conservation Measure work borders the properties of several sensitive receptors. The analysis compares vibration of individual pieces of equipment at various setbacks from noise-sensitive receptors, starting with a setback of 60 feet, which is approximately the shortest distance between the activity area and the nearest sensitive receptor. A summary of the results is provided in Table 43.

Table 43. On-Site Construction Equipment Vibration – Ogier Ponds Conservation Measure

Description	Distance to Receptor (ft)	Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Long-reach excavator	Bulldozer	Tamping foot roller	Concrete pump truck	Bobcat	Manlift	Crane 150t	Concrete vibrator	Threshold
FTA Reference Vibration	25	0.003	0.089	0.089	0.089	0.089	0.076	0.076	0.089	0.089	0.089	0.076	0.003	0.003	0.008	0.035	--
Structural Damage	80	0.001	0.016	0.016	0.016	0.016	0.013	0.013	0.016	0.016	0.016	0.013	0.001	0.001	0.001	0.006	0.2
FTA Reference Vibration	25	58	87	87	87	87	86	86	87	87	87	86	58	58	66	79	--
Indoor Vibration	80	42	72	72	72	72	70	70	72	72	72	70	42	42	51	64	72

As shown in Table 43, there would be no exceedance of the structural damage threshold or the indoor threshold for buildings 80 feet or further from the construction activity. Because construction activity at Ogier Ponds would be at least 80 feet from sensitive receptors, the thresholds would not be exceeded.

OFF-SITE ACTIVITY

Off-site vibration sources consist of haul trucks and worker vehicles traveling to and from the site. The most significant vibration would come from the trucks. However, according to FTA's Transit Noise and Vibration Impact Assessment Manual, vibration from trucks along roadways is unlikely to be perceptible, even if the receptor is close to a major roadway (FTA, 2018).

GROUNDBORNE NOISE

For typical construction activity, airborne noise levels are much higher than groundborne noise levels. According to the FTA's Transit Noise and Vibration Impact Assessment Manual, groundborne noise is typically only an issue for underground activity where there is no airborne noise path or for buildings with significant sound insulation such as recording studios (FTA, 2018). As a result, groundborne noise is not considered further.

6.2.3 Phase 2 Coyote Percolation Dam Conservation Measure

6.2.3.1 Analysis

For the Phase 2 Coyote Percolation Dam Conservation Measure, areas of mobile equipment vibration for construction activity consist of work at the dam, the staging area, and the haul road between the dam and staging area. Both the haul road and the staging area are more than 500 feet from the nearest sensitive receptor; therefore, analysis was limited to work at the dam. A summary of the results is provided in Table 44 and Table 45.

Table 44. On-Site Construction Equipment Vibration, Structural Damage – Phase 2 Coyote Percolation Dam Conservation Measure

Description	Distance to Receptor (ft)	Medium excavator	Loader	Medium Bulldozer	Motor grader	Small backhoe	Track drill rig	Articulated dump truck	Water truck	Bulldozer	Long-reach excavator	Bobcat	Threshold (PPV, in/sec)	Exceed Threshold?
FTA Reference Vibration	25	0.003	0.089	0.089	0.089	0.003	0.089	0.076	0.076	0.089	0.089	0.003	--	--
R-21	350	0.000	0.002	0.002	0.002	0.000	0.002	0.001	0.001	0.002	0.002	0.000	0.2	No

Table 45. On-Site Construction Equipment Vibration, Indoor Impact – Phase 2 Coyote Percolation Dam Conservation Measure

Description	Distance to Receptor (ft)	Medium excavator	Loader	Medium Bulldozer	Motor grader	Small backhoe	Track drill rig	Articulated dump truck	Water truck	Bulldozer	Long-reach excavator	Bobcat	Threshold (VdB)	Exceed Threshold?
FTA Reference Vibration	25	58	87	87	87	58	87	86	86	87	87	58	--	--
R-21	350	23	53	53	53	23	53	51	51	53	53	23	72	No

As shown in the tables above, the significance thresholds are not exceeded at the nearest sensitive receptor. Therefore, no control measures are needed.

GROUNDBORNE NOISE

For typical construction activity, airborne noise levels are much higher than groundborne noise levels. According to the FTA's Transit Noise and Vibration Impact Assessment Manual, groundborne noise is typically only an issue for underground activity where there is no airborne noise path or for buildings with significant sound insulation such as recording studios (FTA, 2018). As a result, groundborne noise is not considered further.

6.2.4 Sediment Augmentation Program

6.2.4.1 Analysis

A discussion of the areas of activity and assumptions can be found in Section 6.1.4.1. A summary of the vibration analysis results is provided in Table 46 and Table 47.

Table 46. On-Site Construction Equipment Vibration, Structural Damage – Sediment Augmentation Program

Description	Distance to Receptor (ft)	Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Bulldozer	Long-reach excavator	Bobcat	Threshold (PPV, in/sec)	Exceed Threshold?
FTA Reference Vibration	25	0.003	0.089	0.089	0.089	0.089	0.076	0.076	0.089	0.089	0.003	--	--
R-2	60	0.001	0.024	0.024	0.024	0.024	0.020	0.020	0.024	0.024	0.001	0.2	No
R-3	340	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.2	No
Malaguerra Ave Residence	80	0.001	0.016	0.016	0.016	0.016	0.013	0.013	0.016	0.016	0.001	0.2	No
Morning Star Dr Residence	155	0.000	0.006	0.006	0.006	0.006	0.005	0.005	0.006	0.006	0.000	0.2	No
Eagle View Dr Residence	275	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.2	No
Coyote Creek Visitor Center at Anderson Lake	145	0.000	0.006	0.006	0.006	0.006	0.005	0.005	0.006	0.006	0.000	0.2	No
Donna Ct Residence	195	0.000	0.004	0.004	0.004	0.004	0.003	0.003	0.004	0.004	0.000	0.2	No
Burnett Ave Residence	110	0.000	0.010	0.010	0.010	0.010	0.008	0.008	0.010	0.010	0.000	0.2	No

Table 47. On-Site Construction Equipment Vibration, Indoor Impact – Sediment Augmentation Program

Description	Distance to Receptor (ft)	Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Bulldozer	Long-reach excavator	Bobcat	Threshold (VdB)	Exceed Threshold?
FTA Reference Vibration	25	58	87	87	87	87	86	86	87	87	58	--	--
R-2	60	46	76	76	76	76	74	74	76	76	46	72	Yes
R-3	340	23	53	53	53	53	52	52	53	53	23	72	No
Malaguerra Ave Residence	80	42	72	72	72	72	70	70	72	72	42	72	No
Morning Star Dr Residence	155	34	63	63	63	63	62	62	63	63	34	72	No
Eagle View Dr Residence	275	26	56	56	56	56	54	54	56	56	26	72	No
Coyote Creek Visitor Center at Anderson Lake	145	35	64	64	64	64	63	63	64	64	35	75	No
Donna Ct Residence	195	31	60	60	60	60	59	59	60	60	31	72	No
Burnett Ave Residence	110	38	68	68	68	68	66	66	68	68	38	72	No

As shown in Table 46, there is no risk of structural damage to any of the sensitive receptors. However, Table 47 shows that the threshold for indoor vibration is exceeded at receptor R-2.

GROUNDBORNE NOISE

For typical construction activity, airborne noise levels are much higher than groundborne noise levels. According to the FTA's Transit Noise and Vibration Impact Assessment Manual, groundborne noise is typically only an issue for underground activity where there is no airborne noise path or for buildings with significant sound insulation such as recording studios (FTA, 2018). As a result, groundborne noise is not considered further.

6.2.4.2 Recommended Control Measures

To reduce vibration at receptor R-2 during the Sediment Augmentation Program, implementation of control measure NOI-4 above is recommended.

6.2.5 North Channel Extension

Work on the North Channel Extension would be downstream of the existing Anderson Dam outlet structure. Equipment for the work would include a bulldozer, motor grader, excavator, loader, dump truck, water truck, pumps, and supporting vehicles. The work would coincide with Year 1 and Year 7 of the seismic retrofit construction and would be significantly smaller in scale. As a result, the vibration analysis and control measures for the seismic retrofit construction would also apply to the North Channel Extension. Therefore, no additional vibration analysis has been conducted specific to the North Channel Extension.

6.2.6 Combined Impacts from Multiple Project Components

Based on our analysis, combined vibration impacts from multiple project components are not expected. While some of the work for various areas will occur simultaneously (e.g., seismic retrofit construction and sediment augmentation in Year 2), phases with greater activity and greater associated vibration are not expected to overlap in such a way as to result in a significant impact.

6.3 Blasting Air Overpressure and Vibration

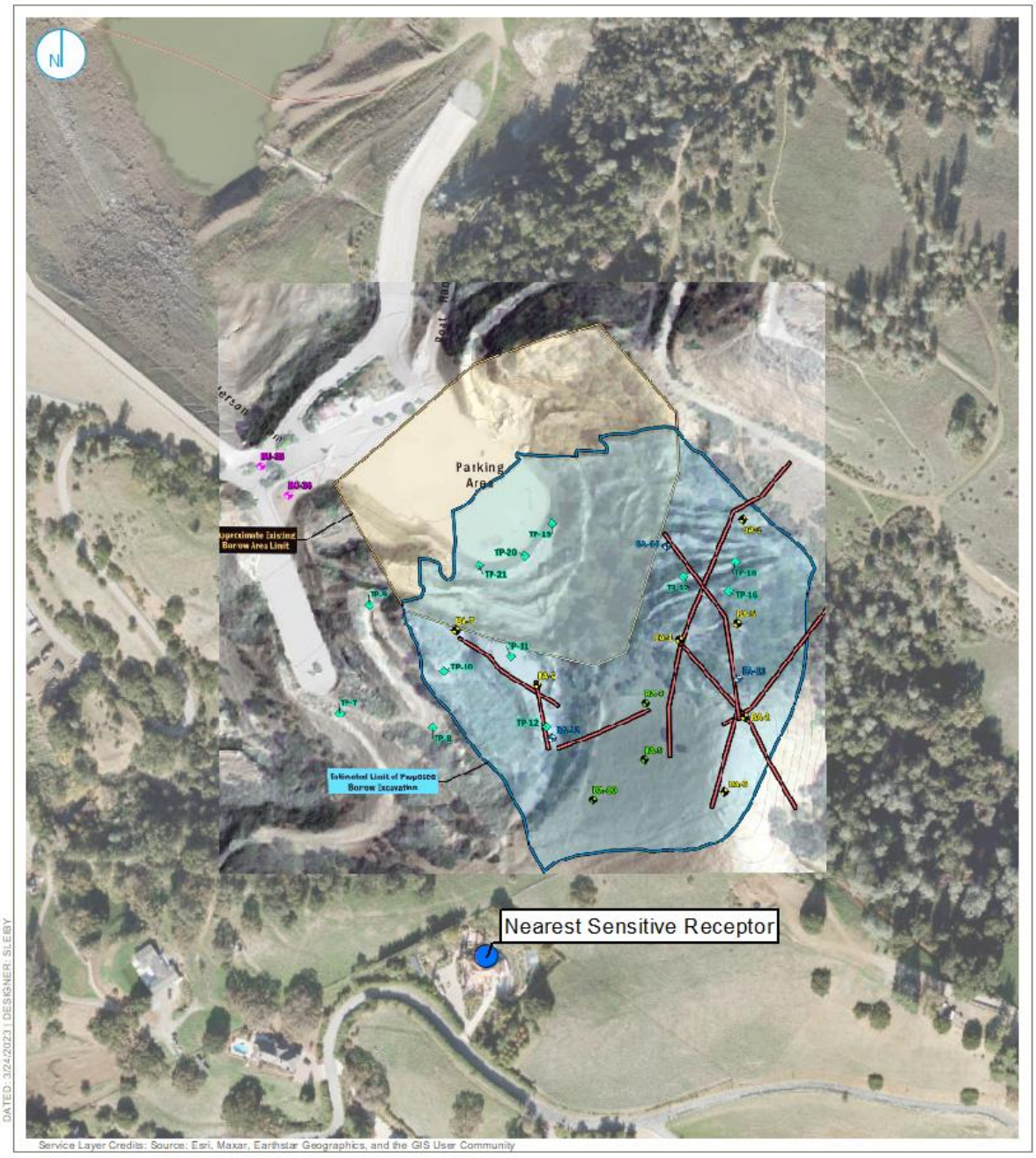
This section discusses potential impacts from blasting overpressure and vibration. It has been separated from the sections above for two reasons. Firstly, blasting as a source of noise and vibration is unique in terms of its energy, in particular low frequency energy. Secondly, the purpose of the analysis was to determine the upper limit for charge weight per delay based on recommended thresholds, rather than assessing potential impacts from a given charge weight per delay.

6.3.1 Blasting Plan

Blasting would take place at the Basalt Hill Borrow Area. The area was previously used to construct the upstream shell of the dam during its original construction in the early 1950s. The floor of the borrow area is currently a parking lot.

Material obtained from blasting will be used for the replacement dam. Blasting will be restricted to the hours of 8:00am to 5:00pm. The approximate extent of blasting activity is shown in Figure 6.1.

Figure 6.1. Basalt Hill Borrow Area Blasting Overview



The nearest sensitive receptor is a residence located at 18051 Barnard Road. The minimum slant distance between the edge of the blasting area and the nearest sensitive receptor is approximately 240 feet.

6.3.2 Analysis

Based on the distance to the nearest receptor of 240 feet, then the maximum loading to not exceed the vibration threshold of 0.1884 in/sec PPV is 7.5 pounds (lb). TNTe per delay (~3.4 kg). If the blasting does not generate significant energy below 3Hz, then the maximum loading to not exceed the vibration threshold of 0.5 in/sec PPV is 25.4 lb. TNTe per delay (~11.5 kg). For the air overpressure threshold of 133 dBL, the maximum loading is 98 lb. TNTe per delay (~45 kg). The allowable explosive loading in lb. TNTe per delay should be converted to explosive material used on the project, using the published relative effectiveness factor (R.E. factor). The calculations can be found in Appendix 5.

The analysis above is for the distance between the edge of the blasting area and the closest sensitive receptor. At greater distances, the limit in charge weight per delay would increase. However, additional analysis would be required to determine the limits at other distances. The analysis assumes a proper drilling pattern and sequential initiation sequence so that wave reinforcement does not occur.

6.3.3 Limitations

Please note that the assessment above is based on limited information available regarding blasting activity at the Basalt Hill Borrow Area. Further, the criteria used are related to structural damage, including cosmetic damage, but do not address the annoyance or complaints from people living near the blasting area. The extent of annoyance and complaints is influenced by many factors, including sociological factors and individuals' varying sensitivities.

Monitoring of vibration and air overpressure should be conducted during blasting. The field measurement results should be used to adjust the blast loading limits.

7. REFERENCES

City of Morgan Hill

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APPENDIX 1 – ANALYSIS METHODS

INTRODUCTION

This appendix summarizes the noise and vibration analysis and methodology for the Anderson Dam Seismic Retrofit Project (ADSRP) and associated conservation measures. Analysis included an ambient sound level survey and evaluation of potential noise and vibration impacts from on-site construction and off-site traffic related to construction.

EXISTING NOISE ENVIRONMENT

Section 4.3 provides a summary of the ambient noise survey, including measurement procedures. Hourly ambient noise levels are provided in Appendix 2.

ENVIRONMENTAL NOISE ANALYSIS

Potential noise emissions from on-site construction and off-site traffic related to construction were analyzed using specialized software (Computer Aided Noise Abatement (CadnaA) model, Build 189.5221). CadnaA enables analysis of environmental noise emissions using sound propagation factors as adopted by International Organization for Standardization (i.e., ISO 9613, ISO 17534). CadnaA considers distance, topography, intervening structures, atmospheric attenuation, ground effects, and vegetation when estimating sound levels from specific sources at distant receptor locations. On-site and off-site truck sound levels were analyzed based on the traffic sound levels and methodologies inherent in CadnaA's FHWA TNM module. The analysis was developed using the following steps:

- Collect sound data for all noise sources to be included in the analysis. Sound data for most construction noise sources was obtained from the FHWA and FTA. Other sound data was obtained from manufacturer cutsheets, reports for other projects, or were estimated based on horsepower rating of the equipment.
- Create a 3-dimensional map of the project site and surrounding area. Elevation data is based on the US National Elevation Dataset (NED) and bathymetry data provided by Horizon Water and Environment.
- Build equipment noise sources in the model based on the project construction areas (e.g., BHBA, staging areas, stockpile areas) and phasing and assign the appropriate sound level to each source.
- Create point source receivers in the 3-dimensional model representing the nearest noise-sensitive receptors to each area of construction.
- Calculate the sound levels to the noise-sensitive receptors.

Details regarding construction noise sources are provided in Appendix 3.

VIBRATION ANALYSIS

Groundborne vibration from construction was analyzed based on the FTA's Transit Noise and Vibration Impact Assessment. For the ADSRP analysis, the reference vibration amplitudes and analysis are provided in Appendix 4. For the conservation measures areas, the reference vibration amplitudes and analysis are given in the results tables in the body of the report.

Vibration amplitudes at each sensitive receptor were calculated for each piece of equipment using the reference vibration data and the following equation:

$$PPV_{equip} = PPV_{ref}\left(\frac{25}{D}\right)^{1.5}$$

where PPV_{equip} is the peak particle velocity of the equipment at the receptor, in/sec, PPV_{ref} is the source reference vibration amplitude at 25 feet, and D is the distance from the equipment to the receptor in feet.

BLASTING ANALYSIS

Groundborne vibration and air overpressure from blasting activity were analyzed based on the ISEE's Blasters' Handbook, 18th Edition. The calculations are provided in Appendix 5.

APPENDIX 2 – AMBIENT SOUND LEVEL SURVEY RESULTS

Table A- 1. SLM-1 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-1									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-15	06:24:58	00:35:01.1	54	66	57	55	47	44	43
2022-06-15	07:00:00	01:00:00.0	45	54	51	48	43	40	39
2022-06-15	08:00:00	01:00:00.0	46	56	51	49	42	39	38
2022-06-15	09:00:00	01:00:00.0	45	54	50	48	40	38	37
2022-06-15	10:00:00	01:00:00.0	48	57	53	50	45	41	39
2022-06-15	11:00:00	01:00:00.0	46	55	52	49	42	39	38
2022-06-15	12:00:00	01:00:00.0	46	54	51	49	42	38	37
2022-06-15	13:00:00	01:00:00.0	46	56	50	48	43	40	39
2022-06-15	14:00:00	01:00:00.0	49	57	51	49	44	41	39
2022-06-15	15:00:00	01:00:00.0	49	56	53	51	47	44	42
2022-06-15	16:00:00	01:00:00.0	51	58	55	53	50	46	44
2022-06-15	17:00:00	01:00:00.0	49	57	53	52	47	44	42
2022-06-15	18:00:00	01:00:00.0	48	56	51	50	46	43	41
2022-06-15	19:00:00	01:00:00.0	47	54	51	50	45	42	40
2022-06-15	20:00:00	01:00:00.0	46	55	49	47	44	42	40
2022-06-15	21:00:00	01:00:00.0	44	50	47	46	43	41	40
2022-06-15	22:00:00	01:00:00.0	44	53	48	45	41	39	38
2022-06-15	23:00:00	01:00:00.0	41	51	43	41	38	37	36
2022-06-16	00:00:00	01:00:00.0	38	43	40	39	37	36	35
2022-06-16	01:00:00	01:00:00.0	38	41	40	39	37	36	36
2022-06-16	02:00:00	01:00:00.0	39	45	42	41	38	36	36
2022-06-16	03:00:00	01:00:00.0	39	44	41	40	38	37	36
2022-06-16	04:00:00	01:00:00.0	42	46	43	43	41	39	38
2022-06-16	05:00:00	01:00:00.0	45	54	49	46	43	41	40
2022-06-16	06:00:00	01:00:00.0	47	56	52	49	44	43	42
2022-06-16	07:00:00	01:00:00.0	47	57	52	49	42	40	39
2022-06-16	08:00:00	00:29:10.9	46	55	50	48	42	40	39

Table A- 2. SLM-2 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-2									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-16	09:13:09	00:46:50.4	61	72	67	64	54	48	47
2022-06-16	10:00:00	01:00:00.0	60	71	66	63	53	48	47
2022-06-16	11:00:00	01:00:00.0	61	72	66	63	53	49	47

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-2									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-16	12:00:00	01:00:00.0	61	72	67	64	54	49	47
2022-06-16	13:00:00	01:00:00.0	59	69	65	62	52	48	47
2022-06-16	14:00:00	01:00:00.0	61	72	68	65	55	48	47
2022-06-16	15:00:00	01:00:00.0	59	70	65	62	52	48	47
2022-06-16	16:00:00	01:00:00.0	67	72	66	63	53	48	47
2022-06-16	17:00:00	01:00:00.0	59	68	65	62	54	49	47
2022-06-16	18:00:00	01:00:00.0	58	69	64	62	53	49	47
2022-06-16	19:00:00	01:00:00.0	57	67	63	60	52	48	47
2022-06-16	20:00:00	01:00:00.0	57	68	63	60	50	48	46
2022-06-16	21:00:00	01:00:00.0	57	67	60	57	48	46	46
2022-06-16	22:00:00	01:00:00.0	54	65	58	55	47	46	45
2022-06-16	23:00:00	01:00:00.0	51	63	55	50	46	45	45
2022-06-17	00:00:00	01:00:00.0	48	58	47	46	45	45	45
2022-06-17	01:00:00	01:00:00.0	46	48	46	46	45	45	45
2022-06-17	02:00:00	01:00:00.0	46	49	46	46	45	45	45
2022-06-17	03:00:00	01:00:00.0	50	60	47	46	46	45	45
2022-06-17	04:00:00	01:00:00.0	47	51	47	47	46	45	45
2022-06-17	05:00:00	01:00:00.0	53	64	57	53	47	46	46
2022-06-17	06:00:00	01:00:00.0	59	70	64	61	50	47	46
2022-06-17	07:00:00	01:00:00.0	59	70	65	62	51	47	46
2022-06-17	08:00:00	01:00:00.0	61	71	67	64	55	48	46
2022-06-17	09:00:00	01:00:00.0	61	71	67	64	54	47	46
2022-06-17	10:00:00	00:02:15.2	60	70	67	64	54	47	46

Table A- 3. SLM-3 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-3									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-16	09:54:30	00:05:29.4	57	68	62	58	49	45	44
2022-06-16	10:00:00	01:00:00.0	50	61	54	51	47	45	43
2022-06-16	11:00:00	01:00:00.0	50	57	54	52	48	45	43
2022-06-16	12:00:00	01:00:00.0	49	56	53	51	47	45	43
2022-06-16	13:00:00	01:00:00.0	48	56	52	50	47	45	43
2022-06-16	14:00:00	01:00:00.0	48	55	52	50	47	44	42
2022-06-16	15:00:00	01:00:00.0	51	59	53	51	47	44	42
2022-06-16	16:00:00	01:00:00.0	48	56	53	51	47	43	41
2022-06-16	17:00:00	01:00:00.0	49	56	53	52	47	43	41
2022-06-16	18:00:00	01:00:00.0	48	56	53	51	46	42	40

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-3									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-16	19:00:00	01:00:00.0	47	55	52	50	45	41	40
2022-06-16	20:00:00	01:00:00.0	45	53	49	48	43	40	39
2022-06-16	21:00:00	01:00:00.0	43	55	46	44	40	39	38
2022-06-16	22:00:00	01:00:00.0	42	50	45	43	40	39	38
2022-06-16	23:00:00	01:00:00.0	41	48	44	43	40	38	38
2022-06-17	00:00:00	01:00:00.0	39	44	42	41	38	37	37
2022-06-17	01:00:00	01:00:00.0	39	43	41	40	38	37	37
2022-06-17	02:00:00	01:00:00.0	39	45	42	41	38	37	37
2022-06-17	03:00:00	01:00:00.0	39	45	43	42	38	38	37
2022-06-17	04:00:00	01:00:00.0	40	45	43	42	39	38	37
2022-06-17	05:00:00	01:00:00.0	44	52	48	47	42	40	39
2022-06-17	06:00:00	01:00:00.0	44	53	48	46	42	40	39
2022-06-17	07:00:00	01:00:00.0	47	55	52	50	45	41	39
2022-06-17	08:00:00	01:00:00.0	50	59	53	51	47	45	43
2022-06-17	09:00:00	01:00:00.0	49	57	53	51	47	44	42
2022-06-17	10:00:00	00:20:03.5	49	56	51	50	46	43	41

Table A- 4. SLM-4 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-4									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-15	07:36:35	00:23:24.5	56	63	60	58	53	48	46
2022-06-15	08:00:00	01:00:00.0	55	64	59	57	52	48	44
2022-06-15	09:00:00	01:00:00.0	54	63	59	57	52	49	46
2022-06-15	10:00:00	01:00:00.0	55	63	59	57	51	47	44
2022-06-15	11:00:00	01:00:00.0	55	64	59	57	51	48	44
2022-06-15	12:00:00	01:00:00.0	54	62	58	56	50	47	43
2022-06-15	13:00:00	01:00:00.0	55	65	59	56	50	47	44
2022-06-15	14:00:00	01:00:00.0	54	64	59	56	51	46	43
2022-06-15	15:00:00	01:00:00.0	55	66	59	57	51	48	45
2022-06-15	16:00:00	01:00:00.0	57	64	59	56	50	44	41
2022-06-15	17:00:00	01:00:00.0	52	63	57	55	45	39	37
2022-06-15	18:00:00	01:00:00.0	52	61	55	52	43	39	37
2022-06-15	19:00:00	01:00:00.0	49	60	54	50	42	37	36
2022-06-15	20:00:00	01:00:00.0	48	60	54	50	39	36	35
2022-06-15	21:00:00	01:00:00.0	43	55	48	45	38	36	36
2022-06-15	22:00:00	01:00:00.0	44	54	48	44	37	35	35
2022-06-15	23:00:00	01:00:00.0	42	53	44	39	35	34	34

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-4									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-16	00:00:00	01:00:00.0	36	45	39	37	34	33	33
2022-06-16	01:00:00	01:00:00.0	37	41	38	37	35	34	33
2022-06-16	02:00:00	01:00:00.0	41	44	39	38	35	34	33
2022-06-16	03:00:00	01:00:00.0	35	40	38	37	35	34	33
2022-06-16	04:00:00	01:00:00.0	41	44	41	40	38	36	34
2022-06-16	05:00:00	01:00:00.0	46	57	48	46	41	39	38
2022-06-16	06:00:00	01:00:00.0	51	65	57	53	42	40	39
2022-06-16	07:00:00	01:00:00.0	53	65	58	55	47	41	40
2022-06-16	08:00:00	00:39:31.1	59	69	64	62	54	50	49

Table A- 5. SLM-5 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-5									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-15	10:08:46	00:51:13.6	49	60	53	49	40	36	34
2022-06-15	11:00:00	01:00:00.0	44	56	48	44	38	34	33
2022-06-15	12:00:00	01:00:00.0	41	50	46	44	38	34	32
2022-06-15	13:00:00	01:00:00.0	45	55	49	47	42	37	35
2022-06-15	14:00:00	01:00:00.0	45	53	50	48	42	36	32
2022-06-15	15:00:00	01:00:00.0	46	55	51	49	42	37	34
2022-06-15	16:00:00	01:00:00.0	47	55	52	50	44	38	36
2022-06-15	17:00:00	01:00:00.0	49	56	53	52	47	41	36
2022-06-15	18:00:00	01:00:00.0	49	57	54	52	47	42	38
2022-06-15	19:00:00	01:00:00.0	45	53	50	49	42	33	31
2022-06-15	20:00:00	01:00:00.0	38	52	42	36	31	30	29
2022-06-15	21:00:00	01:00:00.0	38	49	42	39	31	30	30
2022-06-15	22:00:00	01:00:00.0	36	48	40	35	30	29	29
2022-06-15	23:00:00	01:00:00.0	35	48	37	32	30	29	29
2022-06-16	00:00:00	01:00:00.0	33	44	35	33	29	29	28
2022-06-16	01:00:00	01:00:00.0	29	35	31	30	29	28	28
2022-06-16	02:00:00	01:00:00.0	31	40	35	31	29	29	28
2022-06-16	03:00:00	01:00:00.0	30	35	32	31	30	29	28
2022-06-16	04:00:00	01:00:00.0	33	36	35	34	33	30	29
2022-06-16	05:00:00	01:00:00.0	36	39	37	37	35	34	33
2022-06-16	06:00:00	01:00:00.0	39	47	42	40	37	36	35
2022-06-16	07:00:00	01:00:00.0	41	52	47	44	37	35	34
2022-06-16	08:00:00	01:00:00.0	43	54	48	45	35	32	30
2022-06-16	09:00:00	01:00:00.0	43	54	49	46	36	32	31

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-5									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-16	10:00:00	00:54:12.1	44	56	49	46	38	34	33

Table A- 6. SLM-6 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-6									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-15	09:30:39	00:29:20.4	52	62	54	51	38	33	32
2022-06-15	10:00:00	01:00:00.0	44	56	50	46	36	33	32
2022-06-15	11:00:00	01:00:00.0	42	53	46	43	35	33	32
2022-06-15	12:00:00	01:00:00.0	41	52	47	44	35	33	32
2022-06-15	13:00:00	01:00:00.0	44	55	49	47	38	34	33
2022-06-15	14:00:00	01:00:00.0	47	56	52	50	42	36	33
2022-06-15	15:00:00	01:00:00.0	49	57	54	53	46	38	35
2022-06-15	16:00:00	01:00:00.0	52	60	58	56	49	43	39
2022-06-15	17:00:00	01:00:00.0	49	57	54	52	45	39	37
2022-06-15	18:00:00	01:00:00.0	48	56	53	51	44	39	36
2022-06-15	19:00:00	01:00:00.0	47	56	53	51	43	37	34
2022-06-15	20:00:00	01:00:00.0	44	53	49	47	40	36	35
2022-06-15	21:00:00	01:00:00.0	41	50	46	44	38	35	35
2022-06-15	22:00:00	01:00:00.0	37	48	40	37	34	33	32
2022-06-15	23:00:00	01:00:00.0	36	49	38	35	33	32	31
2022-06-16	00:00:00	01:00:00.0	34	43	36	34	32	32	31
2022-06-16	01:00:00	01:00:00.0	33	36	33	33	32	32	31
2022-06-16	02:00:00	01:00:00.0	34	41	37	34	32	32	31
2022-06-16	03:00:00	01:00:00.0	33	36	34	33	32	32	31
2022-06-16	04:00:00	01:00:00.0	34	36	35	35	33	32	32
2022-06-16	05:00:00	01:00:00.0	35	41	37	36	35	34	33
2022-06-16	06:00:00	01:00:00.0	39	49	43	40	37	35	34
2022-06-16	07:00:00	01:00:00.0	41	52	47	44	38	35	34
2022-06-16	08:00:00	01:00:00.0	44	55	49	44	36	33	32
2022-06-16	09:00:00	01:00:00.0	43	53	48	46	37	33	32
2022-06-16	10:00:00	00:38:07.8	48	57	53	51	44	38	35

Table A- 7. SLM-7 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-7									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-15	09:02:08	00:58:20.2	47	56	50	48	43	40	38

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-7									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-15	10:00:00	01:00:00.0	55	59	58	58	55	46	43
2022-06-15	11:00:00	01:00:00.0	51	58	57	56	49	47	42
2022-06-15	12:00:00	01:00:00.0	46	56	51	48	43	41	39
2022-06-15	13:00:00	01:00:00.0	47	56	53	51	42	37	35
2022-06-15	14:00:00	01:00:00.0	44	52	47	45	40	36	34
2022-06-15	15:00:00	01:00:00.0	45	53	49	48	42	38	37
2022-06-15	16:00:00	01:00:00.0	48	56	53	51	45	41	39
2022-06-15	17:00:00	01:00:00.0	45	54	50	48	42	39	37
2022-06-15	18:00:00	01:00:00.0	45	54	49	47	41	38	37
2022-06-15	19:00:00	01:00:00.0	44	53	48	46	40	36	34
2022-06-15	20:00:00	01:00:00.0	41	52	44	42	37	34	33
2022-06-15	21:00:00	01:00:00.0	38	46	43	41	36	33	32
2022-06-15	22:00:00	01:00:00.0	37	47	42	38	33	32	31
2022-06-15	23:00:00	01:00:00.0	42	52	49	47	34	31	30
2022-06-16	00:00:00	01:00:00.0	34	43	36	34	31	30	30
2022-06-16	01:00:00	01:00:00.0	31	37	34	32	30	30	30
2022-06-16	02:00:00	01:00:00.0	32	40	36	34	31	30	30
2022-06-16	03:00:00	01:00:00.0	32	36	34	33	31	30	30
2022-06-16	04:00:00	01:00:00.0	34	40	36	35	33	31	30
2022-06-16	05:00:00	01:00:00.0	37	43	40	39	36	35	34
2022-06-16	06:00:00	01:00:00.0	44	50	44	42	39	37	36
2022-06-16	07:00:00	01:00:00.0	49	61	54	52	43	38	37
2022-06-16	08:00:00	01:00:00.0	47	60	49	45	38	35	33
2022-06-16	09:00:00	01:00:00.0	50	57	51	48	42	36	33
2022-06-16	10:00:00	00:26:58.5	47	56	50	48	44	41	38

Table A- 8. SLM-8 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-8									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-15	10:25:00	00:36:40.6	48	57	52	48	38	33	32
2022-06-15	11:25:00	01:00:00.0	42	52	47	44	37	33	32
2022-06-15	12:25:00	01:00:00.0	46	54	52	50	43	38	35
2022-06-15	13:25:00	01:00:00.0	48	56	53	52	45	38	33
2022-06-15	14:25:00	01:00:00.0	51	59	56	54	49	42	38
2022-06-15	15:25:00	01:00:00.0	56	63	61	60	54	47	39
2022-06-15	16:25:00	01:00:00.0	57	63	61	60	56	52	47
2022-06-15	17:25:00	01:00:00.0	55	62	60	58	54	49	45

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-8									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-15	18:25:00	01:00:00.0	54	60	58	57	52	47	44
2022-06-15	19:25:00	01:00:00.0	50	57	55	53	49	41	38
2022-06-15	20:25:00	01:00:00.0	45	53	51	50	41	38	36
2022-06-15	21:25:00	01:00:00.0	43	53	49	47	39	36	34
2022-06-15	22:25:00	01:00:00.0	38	49	43	39	35	33	32
2022-06-15	23:25:00	01:00:00.0	35	43	37	36	33	32	31
2022-06-16	00:25:00	01:00:00.0	34	44	37	35	32	30	30
2022-06-16	01:25:00	01:00:00.0	33	41	36	34	31	30	30
2022-06-16	02:25:00	01:00:00.0	32	39	35	34	31	30	29
2022-06-16	03:25:00	01:00:00.0	33	37	35	34	32	30	30
2022-06-16	04:25:00	01:00:00.0	37	45	40	39	36	34	33
2022-06-16	05:25:00	01:00:00.0	43	52	49	46	40	38	37
2022-06-16	06:25:00	01:00:00.0	43	51	48	46	42	40	39
2022-06-16	07:25:00	01:00:00.0	43	52	47	46	41	39	37
2022-06-16	08:25:00	01:00:00.0	43	54	47	45	39	35	33
2022-06-16	09:25:00	01:00:00.0	48	56	53	52	44	38	34
2022-06-16	10:25:00	00:49:53.9	52	59	57	55	50	44	39

Table A- 9. SLM-9 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-9									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-13	20:30:50	00:29:09.1	61	71	61	58	52	49	47
2022-06-13	21:00:00	01:00:00.0	52	61	54	52	49	46	45
2022-06-13	22:00:00	01:00:00.0	47	52	50	49	47	45	44
2022-06-13	23:00:00	01:00:00.0	47	52	50	49	46	44	43
2022-06-14	00:00:00	01:00:00.0	48	53	51	50	47	42	40
2022-06-14	01:00:00	01:00:00.0	43	49	46	45	42	40	38
2022-06-14	02:00:00	01:00:00.0	46	57	50	46	42	39	37
2022-06-14	03:00:00	01:00:00.0	47	54	50	49	46	43	40
2022-06-14	04:00:00	01:00:00.0	51	56	54	53	51	49	47
2022-06-14	05:00:00	01:00:00.0	53	57	55	55	53	51	49
2022-06-14	06:00:00	01:00:00.0	53	57	56	55	53	52	51
2022-06-14	07:00:00	01:00:00.0	52	59	54	53	50	49	47
2022-06-14	08:00:00	01:00:00.0	48	56	51	49	46	44	43
2022-06-14	09:00:00	01:00:00.0	49	56	52	51	48	46	44
2022-06-14	10:00:00	01:00:00.0	62	58	54	53	49	46	44
2022-06-14	11:00:00	01:00:00.0	53	59	56	55	51	48	46

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-9									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-14	12:00:00	01:00:00.0	54	61	58	57	52	48	46
2022-06-14	13:00:00	01:00:00.0	54	62	59	58	53	49	47
2022-06-14	14:00:00	01:00:00.0	53	59	57	56	52	49	47
2022-06-14	15:00:00	01:00:00.0	54	61	59	57	53	49	47
2022-06-14	16:00:00	01:00:00.0	56	63	61	59	55	50	48
2022-06-14	17:00:00	01:00:00.0	56	62	60	59	55	51	48
2022-06-14	18:00:00	01:00:00.0	56	63	61	59	55	51	48
2022-06-14	19:00:00	01:00:00.0	53	60	57	56	52	49	48
2022-06-14	20:00:00	00:55:59.1	52	59	54	52	49	47	45

Table A- 10. SLM-10 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-10									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-13	18:52:47	00:07:12.5	61	70	65	62	58	56	54
2022-06-13	19:00:00	01:00:00.0	59	64	62	61	58	55	53
2022-06-13	20:00:00	01:00:00.0	57	63	60	59	56	54	52
2022-06-13	21:00:00	01:00:00.0	56	61	58	58	55	53	51
2022-06-13	22:00:00	01:00:00.0	55	59	57	57	54	52	50
2022-06-13	23:00:00	01:00:00.0	55	60	58	58	55	52	50
2022-06-14	00:00:00	01:00:00.0	51	57	55	54	50	45	42
2022-06-14	01:00:00	01:00:00.0	49	56	54	52	48	44	40
2022-06-14	02:00:00	01:00:00.0	50	56	54	53	49	43	40
2022-06-14	03:00:00	01:00:00.0	53	60	56	55	52	49	46
2022-06-14	04:00:00	01:00:00.0	55	60	59	58	55	51	49
2022-06-14	05:00:00	01:00:00.0	60	64	62	62	60	58	55
2022-06-14	06:00:00	01:00:00.0	60	63	62	62	60	57	54
2022-06-14	07:00:00	01:00:00.0	54	58	56	56	54	52	49
2022-06-14	08:00:00	01:00:00.0	53	58	56	56	53	50	48
2022-06-14	09:00:00	01:00:00.0	55	60	58	57	54	52	50
2022-06-14	10:00:00	01:00:00.0	55	60	58	57	54	52	50
2022-06-14	11:00:00	01:00:00.0	56	61	59	58	55	53	50

Table A- 11. SLM-11 Hourly Sound Levels

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-11									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-13	19:10:52	00:49:07.4	60	67	63	61	59	57	55

Hourly A-weighted Sound Levels (dB) Measured at Location SLM-11									
Date	Time	Run Duration	LAeq	LAF1	LAF5	LAF10	LAF50	LAF90	LAF99
2022-06-13	20:00:00	01:00:00.0	58	63	61	60	58	55	53
2022-06-13	21:00:00	01:00:00.0	57	62	60	59	57	55	53
2022-06-13	22:00:00	01:00:00.0	56	61	59	58	56	53	51
2022-06-13	23:00:00	01:00:00.0	56	61	59	59	56	53	50
2022-06-14	00:00:00	01:00:00.0	53	59	57	56	52	47	44
2022-06-14	01:00:00	01:00:00.0	52	58	56	55	50	45	40
2022-06-14	02:00:00	01:00:00.0	52	59	56	55	51	45	40
2022-06-14	03:00:00	01:00:00.0	55	62	58	57	53	49	47
2022-06-14	04:00:00	01:00:00.0	58	63	62	60	57	53	49
2022-06-14	05:00:00	01:00:00.0	61	65	64	63	61	59	57
2022-06-14	06:00:00	01:00:00.0	61	64	62	62	60	58	57
2022-06-14	07:00:00	01:00:00.0	58	61	60	59	57	56	54
2022-06-14	08:00:00	01:00:00.0	57	60	59	59	56	54	52
2022-06-14	09:00:00	01:00:00.0	57	61	60	59	57	54	52
2022-06-14	10:00:00	01:00:00.0	57	62	60	59	57	54	52
2022-06-14	11:00:00	01:00:00.0	58	62	60	60	57	55	53
2022-06-14	12:00:00	01:00:00.0	57	63	60	60	56	53	51
2022-06-14	13:00:00	01:00:00.0	59	65	61	60	58	56	55
2022-06-14	14:00:00	01:00:00.0	58	63	61	60	58	56	54
2022-06-14	15:00:00	01:00:00.0	59	63	61	60	58	56	55
2022-06-14	16:00:00	01:00:00.0	59	63	61	61	59	57	55
2022-06-14	17:00:00	01:00:00.0	60	65	62	61	59	58	56
2022-06-14	18:00:00	01:00:00.0	60	65	62	61	59	57	56
2022-06-14	19:00:00	00:46:06.5	59	63	61	61	58	56	55

APPENDIX 3 – CONSTRUCTION NOISE ANALYSIS ADSRP

A. EQUIPMENT LIST AND SOUND LEVELS

Table A- 12. Anderson Dam Equipment List

Anderson Dam Seismic Retrofit Project Estimate of On-Site Equipment

#	Project Component	Activity ID	Construction Activity	Construction Phase	Approx. Duration (months)	Utilization Factor	Number of Workers	Equipment Quantity	Equipment Type	Assumed Equipment Description	Source/Notes	Fuel Type	Power Rating (HP)	Operating Hours/Day	Days/ Week
5	Haul Roads and Stockpile Area preparations	2	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	4	0.9	2	2	Medium Bulldozer	CAT D8T	cat.com	Diesel	354	10	5
6	Haul Roads and Stockpile Area preparations	2	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	4	0.9	2	2	Medium excavator	CAT 330	cat.com	Diesel	273	10	5
7	Haul Roads and Stockpile Area preparations	2	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	4	0.9	1	1	Motor grader	CAT 16	cat.com	Diesel	290	10	5
8	Haul Roads and Stockpile Area preparations	2	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	4	0.9	4	2	Track drill rig	PowerROC T35 (2½"–4½")	epiroc.com	Diesel	201	10	5
9	Haul Roads and Stockpile Area preparations	2	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	4	0.9	3	3	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
10	Haul Roads and Stockpile Area preparations	2	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	4	0.9	5	1	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
11	Haul Roads and Stockpile Area preparations	2	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	4	0.9	2	2	Articulated dump truck	CAT 745	cat.com	Diesel	496	10	5
12	Haul Roads and Stockpile Area preparations	2	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	4	0.9	2	2	Water truck	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	10	5
13	Haul Roads and Stockpile Area preparations	2	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	4	0.9	1	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
	LLOW		Upstream Shaft excavation	Year 1	3	0.7	1	1	Crane 150t	GROVE GRT9165	manitowoc.com	Diesel	300	20	6
	LLOW		Upstream Shaft excavation	Year 1	3	0.7	1	1	Small backhoe	Cat 310	cat.com	Diesel	70	20	6
	LLOW		Upstream Shaft excavation	Year 1	3	0.7	-	2	Jacklegs	-	-	Air	-	20	6
	LLOW		Upstream Shaft excavation	Year 1	3	0.7	2	1	Track drill rig	PowerROC T35 (2½"–4½")	epiroc.com	Diesel	201	10	5
	LLOW		Upstream Shaft excavation	Year 1	3	0.7	-	1	Compressor	Doosan HP450	doosanportablepower.com	Diesel	173	20	6
	LLOW		Upstream Shaft excavation	Year 1	3	0.7	1	1	Shotcrete batch plant	fibo intercon F2200	fibointercon.com	Deisel	75	20	6
	LLOW		Upstream Shaft excavation	Year 1	3	0.7	1	1	Loader	CAT 966M XE	cat.com	Diesel	298	20	6
	LLOW		Upstream Shaft excavation	Year 1	3	0.7	1	1	Telehandler	JLG 1043	jlg.com	Diesel	110	20	6
	LLOW		Upstream Shaft excavation	Year 1	3	1	-	1	Pump	GODWIN CD75	xylem.com	Diesel	17	24	7
	LLOW		Upstream Shaft excavation	Year 1	3	1	-	1	Ventilation fan	Tunnel Drilling fan (AXC…GC)	systemair.com	Electrical	-	24	6
	LLOW		Upstream Shaft excavation	Year 1	3	1	-	1	Generator (80 kW)	Generac SD100	generac.com	Diesel	152	24	7
	LLOW		Upstream Shaft excavation	Year 1	3	0.7	1	1	Articulated dump truck	CAT 745	cat.com	Diesel	496	20	6
	LLOW		Upstream Shaft excavation	Year 1	3	1	1	1	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	20	6
	LLOW		Upstream Shaft excavation	Year 1	3	1	5	1	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	20	6
	LLOW		Upstream Shaft excavation	Year 1	3	1		-	No Equipment - Crew	-	-	-	-	20	6
63	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	0.9	1	1	Large excavator	Cat 365 FEL	machinerytrader.com	Diesel	410	10	5
64	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	0.7	2	1	Track drill rig	PowerROC T35 (2½"–4½")	epiroc.com	Diesel	201	10	5
65	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	0.7	-	1	Compressor	Doosan HP450	doosanportablepower.com	Diesel	173	10	5

Anderson Dam Seismic Retrofit Project Estimate of On-Site Equipment

#	Project Component	Activity ID	Construction Activity	Construction Phase	Approx. Duration (months)	Utilization Factor	Number of Workers	Equipment Quantity	Equipment Type	Assumed Equipment Description	Source/Notes	Fuel Type	Power Rating (HP)	Operating Hours/Day	Days/ Week
66	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	0.7	1	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
67	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	0.7	1	1	Manlift	JLG 600AJ	jlg.com	Diesel	67	10	5
68	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	1	-	1	Pump	GODWIN CD75	xylem.com	Diesel	17	10	5
69	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	1	-	1	Generator (80 kW)	Generac SD100	generac.com	Diesel	152	10	5
70	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	0.9	2	2	Articulated dump truck	CAT 745	cat.com	Diesel	496	10	5
71	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	1	1	1	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
72	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	1	3	1	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
73	HLOW	9	Excavate downstream portal	Year 2 (Stage 1a)	4	1	-	-	No Equipment - Crew	-	-	-	-	10	5
171	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	0.5	-	1	Medium excavator	Cat 330	Use 330 at dam	Diesel	410	10	5
172	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	0.5	2	2	Track drill rig	PowerROC T35 (2½"–4½")	epiroc.com	Diesel	201	10	5
173	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	0.5	-	1	Compressor	Doosan HP450	doosanportablepower.com	Diesel	173	10	5
174	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	0.5	-	-	Shotcrete batch plant	-	Import ready mix	-	-	10	5
175	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	0.5	1	1	Concrete pump truck	Liebherr 42 M5 XXT	liebherr.com	Diesel	500	10	5
176	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	0.5	1	1	Manlift	JLG 600AJ	jlg.com	Diesel	67	10	5
177	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	1	-	1	Generator (80 kW)	Generac SD100	generac.com	Diesel	152	10	5
178	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	0.5	-	-	Articulated dump truck	CAT 745	Use 745s at dam	-	-	10	5
179	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	1	1	1	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
180	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	1	4	1	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
181	Tie-back Wall at Cochrane Road	18	Construction of the tie-back wall at Cochrane Road	Year 3 (Stage 1b)	2.5	1		-	No Equipment - Crew	-	-	-	-	10	5
192	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	0.25	1	1	Articulated dump truck	CAT 745	cat.com	Diesel	496	10	5
193	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	0.7	1	1	Medium excavator	Cat 330	cat.com	Diesel	273	10	5
194	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	0.7	1	1	Mini excavator	Cat 305 CR	cat.com	Diesel	45	10	5
195	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	0.7	2	2	Track drill rig	PowerROC T35 (2½"–4½")	epiroc.com	Diesel	201	10	5
196	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	0.7	-	1	Compressor	Doosan HP450	doosanportablepower.com	Diesel	173	10	5
197	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	0.7	1	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
198	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	1	-	1	Pump	GODWIN CD75	xylem.com	Diesel	17	10	5
199	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	1	-	1	Generator (80 kW)	Generac SD100	generac.com	Diesel	152	10	5
200	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	0.5	1	1	Water truck	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	10	5
201	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	1	1	1	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
202	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	1	5	1	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
203	Spillway	20	Excavation and foundation preparation	Year 3 (Stage 1b)	3	1	-	-	No Equipment - Crew	-	-	-	-	10	5

Anderson Dam Seismic Retrofit Project Estimate of On-Site Equipment

#	Project Component	Activity ID	Construction Activity	Construction Phase	Approx. Duration (months)	Utilization Factor	Number of Workers	Equipment Quantity	Equipment Type	Assumed Equipment Description	Source/Notes	Fuel Type	Power Rating (HP)	Operating Hours/Day	Days/ Week
532	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	1	1	Large excavator	Komatsu PC1600	ritchiespecs.com	Diesel	810	20	5.5
533	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	1	1	Medium excavator	Cat 365 FEL	machinerytrader.com	Diesel	410	20	5.5
534	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	2	2	Medium excavator	Cat 330	cat.com	Diesel	273	20	5.5
535	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	2	2	Small backhoe	Cat 310	cat.com	Diesel	70	20	5.5
536	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	1	1	Loader	CAT 966M XE	cat.com	Diesel	298	20	5.5
537	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	1	1	Motor grader	CAT 16	cat.com	Diesel	290	20	5.5
538	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	1	1	Bulldozer	CAT D10T2	cat.com	Diesel	722	20	3.3
539	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	2	2	Bulldozer w/discs	CAT D8T	cat.com	Diesel	354	20	5.5
540	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	2	2	Bulldozer	CAT D8T	cat.com	Diesel	354	20	5.5
541	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	1	1	Bulldozer	CAT D6	cat.com	Diesel	215	20	5.5
542	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	2	2	Vibratory smooth drum roller	CAT CS76	fs.usda.gov	Diesel	174	20	5.5
543	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	4	4	Padfoot roller	CAT CP76	fs.usda.gov	Diesel	174	20	5.5
544	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	4	4	Tamping foot roller	CAT 825K	cat.com	Diesel	405	20	5.5
545	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	-	2	Compressor	Doosan HP450	doosanportablepower.com	Diesel	173	20	5.5
546	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	-	2	Generator (80 kW)	Generac SD100	generac.com	Diesel	152	20	5.5
547	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	3	3	Large rigid-body dump truck	CAT 773	cat.com	Diesel	719	20	5.5
548	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	5	5	Articulated dump truck	CAT 745	cat.com	Diesel	496	20	5.5
549	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	6	6	Water truck	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	20	5.5
550	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	0.5	-	10	Light plant for night work	RNT-WCDE-4-MHL-4TN4000	www.larsonelectronics.com	Diesel	25	20	5.5
551	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	6	6	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	20	5.5
552	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	1	8	2	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	20	5.5
553	Dam	53	Stage 3b Fill (incl. work at stockpile areas & reservoir disposal)	Year 6 (Stage 3b)	6	-	-	-	No Equipment - Crew	-	-	-	-	20	5.5
660	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.25	1	1	Concrete pump truck	Liebherr 42 M5 XXT	liebherr.com	Diesel	500	10	5
661	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.7	2	2	Articulated dump truck	CAT 745	cat.com	Diesel	496	10	5
662	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.7	1	1	Medium excavator	Cat 330	cat.com	Diesel	273	10	5
663	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.7	1	1	Bulldozer	CAT D8T	cat.com	Diesel	354	10	5
664	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	3	0.7	2	1	Track drill rig	PowerROC T35 (2½"–4½")	epiroc.com	Diesel	201	10	5

Anderson Dam Seismic Retrofit Project Estimate of On-Site Equipment

#	Project Component	Activity ID	Construction Activity	Construction Phase	Approx. Duration (months)	Utilization Factor	Number of Workers	Equipment Quantity	Equipment Type	Assumed Equipment Description	Source/Notes	Fuel Type	Power Rating (HP)	Operating Hours/Day	Days/ Week
665	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	3	0.7	-	1	Compressor	Doosan HP450	doosanportablepower.com	Diesel	173	10	5
666	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	1	1	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
667	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	3	0.7	1	1	Manlift	JLG 600AJ	jlg.com	Diesel	67	10	5
668	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.7	1	1	Motor grader	CAT 16	cat.com	Diesel	290	10	5
669	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.3	1	1	Padfoot roller	CAT CP76	fs.usda.gov	Diesel	174	10	5
670	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.3	1	1	Tamping foot roller	CAT 825K	cat.com	Diesel	405	10	5
671	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.3	1	1	Vibratory smooth drum roller	CAT CS76	fs.usda.gov	Diesel	174	10	5
672	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.7	1	1	Asphalt paving machine	CAT AP1000F	cat.com	Diesel	225	10	5
673	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.7	1	1	Asphalt compactor	CAT CW16 11-wheel	cat.com	Diesel	100	10	5
674	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.5	1	1	Water truck	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	10	5
675	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	0.5	-	2	Concrete vibrator	1.5 Inch x 18 Foot Flexible	californiatoolsandequipment.com	Gasoline	6.5	10	5
676	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	1	-	1	Generator (80 kW)	Generac SD100	generac.com	Diesel	152	10	5
677	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	1	2	2	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
678	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	1	8	2	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
679	Permanent Access Roads	65	Restoring parking areas and construction of permanent access roads	Year 7	9	1	-	-	No Equipment - Crew	-	-	-	-	10	5

Notes

1 Estimated equipment is based on engineering judgment; estimated equipment can be reviewed following completion of the 90% design construction cost estimate.

2 Project components, construction activities, construction phase, and approximate duration are based on the ADSRP Construction Sequencing Plan dated 5/28/21 with the addition of dredging in Year 1 and the unlined spillway in Years 6 and 7.

3 Net HP used if available; gross used if net not available

Table A- 13. Anderson Dam Equipment Sound Levels

Equipment Description	L_{ASmax} @ 50ft	Acoustical Usage Factor	L_{AEQ} @ 50 ft	Source
Medium excavator	85	40	81	FTA, 2018
Loader	80	40	76	FTA, 2018
Light truck - Forman	75	10	65	FHWA, 2006
Light truck - Crew	75	10	65	FHWA, 2006
Medium Bulldozer	85	40	81	FTA, 2018
Motor grader	85	40	81	FTA, 2018
Track drill rig	95	20	88	FTA, 2018
Articulated dump truck	84	40	80	FTA, 2018
Water truck	84	40	80	FTA, 2018
Light truck - Personnel	75	10	65	FHWA, 2006
Boat - 30' Work Boat	82	40	78	Laymon Miller eqns 7-12 & 7-13[1]
Boat - 16' Whaler	77	40	73	Laymon Miller eqns 7-12 & 7-13[1]
Boat - 16' Skiff	73	40	69	Laymon Miller eqns 7-12 & 7-13[1]
Crane - 275t	83	16	77	FTA, 2018
Crane - 70t	83	16	77	FTA, 2018
Dredge Pump	77	50	78	FTA, 2018
Long-reach excavator	85	40	81	FTA, 2018
Crane 150t	83	16	77	FTA, 2018
Vibratory sheetpile driver	95	20	88	FTA, 2018
Concrete vibrator	76	20	69	FTA, 2018
Generator (80 kW)	68	50	65	Manufacturer Cutsheet[2]
Concrete pump truck	84	20	78	FTA, 2018
Vibratory plate	76	40	72	FTA, 2018
Tamper	83	40	79	FTA, 2018
Pump	77	50	78	FTA, 2018
Generator (80 kW)	68	50	65	Manufacturer Cutsheet[2]
15 cfs capacity pump	77	50	78	FTA, 2018
Site generator (2,000 kW)	75	50	72	Manufacturer Cutsheet[3]
Large excavator	85	40	81	FTA, 2018
Compressor	80	40	76	FHWA, 2006
Manlift	85	20	78	FHWA, 2006
3,000 gpm treatment system	77	100	77	Laymon Miller Table 7-12[1]
Bulldozer	85	40	81	FTA, 2018
Bulldozer w/discs	85	40	81	FTA, 2018
Grizzly to screen transition	81	50	78	GHD report[4]
Large rigid-body dump truck	84	40	80	FTA, 2018
Light plant for night work	68	100	68	Manufacturer Cutsheet[5]
Bobcat	80	40	76	FTA, 2018
Shotcrete batch plant	83	15	75	FHWA, 2006
Telehandler	80	40	76	FTA, 2018
Ventilation fan	85	100	85	FHWA, 2006
Robotic shotcrete machine	85	50	82	FHWA, 2006
Scooptrams	85	40	81	FTA, 2018
Jackhammer	88	20	82	FTA, 2018
Padfoot roller	85	20	78	FTA, 2018
Tamping foot roller	85	20	78	FTA, 2018
Excavator-mounted hoe-ram	90	20	83	FHWA, 2006

Equipment Description	L_{ASmax} @ 50ft	Acoustical Usage Factor	L_{AEQ} @ 50 ft	Source
Mini excavator	85	40	81	FTA, 2018
Small backhoe	82	40	78	FTA, 2018
Jacklegs	88	20	82	FTA, 2018
Loader	80	40	76	FTA, 2018
Highway dump truck	84	40	80	FTA, 2018
Vibratory smooth drum roller	85	20	78	FTA, 2018
Light truck - Carpenters	75	10	65	FHWA, 2006
Bulldozers w/riper	85	40	81	FTA, 2018
Explosives truck	84	40	80	FTA, 2018
Bulldozer w/discs	85	40	81	FTA, 2018
Asphalt paving machine	85	50	82	FTA, 2018
Asphalt compactor	82	20	76	FTA, 2018

1 Laymon Miller, *Noise Control for Buildings and Manufacturing Plants*, 1981.
2 Kohler KG80R. https://resources.kohler.com/power/kohler/residential/pdf/g4285.pdf
3 Caterpillar XGC1900. https://www.cat.com/en_US/products/new/power-systems/electric-power/mobile-generator-sets/105220.html
4 TNG Limited, *Mount Peake Project, Noise and Vibration Assessment Report, Appendix J*¸December 2015. https://ntepa.nt.gov.au/__data/assets/pdf_file/0003/289119/mt_peake_draft_eis_appendixJ_noise_vibration_assess_report.pdf
5 Larson Electric RNT-WCDE-4-MHL-4TN4000. https://www.larsonelectronics.com/product/242288/rent-6000w-generator-water-cooled-diesel-engine-30-telescoping-tower-4-mh-fixtures-mining-grade

B. CADNAA INPUTS AND RESULTS

Table A- 14. ADSRP CadnaA On-Site construction Noise Point Sources, DNL Calculation

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
medium_bulldozer	!0100!	119	Lw	119	500	(none)	6.56	r	2036525.79	13497456.59	403.75
track_drill_rig	!0100!	126	Lw	126	500	(none)	6.56	r	2036899.8	13497621.98	403.18
medium_excavator	!0100!	119	Lw	119	500	(none)	6.56	r	2036985.27	13497550.33	406.91
articulated_dump_truck	!010200!	118	Lw	118	500	(none)	6.56	r	2037164.4	13497671.59	405.52
light_truck_1	!010200!	103	Lw	103	500	(none)	6.56	r	2037266.37	13497621.98	407.1
light_truck_2	!010200!	103	Lw	103	500	(none)	6.56	r	2037299.44	13497619.23	407.15
motor_grader	!0100!	119	Lw	119	500	(none)	6.56	r	2037619.78	13497726.71	406.82
water_truck	!0100!	118	Lw	118	500	(none)	6.56	r	2037616.4	13497613.71	406.82
loader	!0100!	114	Lw	114	500	(none)	6.56	r	2036659.65	13497499.44	403.9
stockpile_D_medium_bulldozer	!0100!	119	Lw	119	500	(none)	6.56	r	2042221.29	13498465.49	572.12
stockpile_D_medium_excavator	!0100!	119	Lw	119	500	(none)	6.56	r	2042481.73	13498524.51	530.38
stockpile_D_dump_truck	!0100!	118	Lw	118	500	(none)	6.56	r	2042700.49	13498298.79	550.37
stockpile_D_motor_grader	!0100!	119	Lw	119	500	(none)	6.56	r	2042971.36	13498316.17	505.72
stockpile_D_loader	!0100!	114	Lw	114	500	(none)	6.56	r	2042891.5	13497993.21	580
stockpile_B_truck	!0100!	118	Lw	118	500	(none)	6.56	r	2040451.12	13497274.48	666.02
stockpile_D_loader	!0100!	114	Lw	114	500	(none)	6.56	r	2040754.29	13497255.2	692.27
stockpile_K(N)_truck2	!0100!	118	Lw	118	500	(none)	6.56	r	2048534.92	13494051.66	531.64
stockpile_K(N)_truck1	!0100!	118	Lw	118	500	(none)	6.56	r	2048218.91	13494416.28	519.08
stockpile_K(S)_truck1	!0100!	118	Lw	118	500	(none)	6.56	r	2049493.35	13493575.92	538.7
stockpile_K(S)_truck2	!0100!	118	Lw	118	500	(none)	6.56	r	2050149.68	13493301.58	548.04
Medium Bulldozer	!010100!	115.8	Lw	MBDOZ		(none)	6.56	r	2037583.53	13498273.1	455.12
Medium Bulldozer	!010100!	115.8	Lw	MBDOZ		(none)	6.56	r	2039585.64	13496976.17	491.63
Medium Excavator	!010100!	115.8	Lw	MEXC		(none)	6.56	r	2037794.74	13498246.69	451.21
Medium Excavator	!010100!	115.8	Lw	MEXC		(none)	6.56	r	2040672.92	13497294.59	679.38
Motor Grader	!010100!	115.8	Lw	MGRAD		(none)	6.56	r	2037117.05	13497868.24	400.86
Track Drill Rig	!010100!	122.8	Lw	TDRIG		(none)	6.56	r	2040764.32	13499131.34	461.56
Track Drill Rig	!010100!	122.8	Lw	TDRIG		(none)	6.56	r	2042218.6	13498629.08	524.18
Loader	!010100!	110.8	Lw	LOAD		(none)	6.56	r	2037473.5	13497939.75	405.91
Large Excavator	!010200!	115.8	Lw	LEXC		(none)	6.56	r	2039520.19	13497757.12	609.08
Track Drill rig	!010200!	122.8	Lw	TDRIG		(none)	6.56	r	2039469.81	13497435.45	519.21
Compressor	!010200!	110.8	Lw	COMP		(none)	6.56	r	2039128.77	13498063.28	532.62
Loader	!010200!	110.8	Lw	LOAD		(none)	6.56	r	2039287.66	13497741.62	528.53

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Man Lift	!010200!	112.8	Lw	MLIFT		(none)	6.56	r	2039372.92	13497993.52	603.6
Pump	!010200!	112.8	Lw	PUMP		(none)	6.56	r	2039667.46	13497551.72	605.77
Generator	!010200!	99.8	Lw	GEN		(none)	6.56	r	2039454.3	13497613.73	557.99
Medium Excavator	!010300!	115.8	Lw	MEXC		(none)	6.56	r	2037783.98	13497652.48	406.82
Track Drill Rig	!010300!	122.8	Lw	TDRIG		(none)	6.56	r	2038907.86	13497644.73	429.89
Track Drill Rig	!010300!	122.8	Lw	TDRIG		(none)	6.56	r	2039524.06	13497005.28	497.87
Compresor	!010300!	110.8	Lw	COMP		(none)	6.56	r	2039427.18	13497218.43	485.05
Man Lift	!010300!	112.8	Lw	MLIFT		(none)	6.56	r	2039655.83	13496892.89	477.72
Generator	!010300!	99.8	Lw	GEN		(none)	6.56	r	2039008.63	13497633.1	437.47
Medium Excavator	!010301!	115.8	Lw	MEXC		(none)	6.56	r	2039654.39	13497881.1	627.19
Mini Excavator	!010301!	115.8	Lw	MINIEXC		(none)	6.56	r	2039326.3	13497840.09	557.87
Track Drill Rig	!010301!	122.8	Lw	TDRIG		(none)	6.56	r	2039593.85	13497453.41	557.78
Track Drill Rig	!010301!	122.8	Lw	TDRIG		(none)	6.56	r	2039957.79	13498310.1	495.46
Compressor	!010301!	110.8	Lw	COMP		(none)	6.56	r	2040013.73	13497326.47	631.84
Loader	!010301!	110.8	Lw	LOAD		(none)	6.56	r	2039666.11	13498281.45	550.04
Pump	!010301!	112.8	Lw	PUMP		(none)	6.56	r	2040076.22	13497656.51	560.63
Generator	!010301!	99.8	Lw	GEN		(none)	6.56	r	2039888.74	13498000.23	521.98
Large Excavator	!010700!	115.8	Lw	LEXC2		(none)	6.56	r	2040734.22	13497222.82	687.97
Medium Excavator	!010700!	115.8	Lw	MEXC2		(none)	6.56	r	2040062.96	13498073.07	461.56
Medium Excavator	!010700!	115.8	Lw	MEXC		(none)	6.56	r	2039375.32	13498213.52	638.41
Medium Excavator	!010700!	115.8	Lw	MEXC		(none)	6.56	r	2039946.26	13498435.67	523.92
Small Back Hoe	!010700!	115.8	Lw	SBHOE		(none)	6.56	r	2042354.82	13499295.36	466.56
Small Back Hoe	!010700!	115.8	Lw	SBHOE		(none)	6.56	r	2040871.18	13497451.07	765
Loader	!010700!	110.8	Lw	LOAD		(none)	6.56	r	2041158.78	13497099.56	853
Motor Grader	!010700!	115.8	Lw	MGRAD		(none)	6.56	r	2042827.87	13498847.62	466.56
Bulldozer	!010700!	115.8	Lw	BOZ		(none)	6.56	r	2041985.05	13499391.22	466.56
Bulldozer with Discs	!010700!	115.8	Lw	BDOZWITHDISCS		(none)	6.56	r	2039862.26	13497690.19	602.14
Bulldozer with Discs	!010700!	115.8	Lw	BDOZWITHDISCS		(none)	6.56	r	2049657.08	13493491.93	540.3
Bulldozer	!010700!	115.8	Lw	MBDOZ		(none)	6.56	r	2040715.96	13496994.57	717.35
Bulldozer	!010700!	115.8	Lw	MBDOZ		(none)	6.56	r	2047992.67	13494575.65	516.56
Bulldozer	!010700!	115.8	Lw	BDOZ2		(none)	6.56	r	2042814.5	13499256.03	466.56
Vibratory Smooth Drum Roller	!010700!	112.8	Lw	VIBSDROLL		(none)	6.56	r	2039566.02	13497614.56	593.98
Vibratory Smooth Drum Roller	!010700!	112.8	Lw	VIBSDROLL		(none)	6.56	r	2039365.25	13497658.66	539.12
Padfoot Roller	!010700!	112.8	Lw	PADROLL		(none)	6.56	r	2039223.44	13497952.99	543.11

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Padfoot Roller	!010700!	112.8	Lw	PADROLL		(none)	6.56	r	2039439.54	13497914.09	610.95
Padfoot Roller	!010700!	112.8	Lw	PADROLL		(none)	6.56	r	2039551.76	13498145.39	612.3
Padfoot Roller	!010700!	112.8	Lw	PADROLL		(none)	6.56	r	2041556.39	13500380.85	561.49
Tamping Foot Roller	!010700!	112.8	Lw	TAMPFROLL		(none)	6.56	r	2039873.57	13497506.04	640.62
Tamping Foot Roller	!010700!	112.8	Lw	TAMPFROLL		(none)	6.56	r	2039740.15	13498355.18	553.77
Tamping Foot Roller	!010700!	112.8	Lw	TAMPFROLL		(none)	6.56	r	2039620.61	13497764.37	637.91
Tamping Foot Roller	!010700!	112.8	Lw	TAMPFROLL		(none)	6.56	r	2050094.41	13493464.97	542.93
Compressor	!010700!	110.8	Lw	COMP		(none)	6.56	r	2040994.43	13497336.95	793.78
Compressor	!010700!	110.8	Lw	COMP		(none)	6.56	r	2042655.43	13499112.75	466.56
Generator	!010700!	99.8	Lw	GEN		(none)	6.56	r	2040820.96	13497063.04	715.46
Generator	!010700!	99.8	Lw	GEN		(none)	6.56	r	2041811.58	13499322.75	466.56
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2037131.14	13497657.55	405.26
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2037724.55	13498222.49	440.94
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2048286.16	13494304.04	522.37
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2050533.36	13493287.09	552.27
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2040903.13	13496976.31	788.07
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2041848.1	13499514.48	466.56
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2042204.17	13499372.96	466.56
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2042341.13	13499140.15	466.56
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2039626.01	13497991.75	614.76
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2041002.5	13501025.29	563.13
Medium Excavator	!010800!	115.8	Lw	MEXC		(none)	6.56	r	2040629.23	13497222.82	678.06
Bulldozer	!010800!	115.8	Lw	MBDOZ		(none)	6.56	r	2040706.83	13497090.43	694.61
Track Drill Rig	!010800!	122.8	Lw	TDRIG		(none)	6.56	r	2040436.91	13497542.45	648.02
Compressor	!010800!	110.8	Lw	COMP		(none)	6.56	r	2040784.44	13497158.91	693.56
Loader	!010800!	110.8	Lw	LOAD		(none)	6.56	r	2040254.89	13497318.69	656.27
Man Lift	!010800!	112.8	Lw	MLIFT		(none)	6.56	r	2040624.67	13497341.5	671.36
Motor Grader	!010800!	115.8	Lw	MGRAD		(none)	6.56	r	2040496.84	13497706.72	635.98
Padfoot Roller	!010800!	112.8	Lw	PADROLL		(none)	6.56	r	2040610.97	13498021.71	587.79
Tamping Foot Roller	!010800!	112.8	Lw	TAMPFROLL		(none)	6.56	r	2040510.54	13497880.19	612.39
Vibratory Smooth Drum Roller	!010800!	112.8	Lw	VIBSDROLL		(none)	6.56	r	2038808.09	13497707.73	436.43
Asphalt Paving Machine	!010800!	116.8	Lw	ASHPAVMAC		(none)	6.56	r	2040761.61	13496930.65	737.45
Asphalt Compactor	!010800!	110.8	Lw	ASHCOM		(none)	6.56	r	2038809.09	13497631.28	424.93
Concrete Vibrator	!010800!	103.8	Lw	CONVIB		(none)	6.56	r	2038777.86	13497662.59	429.75

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Concrete Vibrator	!010800!	103.8	Lw	CONVIB		(none)	6.56	r	2040560.75	13497209.12	678.65
Generator	!010800!	99.8	Lw	GEN		(none)	6.56	r	2040469.45	13497619.98	642.6
medium_excavator	!010100!	119	Lw	119	500	(none)	6.56	r	2036985.27	13497550.33	406.91
light_truck_1	!010100!	103	Lw	103	500	(none)	6.56	r	2037266.37	13497621.98	407.1
light_truck_2	!010100!	103	Lw	103	500	(none)	6.56	r	2037299.44	13497619.23	407.15
articulated_dump_truck	!010100!	118	Lw	118	500	(none)	6.56	r	2037164.4	13497671.59	405.52
motor_grader	!010100!	119	Lw	119	500	(none)	6.56	r	2037619.78	13497726.71	406.82
water_truck	!010100!	118	Lw	118	500	(none)	6.56	r	2037616.4	13497613.71	406.82
loader	!010100!	114	Lw	114	500	(none)	6.56	r	2036659.65	13497499.44	403.9
light_truck_1	!0100!	103	Lw	103	500	(none)	6.56	r	2037266.37	13497621.98	407.1
light_truck_2	!0100!	103	Lw	103	500	(none)	6.56	r	2037299.44	13497619.23	407.15
articulated_dump_truck	!0100!	118	Lw	118	500	(none)	6.56	r	2037164.4	13497671.59	405.52
light_truck_1	!010200!	103	Lw	103	500	(none)	6.56	r	2039538.95	13497280.62	506.01
light_truck_2	!010200!	103	Lw	103	500	(none)	6.56	r	2039450.33	13497363.21	493.89
articulated_dump_truck	!010200!	118	Lw	118	500	(none)	6.56	r	2039386.41	13497428.21	493.89
Loader	!010200!	110.8	Lw	LOAD		(none)	6.56	r	2037473.5	13497939.75	405.91
Medium Excavator	!010301!	115.8	Lw	MEXC		(none)	6.56	r	2037794.74	13498246.69	451.21
Loader	!010301!	110.8	Lw	LOAD		(none)	6.56	r	2037473.5	13497939.75	405.91
light_truck_1	!010301!	103	Lw	103	500	(none)	6.56	r	2037266.37	13497621.98	407.1
light_truck_2	!010301!	103	Lw	103	500	(none)	6.56	r	2037299.44	13497619.23	407.15
articulated_dump_truck	!010301!	118	Lw	118	500	(none)	6.56	r	2037164.4	13497671.59	405.52
light_truck_1	!010301!	103	Lw	103	500	(none)	6.56	r	2040031.28	13496806.4	554.71
light_truck_2	!010301!	103	Lw	103	500	(none)	6.56	r	2039812.23	13497107.19	584.57
articulated_dump_truck	!010301!	118	Lw	118	500	(none)	6.56	r	2039730.8	13496946.57	515.22
water_truck	!010301!	118	Lw	118	500	(none)	6.56	r	2039636.12	13497104.83	517.87
light_truck_1	!010300!	103	Lw	103	500	(none)	6.56	r	2039893.9	13496746.66	526.34
light_truck_2	!010300!	103	Lw	103	500	(none)	6.56	r	2039915.77	13496957.85	560.96
concrete pump truck	!010300!	112.8	Lw	CPUMPTRU	500	(none)	6.56	r	2039757.02	13497270.41	581.09
medium_excavator	!010700!	119	Lw	119	500	(none)	6.56	r	2036985.27	13497550.33	406.91
light_truck_1	!010700!	103	Lw	103	500	(none)	6.56	r	2037266.37	13497621.98	407.1
light_truck_2	!010700!	103	Lw	103	500	(none)	6.56	r	2037299.44	13497619.23	407.15
articulated_dump_truck	!010700!	118	Lw	118	500	(none)	6.56	r	2037164.4	13497671.59	405.52
water_truck	!010700!	118	Lw	118	500	(none)	6.56	r	2037616.4	13497613.71	406.82
articulated_dump_truck	!010800!	118	Lw	118	500	(none)	6.56	r	2037164.4	13497671.59	405.52

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
light_truck_1	!010800!	103	Lw	103	500	(none)	6.56	r	2037266.37	13497621.98	407.1
light_truck_2	!010800!	103	Lw	103	500	(none)	6.56	r	2037299.44	13497619.23	407.15
Vibratory Smooth Drum Roller	!010800!	112.8	Lw	VIBSDROLL		(none)	6.56	r	2037446.09	13497590.92	407.53
Bulldozer	!010800!	115.8	Lw	MBDOZ		(none)	6.56	r	2036789.85	13497551.5	404.03
Medium Excavator	!010800!	115.8	Lw	MEXC		(none)	6.56	r	2037783.98	13497652.48	406.82
light_truck_1	!010800!	103	Lw	103	500	(none)	6.56	r	2039893.9	13496746.66	526.34
light_truck_2	!010800!	103	Lw	103	500	(none)	6.56	r	2039915.77	13496957.85	560.96
water_truck	!010800!	118	Lw	118	500	(none)	6.56	r	2039636.12	13497104.83	517.87
articulated_dump_truck	!010800!	118	Lw	118	500	(none)	6.56	r	2039730.8	13496946.57	515.22
concrete pump truck	!010800!	112.8	Lw	CPUMPTRU	500	(none)	6.56	r	2039757.02	13497270.41	581.09
Large Excavator	!0109!	115.8	Lw	LEXC2		(none)	6.56	r	2040734.22	13497222.82	687.97
Loader	!0109!	110.8	Lw	LOAD		(none)	6.56	r	2041158.78	13497099.56	853
Bulldozer	!0109!	115.8	Lw	BOZ		(none)	6.56	r	2040662.64	13497102.98	692.36
light_truck_1	!0109!	103	Lw	103	500	(none)	6.56	r	2040031.28	13496806.4	554.71
light_truck_2	!0109!	103	Lw	103	500	(none)	6.56	r	2039812.23	13497107.19	584.57
water_truck	!0109!	118	Lw	118	500	(none)	6.56	r	2040160.43	13497242.81	650.64
Pump	!0109!	112.8	Lw	PUMP		(none)	6.56	r	2040576.41	13497361.78	661.8
light_truck_1	!010A00!	99.8	Lw	LTRUFOR	500	(none)	6.56	r	2039992	13498408	507.77
Track Drill rig - 5 dB shielding from tunnel/shaft	!010A00!	117.8	Lw	TDRIG		(none)	1	r	2039702	13498436	578.01
Compressor	!010A00!	110.8	Lw	COMP		(none)	6.56	r	2039908	13498507	549.84
Loader	!010A00!	110.8	Lw	LOAD		(none)	6.56	r	2039611	13498420	611.13
Pump	!010A00!	112.8	Lw	PUMP		(none)	6.56	r	2039874	13498366	524.61
Generator	!010A00!	99.8	Lw	GEN		(none)	6.56	r	2039824	13498462	556.09
light_truck_2	!010A00!	99.8	Lw	LTRUCREW	500	(none)	6.56	r	2039699	13498507	598.99
light_truck_1	!010A00!	99.8	Lw	LTRUFOR	500	(none)	6.56	r	2039765	13498336	538.62
light_truck_2	!010A00!	99.8	Lw	LTRUCREW	500	(none)	6.56	r	2039814	13498518	569.3
ventilation fan	!010A00!	119.8	Lw	VENTFAN	500	(none)	6.56	r	2039650	13498461	603.26
jacklegs	!010A00!	116.8	Lw	JACKLG	500	(none)	6.56	r	2039812	13498390	545.19
shotcrete batch plant	!010A00!	109.8	Lw	SBATCHP	500	(none)	6.56	r	2039753	13498378	558.72
light_truck_2	!010A00!	99.8	Lw	LTRUCREW	500	(none)	6.56	r	2039679	13498357	572.14
light_truck_1	!010A00!	99.8	Lw	LTRUFOR	500	(none)	6.56	r	2039830	13498314	522.43
jacklegs	!010A00!	116.8	Lw	JACKLG	500	(none)	6.56	r	2039744	13498421	569.73
small backhoe	!010A00!	112.8	Lw	SBHOE	500	(none)	6.56	r	2039721	13498430	577.35
150t crane	!010A00!	111.8	Lw	CRANE150T	500	(none)	6.56	r	2039673	13498548	613.28

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates				
			Type	Value					X		Y		Z
		(dBA)			(Hz)		(ft)		(ft)		(ft)		(ft)
telehandler	!010A00!	110.8	Lw	TELEHAND	500	(none)	6.56	r	2039654		13498399		590.11

Table A- 15. ADSRP CadnaA On-Site Construction Noise Results, DNL Calculation

Receiver		Height		Coordinates			V1	V3	V7	V8	V9	V10		
Name	ID			X	Y	Z	Day	Day	Day	Day	Day	Day		
		(ft)		(ft)	(ft)	(ft)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)		
R01	!02!R01	9.84	r	2036199.31	13497204.95	405.64	60.8	60.3	58.8	58.3	49.2	34.9		
R02	!02!R02	9.84	r	2036734.82	13497862.83	415.47	71.7	66.6	69.6	68.9	50.5	33.9		
R03	!02!R03	9.84	r	2036918.8	13497344.65	412.32	74.4	67.5	73.5	69.9	51.4	35.4		
R04	!02!R04	9.84	r	2037463.98	13497357.38	414.47	73.1	69.1	71.4	69.9	53.4	37.6		
R05	!02!R05	9.84	r	2037852.89	13497314.37	417.55	70.3	69.1	68.5	67.7	55	38.7		
R06	!02!R06	9.84	r	2038345.21	13497255.15	424.43	65.3	69.7	64.7	65.3	57.5	41.2		
R07	!02!R07	9.84	r	2038757.87	13496747.04	447.09	61.9	68.6	62.4	63.8	59.7	42.4		
R08	!02!R08	9.84	r	2039941.42	13496201.61	573.71	60	68.6	59.5	63.9	61.4	49		
R09	!02!R09	9.84	r	2040681.07	13496192.93	708.58	54.8	58.7	54.2	54.8	53.6	49.9		
R10	!02!R10	9.84	r	2043416.6	13496287.04	747.95	35.9	28.9	51.4	29	34.3	31.2		
R11	!02!R11	9.84	r	2048115.49	13493743.96	659.62	36.5	28.7	53.2	20.8	23	34.1		
R12	!02!R12	9.84	r	2049896.39	13492799.21	659.59	32	-80.2	57	-80.2	18.9	-80.2		
R13	!02!R13	9.84	r	2049085.37	13496052.59	849.74	37.7	34.5	47.1	30.6	31.8	34.6		
R31	!02!R31	9.84	r	2038638.71	13496936.55		442.61	62.9	69.4	63.3	64.6	59.2	42.2	
R32	!02!R32	9.84	r	2038976.01	13497455.33		430.64	61.4	72.8	66.1	67.8	57.8	43	

Table A- 16. ADSRP CadnaA On-Site Construction Noise Point Sources, FTA Calculation

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
medium_bulldozer	!0100!	119.8	Lw	MBDOZ	500	(none)	6.56	r	2036525.79	13497456.59	403.75
track_drill_rig	!0100!	129.8	Lw	TDRIG	500	(none)	6.56	r	2036899.8	13497621.98	403.18
medium_excavator	!0100!	119.8	Lw	MEXC	500	(none)	6.56	r	2036985.27	13497550.33	406.91
articulated_dump_truck	!010200!	118.8	Lw	ADT	500	(none)	6.56	r	2037164.4	13497671.59	405.52
light_truck_1	!010200!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2037266.37	13497621.98	407.1
light_truck_2	!010100!	109.8	Lw	LTRUCREW	500	(none)	6.56	r	2037299.44	13497619.23	407.15
motor_grader	!010100!	119.8	Lw	MGRAD	500	(none)	6.56	r	2037619.78	13497726.71	406.82

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
water_truck	!010301!	118.8	Lw	WTRUCK	500	(none)	6.56	r	2039582.77	13497116.82	511.19
loader	!010100!	114.8	Lw	LOAD	500	(none)	6.56	r	2036659.65	13497499.44	403.9
stockpile_D_medium_bulldozer	!0100!	119.8	Lw	MBDOZ	500	(none)	6.56	r	2042221.29	13498465.49	572.12
stockpile_D_medium_excavator	!0100!	119.8	Lw	MEXC	500	(none)	6.56	r	2042481.73	13498524.51	530.38
stockpile_D_dump_truck	!0100!	118.8	Lw	ADT	500	(none)	6.56	r	2042700.49	13498298.79	550.37
stockpile_D_motor_grader	!0100!	119.8	Lw	MGRAD	500	(none)	6.56	r	2042971.36	13498316.17	505.72
stockpile_D_loader	!0100!	114.8	Lw	LOAD	500	(none)	6.56	r	2042891.5	13497993.21	580
stockpile_B_truck	!0100!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2040451.12	13497274.48	666.02
stockpile_D_loader	!0100!	114.8	Lw	LOAD	500	(none)	6.56	r	2040754.29	13497255.2	692.27
stockpile_K(N)_truck2	!0100!	118.8	Lw	ADT	500	(none)	6.56	r	2048534.92	13494051.66	531.64
stockpile_K(N)_truck1	!0100!	118.8	Lw	ADT	500	(none)	6.56	r	2048218.91	13494416.28	519.08
stockpile_K(S)_truck1	!0100!	118.8	Lw	ADT	500	(none)	6.56	r	2049493.35	13493575.92	538.7
stockpile_K(S)_truck2	!0100!	118.8	Lw	ADT	500	(none)	6.56	r	2050149.68	13493301.58	548.04
Medium Bulldozer	!010100!	119.8	Lw	MBDOZ		(none)	6.56	r	2037583.53	13498273.1	455.12
Medium Bulldozer	!010100!	119.8	Lw	MBDOZ		(none)	6.56	r	2039585.64	13496976.17	491.63
Medium Excavator	!010100!	119.8	Lw	MEXC		(none)	6.56	r	2037794.74	13498246.69	451.21
Medium Excavator	!010100!	119.8	Lw	MEXC		(none)	6.56	r	2040672.92	13497294.59	679.38
Motor Grader	!010100!	119.8	Lw	MGRAD		(none)	6.56	r	2037117.05	13497868.24	400.86
Track Drill Rig	!010100!	129.8	Lw	TDRIG		(none)	6.56	r	2040764.32	13499131.34	461.56
Track Drill Rig	!010100!	129.8	Lw	TDRIG		(none)	6.56	r	2042218.6	13498629.08	524.18
Loader	!010100!	114.8	Lw	LOAD		(none)	6.56	r	2037473.5	13497939.75	405.91
Large Excavator	!010200!	119.8	Lw	LEXC		(none)	6.56	r	2039520.19	13497757.12	609.08
Track Drill rig	!010200!	129.8	Lw	TDRIG		(none)	6.56	r	2039469.81	13497435.45	519.21
Compressor	!010200!	114.8	Lw	COMP		(none)	6.56	r	2039128.77	13498063.28	532.62
Loader	!010200!	114.8	Lw	LOAD		(none)	6.56	r	2039287.66	13497741.62	528.53
Man Lift	!010200!	119.8	Lw	MLIFT		(none)	6.56	r	2039372.92	13497993.52	603.6
Pump	!010200!	115.8	Lw	PUMP		(none)	6.56	r	2039667.46	13497551.72	605.77
Generator	!010200!	102.8	Lw	GEN		(none)	6.56	r	2039454.3	13497613.73	557.99
Medium Excavator	!010100!	119.8	Lw	MEXC		(none)	6.56	r	2037783.98	13497652.48	406.82
Track Drill Rig	!010300!	129.8	Lw	TDRIG		(none)	6.56	r	2038907.86	13497644.73	429.89
Track Drill Rig	!010300!	129.8	Lw	TDRIG		(none)	6.56	r	2039524.06	13497005.28	497.87
Compresor	!010300!	114.8	Lw	COMP		(none)	6.56	r	2039427.18	13497218.43	485.05
Man Lift	!010300!	119.8	Lw	MLIFT		(none)	6.56	r	2039655.83	13496892.89	477.72
Generator	!010300!	102.8	Lw	GEN		(none)	6.56	r	2039008.63	13497633.1	437.47

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Medium Excavator	!010301!	119.8	Lw	MEXC		(none)	6.56	r	2039654.39	13497881.1	627.19
Mini Excavator	!010301!	119.8	Lw	MINIEXC		(none)	6.56	r	2039326.3	13497840.09	557.87
Track Drill Rig	!010301!	129.8	Lw	TDRIG		(none)	6.56	r	2039593.85	13497453.41	557.78
Track Drill Rig	!010301!	129.8	Lw	TDRIG		(none)	6.56	r	2039957.79	13498310.1	495.46
Compressor	!010301!	114.8	Lw	COMP		(none)	6.56	r	2040013.73	13497326.47	631.84
Loader	!010301!	114.8	Lw	LOAD		(none)	6.56	r	2039666.11	13498281.45	550.04
Pump	!010301!	115.8	Lw	PUMP		(none)	6.56	r	2040076.22	13497656.51	560.63
Generator	!010301!	102.8	Lw	GEN		(none)	6.56	r	2039888.74	13498000.23	521.98
Large Excavator	!010700!	119.8	Lw	LEXC2		(none)	6.56	r	2040734.22	13497222.82	687.97
Medium Excavator	!010700!	119.8	Lw	MEXC2		(none)	6.56	r	2040062.96	13498073.07	461.56
Medium Excavator	!010700!	119.8	Lw	MEXC		(none)	6.56	r	2039375.32	13498213.52	638.41
Medium Excavator	!010700!	119.8	Lw	MEXC		(none)	6.56	r	2039946.26	13498435.67	523.92
Small Back Hoe	!010700!	116.8	Lw	SBHOE		(none)	6.56	r	2042354.82	13499295.36	466.56
Small Back Hoe	!010700!	116.8	Lw	SBHOE		(none)	6.56	r	2040871.18	13497451.07	765
Loader	!010700!	114.8	Lw	LOAD		(none)	6.56	r	2041158.78	13497099.56	853
Motor Grader	!010700!	119.8	Lw	MGRAD		(none)	6.56	r	2042811.53	13498864.97	466.56
Bulldozer	!010700!	119.8	Lw	BOZ		(none)	6.56	r	2041985.05	13499391.22	466.56
Bulldozer with Discs	!010700!	119.8	Lw	BDOZWITHDISCS		(none)	6.56	r	2039862.26	13497690.19	602.14
Bulldozer with Discs	!010700!	119.8	Lw	BDOZWITHDISCS		(none)	6.56	r	2049657.08	13493491.93	540.3
Bulldozer	!010700!	119.8	Lw	MBDOZ		(none)	6.56	r	2040715.96	13496994.57	717.35
Bulldozer	!010700!	119.8	Lw	MBDOZ		(none)	6.56	r	2047992.67	13494575.65	516.56
Bulldozer	!010700!	119.8	Lw	BDOZ2		(none)	6.56	r	2042790.93	13499272.29	466.56
Vibratory Smooth Drum Roller	!010700!	119.8	Lw	VIBSDROLL		(none)	6.56	r	2039612.54	13497663.66	616.75
Vibratory Smooth Drum Roller	!010700!	119.8	Lw	VIBSDROLL		(none)	6.56	r	2039360.76	13497701.7	545.91
Padfoot Roller	!010700!	119.8	Lw	PADROLL		(none)	6.56	r	2039223.44	13497952.99	543.11
Padfoot Roller	!010700!	119.8	Lw	PADROLL		(none)	6.56	r	2039451.74	13497941.92	617.45
Padfoot Roller	!010700!	119.8	Lw	PADROLL		(none)	6.56	r	2039563.31	13498153.93	607.16
Padfoot Roller	!010700!	119.8	Lw	PADROLL		(none)	6.56	r	2041556.39	13500380.85	561.49
Tamping Foot Roller	!010700!	119.8	Lw	TAMPFROLL		(none)	6.56	r	2039912.97	13497489.4	645.86
Tamping Foot Roller	!010700!	119.8	Lw	TAMPFROLL		(none)	6.56	r	2039740.15	13498355.18	553.77
Tamping Foot Roller	!010700!	119.8	Lw	TAMPFROLL		(none)	6.56	r	2039607.89	13497806.61	641.33
Tamping Foot Roller	!010700!	119.8	Lw	TAMPFROLL		(none)	6.56	r	2050094.41	13493464.97	542.93
Compressor	!010700!	114.8	Lw	COMP		(none)	6.56	r	2040994.43	13497336.95	793.78
Compressor	!010700!	114.8	Lw	COMP		(none)	6.56	r	2042622.93	13499117.16	466.56

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Generator	!010700!	102.8	Lw	GEN		(none)	6.56	r	2040820.96	13497063.04	715.46
Generator	!010700!	102.8	Lw	GEN		(none)	6.56	r	2041811.58	13499322.75	466.56
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2037131.14	13497657.55	405.26
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2037724.55	13498222.49	440.94
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2048286.16	13494304.04	522.37
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2050533.36	13493287.09	552.27
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2040903.13	13496976.31	788.07
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2041848.1	13499514.48	466.56
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2042204.17	13499372.96	466.56
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2042341.13	13499140.15	466.56
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2039626.01	13497991.75	614.76
Light Plant for Night Work	!010700!	102.8	Lw	LPLANTNWORK		(none)	6.56	r	2041002.5	13501025.29	563.13
Medium Excavator	!010800!	119.8	Lw	MEXC		(none)	6.56	r	2040629.23	13497222.82	678.06
Bulldozer	!010800!	119.8	Lw	MBDOZ		(none)	6.56	r	2040706.83	13497090.43	694.61
Track Drill Rig	!010800!	129.8	Lw	TDRIG		(none)	6.56	r	2040436.91	13497542.45	648.02
Compressor	!010800!	114.8	Lw	COMP		(none)	6.56	r	2040784.44	13497158.91	693.56
Loader	!010800!	114.8	Lw	LOAD		(none)	6.56	r	2040254.89	13497318.69	656.27
Man Lift	!010800!	119.8	Lw	MLIFT		(none)	6.56	r	2040624.67	13497341.5	671.36
Motor Grader	!010800!	119.8	Lw	MGRAD		(none)	6.56	r	2040496.84	13497706.72	635.98
Padfoot Roller	!010800!	119.8	Lw	PADROLL		(none)	6.56	r	2040610.97	13498021.71	587.79
Tamping Foot Roller	!010800!	119.8	Lw	TAMPFROLL		(none)	6.56	r	2040510.54	13497880.19	612.39
Vibratory Smooth Drum Roller	!010800!	119.8	Lw	VIBSDROLL		(none)	6.56	r	2038808.09	13497707.73	436.43
Asphalt Paving Machine	!010800!	119.8	Lw	ASHPAVMAC		(none)	6.56	r	2040761.61	13496930.65	737.45
Asphalt Compactor	!010800!	117.8	Lw	ASHCOM		(none)	6.56	r	2038809.09	13497631.28	424.93
Concrete Vibrator	!010800!	110.8	Lw	CONVIB		(none)	6.56	r	2038777.86	13497662.59	429.75
Concrete Vibrator	!010800!	110.8	Lw	CONVIB		(none)	6.56	r	2040560.75	13497209.12	678.65
Generator	!010800!	102.8	Lw	GEN		(none)	6.56	r	2040469.45	13497619.98	642.6
Loader	!010200!	114.8	Lw	LOAD		(none)	6.56	r	2037473.5	13497939.75	405.91
light_truck_2	!010200!	109.8	Lw	LTRUCREW	500	(none)	6.56	r	2037299.44	13497619.23	407.15
light_truck_1	!010100!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2037266.37	13497621.98	407.1
articulated_dump_truck	!010100!	118.8	Lw	ADT	500	(none)	6.56	r	2037164.4	13497671.59	405.52
Medium Excavator	!010301!	119.8	Lw	MEXC		(none)	6.56	r	2037794.74	13498246.69	451.21
Loader	!010301!	114.8	Lw	LOAD		(none)	6.56	r	2037473.5	13497939.75	405.91
light_truck_1	!010301!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2037266.37	13497621.98	407.1

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
light_truck_2	!010301!	109.8	Lw	LTRUCREW	500	(none)	6.56	r	2037299.44	13497619.23	407.15
articulated_dump_truck	!010301!	118.8	Lw	ADT	500	(none)	6.56	r	2037164.4	13497671.59	405.52
Medium Excavator	!010700!	119.8	Lw	MEXC		(none)	6.56	r	2037783.98	13497652.48	406.82
Bulldozer	!010700!	119.8	Lw	BDOZ2		(none)	6.56	r	2036783.76	13497534.99	404.6
light_truck_1	!010700!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2037266.37	13497621.98	407.1
light_truck_2	!010700!	109.8	Lw	LTRUCREW	500	(none)	6.56	r	2037299.44	13497619.23	407.15
articulated_dump_truck	!010700!	118.8	Lw	ADT	500	(none)	6.56	r	2037164.4	13497671.59	405.52
water_truck	!010700!	118.8	Lw	WTRUCK	500	(none)	6.56	r	2037616.4	13497613.71	406.82
articulated_dump_truck	!010800!	118.8	Lw	ADT	500	(none)	6.56	r	2037164.4	13497671.59	405.52
Medium Excavator	!010800!	119.8	Lw	MEXC		(none)	6.56	r	2037783.98	13497652.48	406.82
Bulldozer	!010800!	119.8	Lw	BDOZ2		(none)	6.56	r	2036783.76	13497534.99	404.6
light_truck_1	!010800!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2037266.37	13497621.98	407.1
light_truck_2	!010800!	109.8	Lw	LTRUCREW	500	(none)	6.56	r	2037299.44	13497619.23	407.15
Vibratory Smooth Drum Roller	!010800!	119.8	Lw	VIBSDROLL		(none)	6.56	r	2037491.79	13497573.75	407.71
light_truck_1	!010200!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2039467.76	13497338.5	492.11
light_truck_2	!010200!	109.8	Lw	LTRUCREW	500	(none)	6.56	r	2039529.69	13497262.99	502.19
articulated_dump_truck	!010200!	118.8	Lw	ADT	500	(none)	6.56	r	2039397.15	13497413.19	493.61
concrete pump truck	!010300!	119.8	Lw	CPUMPTRU	500	(none)	6.56	r	2039747.96	13497262.31	578.76
light_truck_1	!010301!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2039915.58	13496964.7	561.97
light_truck_2	!010301!	109.8	Lw	LTRUCREW	500	(none)	6.56	r	2039808.16	13497117.48	586.02
articulated_dump_truck	!010301!	118.8	Lw	ADT	500	(none)	6.56	r	2040024.34	13496826.15	556.25
water_truck	!010100!	118.8	Lw	WTRUCK	500	(none)	6.56	r	2037616.4	13497613.71	406.82
light_truck_1	!010301!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2039868.17	13496784.53	529.77
light_truck_2	!010301!	109.8	Lw	LTRUCREW	500	(none)	6.56	r	2039719.66	13496926.25	507.4
articulated_dump_truck	!010800!	118.8	Lw	ADT	500	(none)	6.56	r	2040024.34	13496826.15	556.25
water_truck	!010800!	118.8	Lw	WTRUCK	500	(none)	6.56	r	2039582.77	13497116.82	511.19
concrete pump truck	!010800!	119.8	Lw	CPUMPTRU	500	(none)	6.56	r	2039747.96	13497262.31	578.76
light_truck_1	!010800!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2039868.17	13496784.53	529.77
light_truck_2	!010800!	109.8	Lw	LTRUCREW	500	(none)	6.56	r	2039719.66	13496926.25	507.4
light_truck_1	!0109!	109.8	Lw	LTRUFOR	500	(none)	6.56	r	2039915.58	13496964.7	561.97
light_truck_2	!0109!	109.8	Lw	LTRUCREW	500	(none)	6.56	r	2039808.16	13497117.48	586.02
Pump	!0109!	115.8	Lw	PUMP		(none)	6.56	r	2040535.31	13497352.96	656.17
water_truck	!0109!	118.8	Lw	WTRUCK	500	(none)	6.56	r	2040089.52	13497244.76	650.44
Loader	!0109!	114.8	Lw	LOAD		(none)	6.56	r	2041158.78	13497099.56	853

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Bulldozer	!0109!	119.8	Lw	MBDOZ		(none)	6.56	r	2040715.96	13496994.57	717.35
Large Excavator	!0109!	119.8	Lw	LEXC2		(none)	6.56	r	2040734.22	13497222.82	687.97
light_truck_1	!010A00!	99.8	Lw	LTRUFOR	500	(none)	6.56	r	2039992	13498408	507.77
Track Drill rig - 5 dB shielding from tunnel/shaft	!010A00!	117.8	Lw	TDRIG		(none)	1	r	2039702	13498436	578.01
Compressor	!010A00!	110.8	Lw	COMP		(none)	6.56	r	2039908	13498507	549.84
Loader	!010A00!	110.8	Lw	LOAD		(none)	6.56	r	2039611	13498420	611.13
Pump	!010A00!	112.8	Lw	PUMP		(none)	6.56	r	2039874	13498366	524.61
Generator	!010A00!	99.8	Lw	GEN		(none)	6.56	r	2039824	13498462	556.09
light_truck_2	!010A00!	99.8	Lw	LTRUCREW	500	(none)	6.56	r	2039699	13498507	598.99
light_truck_1	!010A00!	99.8	Lw	LTRUFOR	500	(none)	6.56	r	2039765	13498336	538.62
light_truck_2	!010A00!	99.8	Lw	LTRUCREW	500	(none)	6.56	r	2039814	13498518	569.3
ventilation fan	!010A00!	119.8	Lw	VENTFAN	500	(none)	6.56	r	2039650	13498461	603.26
jacklegs	!010A00!	116.8	Lw	JACKLG	500	(none)	6.56	r	2039812	13498390	545.19
shotcrete batch plant	!010A00!	109.8	Lw	SBATCHP	500	(none)	6.56	r	2039753	13498378	558.72
light_truck_2	!010A00!	99.8	Lw	LTRUCREW	500	(none)	6.56	r	2039679	13498357	572.14
light_truck_1	!010A00!	99.8	Lw	LTRUFOR	500	(none)	6.56	r	2039830	13498314	522.43
jacklegs	!010A00!	116.8	Lw	JACKLG	500	(none)	6.56	r	2039744	13498421	569.73
small backhoe	!010A00!	112.8	Lw	SBHOE	500	(none)	6.56	r	2039721	13498430	577.35
150t crane	!010A00!	111.8	Lw	CRANE150T	500	(none)	6.56	r	2039673	13498548	613.28
telehandler	!010A00!	110.8	Lw	TELEHAND	500	(none)	6.56	r	2039654	13498399	590.11

Table A- 17. ADSRP CadnaA On-Site Construction Noise Results, FTA Calculation

Receiver		Height		Coordinates			V1	V3	V7	V8	V9	V10
Name	ID			X	Y	Z	Day	Day	Day	Day	Day	Day
		(ft)		(ft)	(ft)	(ft)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
R01	!02!R01	9.84	r	2036199.31	13497204.95	405.64	61.7	65.7	62.4	62.2	51	34.9
R02	!02!R02	9.84	r	2036734.82	13497862.83	415.47	72.4	69.1	72	72	52.4	33.9
R03	!02!R03	9.84	r	2036918.8	13497344.65	412.32	71.8	70.7	73.4	73.7	53.2	35.4
R04	!02!R04	9.84	r	2037463.98	13497357.38	414.47	74.7	72.3	73.4	75.3	55.1	37.6
R05	!02!R05	9.84	r	2037852.89	13497314.37	417.55	73.3	72.6	72.5	72.5	56.8	38.7
R06	!02!R06	9.84	r	2038345.21	13497255.15	424.43	67.9	75.7	69.4	70.2	59.2	41.2
R07	!02!R07	9.84	r	2038757.87	13496747.04	447.09	64.5	74.4	67.5	66.9	60.9	42.4
R08	!02!R08	9.84	r	2039941.42	13496201.61	573.71	63.5	74.6	65.2	66.9	62	49

Receiver		Height		Coordinates			V1	V3	V7	V8	V9	V10		
Name	ID			X	Y	Z	Day	Day	Day	Day	Day	Day		
		(ft)		(ft)	(ft)	(ft)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)		
R09	!02!R09	9.84	r	2040681.07	13496192.93	708.58	57.5	64.4	58.4	58.1	55.8	49.9		
R10	!02!R10	9.84	r	2043416.6	13496287.04	747.95	41	32.8	55.5	33.2	38.3	31.2		
R11	!02!R11	9.84	r	2048115.49	13493743.96	659.62	44	34.9	57.3	26.9	26.8	34.1		
R12	!02!R12	9.84	r	2049896.39	13492799.21	659.59	39	-80.2	62.7	-80.2	22.9	-80.2		
R13	!02!R13	9.84	r	2049085.37	13496052.59	849.74	45.1	40.9	51.5	36.9	34.1	34.6		
R31	!02!R31	9.84	r	2038638.71	13496936.55		442.61	65.6	75.4	68.3	68.9	60.5	42.2	
R32	!02!R32	9.84	r	2038976.01	13497455.33		430.64	63.9	79.3	72.0	74.3	61.6	43	

OGIER PONDS

A. EQUIPMENT LIST AND SOUND LEVELS

Table A- 18. Ogier Ponds Equipment List

Ogier Ponds Restoration Conservation Measure Estimate of On-Site Equipment (02/03/2022)

#	Construction Activity	Construction Phase	Approx. Duration (months)	Utilization Factor	Equipment Quantity	Equipment Type	Assumed Equipment Description	Source/Notes	Fuel Type	Power Rating (HP)[3]	Operating Hours/Day	Days/ Week
5	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	0.9	1	Medium Bulldozer	CAT D8T	cat.com	Diesel	354	10	5
6	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	0.9	1	Medium excavator	CAT 330	cat.com	Diesel	273	10	5
7	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	0.9	1	Motor grader	CAT 16	cat.com	Diesel	290	10	5
8	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	0.9	1	Track drill rig	PowerROC T35 (2½"–4½")	epiroc.com	Diesel	201	10	5
9	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	0.9	2	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
10	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	0.9	2	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
11	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	0.9	2	Articulated dump truck	CAT 745	cat.com	Diesel	496	10	5
12	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	0.9	2	Water truck	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	10	5
13	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	1.0	1	Pump for water trucks	GODWIN CD150M	xylem.com	Diesel	74	10	5
14	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	0.9	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
15	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	3	1.0	-	No Equipment - Crew	-	-	-	-	10	5
25	Dewater Pond 1	Year 1	3	0.7	40	Pump	GODWIN CD75	xylem.com	Diesel	17	24	7
26	Dewater Pond 1	Year 1	3	0.9	1	Long-reach excavator	CAT 352 LRE	cat.com	Diesel	424	10	5
27	Dewater Pond 1	Year 1	3	1.0	1	Generator (80 kW)	Generac SD100	generac.com	Diesel	152	10	5
28	Dewater Pond 1	Year 1	3	0.9	1	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
29	Dewater Pond 1	Year 1	3	0.9	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
30	Dewater Pond 1	Year 1	3	1.0	-	No Equipment - Crew	-	-	-	-	10	5
40	Pond 1 Fill Borrow Hill Excavation	Year 1	2	0.9	1	Bulldozer	CAT D10T2	cat.com	Diesel	722	10	5
41	Pond 1 Fill Borrow Hill Excavation	Year 1	2	0.9	1	Long-reach excavator	CAT 352 LRE	cat.com	Diesel	424	10	5
42	Pond 1 Fill Borrow Hill Excavation	Year 1	2	0.9	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
43	Pond 1 Fill Borrow Hill Excavation	Year 1	2	0.9	1	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
44	Pond 1 Fill Borrow Hill Excavation	Year 1	2	0.9	1	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
45	Pond 1 Fill Borrow Hill Excavation	Year 1	2	0.9	20	Articulated dump truck	CAT 745	cat.com	Diesel	496	10	5
46	Pond 1 Fill Borrow Hill Excavation	Year 1	2	0.9	1	Water truck	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	10	5
47	Pond 1 Fill Borrow Hill Excavation	Year 1	2	0.9	1	Pump for water trucks	GODWIN CD150M	xylem.com	Diesel	74	10	5
48	Pond 1 Fill Borrow Hill Excavation	Year 1	2	1.0	-	No Equipment - Crew	-	-	-	-	10	5
49	Pond 1 Fill Import from Basalt Hill Excavation	Year 1	2	0.9	0	Bulldozer	CAT D10T2	cat.com	Diesel	722	10	5
50	Pond 1 Fill Import from Basalt Hill Excavation	Year 1	2	0.9	0	Long-reach excavator	CAT 352 LRE	cat.com	Diesel	424	10	5
51	Pond 1 Fill Import from Basalt Hill Excavation	Year 1	2	0.9	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
52	Pond 1 Fill Import from Basalt Hill Excavation	Year 1	2	0.9	1	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
53	Pond 1 Fill Import from Basalt Hill Excavation	Year 1	2	0.9	1	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
54	Pond 1 Fill Import from Basalt Hill Excavation	Year 1	2	0.9	20	Articulated dump truck	CAT 745	cat.com	Diesel	496	10	5
55	Pond 1 Fill Import from Basalt Hill Excavation	Year 1	2	0.9	1	Water truck	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	10	5

Ogier Ponds Restoration Conservation Measure Estimate of On-Site Equipment (02/03/2022)

#	Construction Activity	Construction Phase	Approx. Duration (months)	Utilization Factor	Equipment Quantity	Equipment Type	Assumed Equipment Description	Source/Notes	Fuel Type	Power Rating (HP)[3]	Operating Hours/Day	Days/ Week
56	Pond 1 Fill Import from Basalt Hill Excavation	Year 1	2	0.9	1	Pump for water trucks	GODWIN CD150M	xylem.com	Diesel	74	10	5
57	Pond 1 Fill Import from Basalt Hill Excavation	Year 1	2	1.0	-	No Equipment - Crew	-	-	-	-	10	5
91	Spillway	Year 2	2	0.7	1	Concrete pump truck	Liebherr 42 M5 XXT	liebherr.com	Diesel	500	10	5
92	Spillway	Year 2	2	0.7	1	Compressor	Doosan HP450	doosanportablepower.com	Diesel	173	10	5
93	Spillway	Year 2	2	0.7	1	Bobcat	S590 Skid-Steer Loader	bobcat.com	Diesel	68	10	5
94	Spillway	Year 2	2	0.7	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
95	Spillway	Year 2	2	0.7	2	Manlift	JLG 600AJ	jlg.com	Diesel	67	10	5
96	Spillway	Year 2	2	0.7	0	Crane 150t	GROVE GRT9165	manitowoc.com	Diesel	300	10	5
97	Spillway	Year 2	2	1.0	2	Pump	GODWIN CD75	xylem.com	Diesel	17	10	5
98	Spillway	Year 2	2	0.7	2	Welder	Big Blue® 800 Series	millerwelds.com	Diesel	66	10	5
99	Spillway	Year 2	2	0.7	4	Concrete vibrator	1.5 Inch x 18 Foot Flexible	californiatoolsandequipment.com	Gasoline	6.5	10	5
100	Spillway	Year 2	2	1.0	1	Generator (80 kW)	Generac SD100	generac.com	Diesel	152	10	5
101	Spillway	Year 2	2	1.0	2	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
102	Spillway	Year 2	2	1.0	1	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
103	Spillway	Year 2	2	1.0	2	Light truck - Carpenters	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
104	Spillway	Year 2	2	1.0	-	No Equipment - Crew	-	-	-	-	10	5

B. CADNAA INPUTS AND RESULTS

Table A- 19. Ogier Ponds CadnaA On-Site Construction Noise Point Sources, DNL Calculation

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Medium Excavator	!0400!	113.4	Lw	MedExc		(none)	5	r	2022639.16	13501760.74	333.08
Loader	!0400!	108.4	Lw	LD		(none)	5	r	2021785.23	13502184.09	333.08
Medium Bulldozer	!0401!	115.5	Lw	MDoz		(none)	5	r	2020319.5	13502447.18	325.34
Medium Excavator	!0401!	115.5	Lw	MedExc		(none)	5	r	2019545.1	13503159.08	321.45
Motor Grader	!0401!	115.5	Lw	MGrad		(none)	5	r	2018659.57	13503947.37	319.41
Track Drill Rig	!0401!	126.5	Lw	TDrRig		(none)	5	r	2021962.07	13502346.48	333.08
Pump For Water Trucks	!0401!	108.4	Lw	PWTruc		(none)	5	r	2021132.1	13502329.11	330.2
Loader	!0401!	111.5	Lw	LD		(none)	5	r	2019972.23	13502780.56	323.61
Long Reach Excavator	!0402!	116.4	Lw	LRExc		(none)	5	r	2022112.21	13501832.22	333.08
Generator	!0402!	99.4	Lw	Gen		(none)	5	r	2021657.21	13502059.72	333.08
Pump for Water Truck	!0402!	108.4	Lw	PWTruc		(none)	5	r	2022234.71	13502243.47	333.08
Loader	!0402!	108.4	Lw	LD		(none)	5	r	2019176.58	13503464.09	319.56
Long Reach Excavator	!0403!	115.5	Lw	LRExc		(none)	5	r	2022943.46	13501801.59	333.08
Generator	!0403!	99.5	Lw	Gen		(none)	5	r	2022435.96	13501893.47	333.08
Loader	!0403!	111.5	Lw	LD		(none)	5	r	2022764.08	13501438.47	333.08
Bulldozer	!0404!	116.4	Lw	Doz		(none)	5	r	2021145.33	13502033.47	329.91
Long Reach Excavator	!0404!	116.4	Lw	LRExc		(none)	5	r	2020804.08	13502457.84	328.34
Loader	!0404!	108.4	Lw	LD		(none)	5	r	2020856.58	13502151.59	328.28
Loader	!0404!	108.4	Lw	LD		(none)	5	r	2018848.46	13503547.22	317.84
Bulldozer	!0405!	115.5	Lw	Doz		(none)	5	r	2022431.58	13502190.97	333.08
Long Reach Excavator	!0405!	115.5	Lw	LRExc		(none)	5	r	2022252.21	13501985.34	333.08
Loader	!0405!	111.5	Lw	LD		(none)	5	r	2022050.96	13502142.84	333.08
Pump For Water Truck	!0405!	108.4	Lw	PWTruc		(none)	5	r	2022819.21	13501642.14	333.08
Loader	!0406!	108.4	Lw	LD		(none)	5	r	2021972.65	13501957.14	333.08
Pump for Water Truck	!0406!	108.4	Lw	PWTruc		(none)	5	r	2022806.08	13501959.33	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022205.61	13502189.85	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022125.7	13502133.61	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022059.11	13502092.92	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022026.55	13502001.91	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2021871.33	13501985.3	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2021946.81	13501957.93	333.08

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022337.05	13502237.39	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022502.06	13502149.76	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022589.69	13502079.84	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022681.05	13502014.59	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022744.9	13501971.71	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022810.16	13501874.75	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022853.04	13501740.51	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022734.65	13501667.8	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022572.44	13501647.29	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022471.76	13501721.87	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022339.38	13501742.38	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022200.48	13501822.55	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2022047.6	13501864.5	333.08
Articulated Dump Truck	!0405!	115.5	Lw	ATD		(none)	5	r	2021923.61	13501903.65	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021650.96	13502092.93	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021606.33	13502150.48	332.9
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2021714.76	13502096.13	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021681.5	13502112.9	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021636.86	13502170.45	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2021769.96	13502127.84	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021709.69	13502126.99	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021670.93	13502183.96	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021746.1	13502145.78	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021701.46	13502203.34	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2021809.9	13502148.98	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021776.63	13502165.75	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021732	13502223.3	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021804.82	13502179.85	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021766.06	13502236.81	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021834.19	13502196.29	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021789.55	13502253.84	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2021897.99	13502199.49	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021864.72	13502216.26	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021820.09	13502273.81	333.08

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021892.91	13502230.35	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021854.15	13502287.32	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021922.28	13502240.92	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021877.64	13502298.47	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2021986.08	13502244.12	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021981	13502274.98	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021942.24	13502331.95	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022016.24	13502294.95	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2021971.61	13502352.5	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2022080.04	13502298.15	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022046.78	13502314.92	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022002.14	13502372.47	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022074.97	13502329.01	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022036.21	13502385.98	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022111.38	13502345.46	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022066.74	13502403.01	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2022175.18	13502348.65	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022141.91	13502365.42	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022097.28	13502422.98	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022170.1	13502379.52	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022131.34	13502436.48	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022206.51	13502397.14	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022161.88	13502454.69	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2022270.31	13502400.33	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022237.05	13502417.1	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022192.42	13502474.65	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022265.24	13502431.2	333.08
pump	!0403!	112.5	Lw	PMP		(none)	5	r	2022226.48	13502488.16	333.08
Loader	!0407!	111.5	Lw	LD		(none)	5	r	2021972.65	13501957.14	333.08
pump	!0407!	112.5	Lw	PMP		(none)	5	r	2021295.07	13502354.85	331.23
pump	!0407!	112.5	Lw	PMP		(none)	5	r	2021189.37	13502431.2	330.68
Generator	!0407!	99.5	Lw	Gen		(none)	5	r	2022435.96	13501893.47	333.08
concrete pump truck	!0407!	112.5	Lw	CPmpTru		(none)	5	r	2021226.4	13502287.15	330.73
compressor	!0407!	110.5	Lw	Comp		(none)	5	r	2021191.16	13502585.48	330.88

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Manlift	!0407!	112.5	Lw	MLift		(none)	5	r	2021022.03	13502406.95	329.62
Manlift	!0407!	112.5	Lw	MLift		(none)	5	r	2021407.28	13502352.93	331.92
Concrete Vibrator	!0407!	103.5	Lw	ConVib		(none)	5	r	2020982.09	13502298.9	329.24
Concrete Vibrator	!0407!	103.5	Lw	ConVib		(none)	5	r	2021278.08	13502519.71	331.33
Concrete Vibrator	!0407!	103.5	Lw	ConVib		(none)	5	r	2021496.54	13502374.07	332.5
Concrete Vibrator	!0407!	103.5	Lw	ConVib		(none)	5	r	2021289.82	13502146.21	330.94

Table A- 20. Ogier Ponds CadnaA On-Site Construction Noise Line Sources, DNL Calculation

Name	ID	Result. PWL	Result. PWL'	Lw / Li		Freq.	Direct.	Moving Pt. Src	
				Type	Value			Number	Speed
		(dBA)	(dBA)			(Hz)			(mph)
Light Truck Forman	!0400!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	!0400!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Forman	!0401!	102.9	70.4	PWL-Pt	LT	500	(none)	2	10
Light Truck Crew	!0401!	102.9	70.4	PWL-Pt	LT	500	(none)	2	10
Articulated Dump Truck	!0401!	108.9	76.4	PWL-Pt	ATD	500	(none)	2	10
Water Truck	!0401!	108.9	76.4	PWL-Pt	WTru	500	(none)	2	10
Light Truck Forman	!0402!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	!0402!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Articulated Dump Truck	!0402!	108	75.5	PWL-Pt	ATD	500	(none)	1	6.2
Water Truck	!0402!	108	75.5	PWL-Pt	WTru	500	(none)	1	6.2
Light Truck Forman	!0403!	99.9	67.4	PWL-Pt	LT	500	(none)	1	10
Light Truck Forman	!0404!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	!0404!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Articulated Dump Truck	!0404!	111	78.5	PWL-Pt	ATD	500	(none)	2	6.2
Light Truck Forman	!0405!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	!0405!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Articulated Dump Truck	!0405!	112.9	80.4	PWL-Pt	ATD	500	(none)	5	10
Water Truck	!0405!	112.9	80.4	PWL-Pt	WTru	500	(none)	5	10
Light Truck Forman	!0406!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	!0406!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Articulated Dump Truck	!0406!	121	88.5	PWL-Pt	ATD	500	(none)	20	6.2
Water Truck	!0406!	108	75.5	PWL-Pt	WTru	500	(none)	1	6.2

Name	ID	Result. PWL	Result. PWL'	Lw / Li		Freq.	Direct.	Moving Pt. Src	
				Type	Value			Number	Speed
		(dBA)	(dBA)			(Hz)			(mph)
Light Truck Forman	!0407!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	!0407!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	!0407!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Forman	!0407!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	!0407!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2

Table A- 21. Ogier Ponds CadnaA On-Site Construction Noise Results, DNL Calculation

Receiver		Height		Coordinates			V1	V2	V3	V4	V5	V6	V7	V8
Name	ID			X	Y	Z	Day	Day	Day	Day	Day	Day	Day	Day
		(ft)		(ft)	(ft)	(ft)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
R4 - Parkway Lakes RV Park	!05!	5	r	2020088	13501968.89	323.32	46.8	66.6	56	59.1	64.7	61.1	64.7	63
R1 - 9940 Monterey Hwy	!05!	5	r	2017727.34	13503959.68	314.31	34.3	53.1	42.9	47.7	45.8	48.6	49.1	43.4
R2 - 559 Monterey Hwy	!05!	5	r	2018386.47	13503434.75	315.39	44.2	62.7	56.8	51.6	60.4	58.4	62.9	55.7
R3 - 10000 Monterey Hwy	!05!	5	r	2019423.42	13502811.84	320.27	45.8	68.9	57	55.6	61	62.3	64.3	60.2
R7 - Santa Clara County	!05!	5	r	2021751	13501446.97	332.92	54.1	65.7	61.6	67.6	63.6	70.3	61.9	64.4
R5 - 210 Ogier Ave trailer	!05!	5	r	2020556.13	13502009.43	326.25	54.1	67.2	61.6	62.2	63.6	63.2	61.9	66.7
R6 - Marra Brother Distributing	!05!	5	r	2021128.38	13501879.25	329.62	54.1	65.8	61.6	67.3	63.6	64.5	61.9	69.5

Table A- 22. Ogier Ponds CadnaA On-Site Construction Noise Point Sources, FTA Calculation

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Medium Excavator	!0400!	113.4	Lw	MedExc		(none)	5	r	2022639.16	13501760.74	333.08
Loader	!0400!	108.4	Lw	LD		(none)	5	r	2021785.23	13502184.09	333.08
Medium Bulldozer	!0401!	119.5	Lw	MDoz		(none)	5	r	2020319.5	13502447.18	325.34
Medium Excavator	!0401!	119.5	Lw	MedExc		(none)	5	r	2019545.1	13503159.08	321.45
Motor Grader	!0401!	119.5	Lw	MGrad		(none)	5	r	2018659.57	13503947.37	319.41
Track Drill Rig	!0401!	129.5	Lw	TDrRig		(none)	5	r	2021962.07	13502346.48	333.08
Pump For Water Trucks	!0401!	115.5	Lw	PWTruc		(none)	5	r	2021132.1	13502329.11	330.2
Loader	!0401!	114.5	Lw	LD		(none)	5	r	2019972.23	13502780.56	323.61
Long Reach Excavator	!0402!	116.4	Lw	LRExc		(none)	5	r	2022112.21	13501832.22	333.08
Generator	!0402!	99.4	Lw	Gen		(none)	5	r	2021657.21	13502059.72	333.08

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Pump for Water Truck	!0402!	108.4	Lw	PWTruc		(none)	5	r	2022234.71	13502243.47	333.08
Loader	!0402!	108.4	Lw	LD		(none)	5	r	2019176.58	13503464.09	319.56
Long Reach Excavator	!0403!	119.5	Lw	LRExc		(none)	5	r	2022943.46	13501801.59	333.08
Generator	!0403!	102.5	Lw	Gen		(none)	5	r	2022435.96	13501893.47	333.08
Loader	!0403!	114.5	Lw	LD		(none)	5	r	2022764.08	13501438.47	333.08
Bulldozer	!0404!	116.4	Lw	Doz		(none)	5	r	2021145.33	13502033.47	329.91
Long Reach Excavator	!0404!	116.4	Lw	LRExc		(none)	5	r	2020804.08	13502457.84	328.34
Loader	!0404!	108.4	Lw	LD		(none)	5	r	2020856.58	13502151.59	328.28
Loader	!0404!	108.4	Lw	LD		(none)	5	r	2018848.46	13503547.22	317.84
Bulldozer	!0405!	119.5	Lw	Doz		(none)	5	r	2022431.58	13502190.97	333.08
Long Reach Excavator	!0405!	119.5	Lw	LRExc		(none)	5	r	2022252.21	13501985.34	333.08
Loader	!0405!	114.5	Lw	LD		(none)	5	r	2022050.96	13502142.84	333.08
Pump For Water Truck	!0405!	115.5	Lw	PWTruc		(none)	5	r	2022819.21	13501642.14	333.08
Loader	!0406!	108.4	Lw	LD		(none)	5	r	2021972.65	13501957.14	333.08
Pump for Water Truck	!0406!	108.4	Lw	PWTruc		(none)	5	r	2022806.08	13501959.33	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022205.61	13502189.85	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022125.7	13502133.61	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022059.11	13502092.92	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022026.55	13502001.91	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2021871.33	13501985.3	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2021946.81	13501957.93	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022337.05	13502237.39	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022502.06	13502149.76	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022589.69	13502079.84	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022681.05	13502014.59	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022744.9	13501971.71	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022810.16	13501874.75	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022853.04	13501740.51	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022734.65	13501667.8	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022572.44	13501647.29	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022471.76	13501721.87	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022339.38	13501742.38	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022200.48	13501822.55	333.08
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2022047.6	13501864.5	333.08

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Articulated Dump Truck	!0405!	118.5	Lw	ATD		(none)	5	r	2021923.61	13501903.65	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021650.96	13502092.93	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021606.33	13502150.48	332.9
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2021714.76	13502096.13	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021681.5	13502112.9	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021636.86	13502170.45	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2021769.96	13502127.84	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021709.69	13502126.99	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021670.93	13502183.96	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021746.1	13502145.78	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021701.46	13502203.34	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2021809.9	13502148.98	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021776.63	13502165.75	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021732	13502223.3	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021804.82	13502179.85	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021766.06	13502236.81	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021834.19	13502196.29	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021789.55	13502253.84	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2021897.99	13502199.49	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021864.72	13502216.26	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021820.09	13502273.81	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021892.91	13502230.35	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021854.15	13502287.32	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021922.28	13502240.92	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021877.64	13502298.47	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2021986.08	13502244.12	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021981	13502274.98	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021942.24	13502331.95	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022016.24	13502294.95	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2021971.61	13502352.5	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2022080.04	13502298.15	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022046.78	13502314.92	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022002.14	13502372.47	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022074.97	13502329.01	333.08

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022036.21	13502385.98	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022111.38	13502345.46	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022066.74	13502403.01	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2022175.18	13502348.65	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022141.91	13502365.42	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022097.28	13502422.98	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022170.1	13502379.52	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022131.34	13502436.48	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022206.51	13502397.14	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022161.88	13502454.69	333.08
Generator	!0402!	99.5	Lw	Gen		(none)	5	r	2022270.31	13502400.33	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022237.05	13502417.1	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022192.42	13502474.65	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022265.24	13502431.2	333.08
pump	!0403!	115.5	Lw	PMP		(none)	5	r	2022226.48	13502488.16	333.08
Loader	!0407!	114.5	Lw	LD		(none)	5	r	2021972.65	13501957.14	333.08
pump	!0407!	115.5	Lw	PMP		(none)	5	r	2021295.07	13502354.85	331.23
pump	!0407!	115.5	Lw	PMP		(none)	5	r	2021189.37	13502431.2	330.68
Generator	!0407!	102.5	Lw	Gen		(none)	5	r	2022435.96	13501893.47	333.08
concrete pump truck	!0407!	119.5	Lw	CPmpTru		(none)	5	r	2021226.4	13502287.15	330.73
compressor	!0407!	114.5	Lw	Comp		(none)	5	r	2021191.16	13502585.48	330.88
Manlift	!0407!	119.5	Lw	MLift		(none)	5	r	2021022.03	13502406.95	329.62
Manlift	!0407!	119.5	Lw	MLift		(none)	5	r	2021407.28	13502352.93	331.92
Concrete Vibrator	!0407!	110.5	Lw	ConVib		(none)	5	r	2020982.09	13502298.9	329.24
Concrete Vibrator	!0407!	110.5	Lw	ConVib		(none)	5	r	2021278.08	13502519.71	331.33
Concrete Vibrator	!0407!	110.5	Lw	ConVib		(none)	5	r	2021496.54	13502374.07	332.5
Concrete Vibrator	!0407!	110.5	Lw	ConVib		(none)	5	r	2021289.82	13502146.21	330.94

Table A- 23. Ogier Ponds CadnaA On-Site Construction Noise Line Sources, FTA Calculation

Name	M.	ID	Result. PWL	Result. PWL'	Lw / Li		Freq.	Direct.	Moving Pt. Src	
					Type	Value			Number	Speed
			(dBA)	(dBA)			(Hz)			(mph)
Light Truck Forman	~	!0400!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2

Name	M.	ID	Result. PWL	Result. PWL'	Lw / Li		Freq.	Direct.	Moving Pt. Src	
					Type	Value			Number	Speed
			(dBA)	(dBA)			(Hz)			(mph)
Light Truck Crew	~	!0400!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Forman		!0401!	102.9	70.4	PWL-Pt	LT	500	(none)	2	10
Light Truck Crew		!0401!	102.9	70.4	PWL-Pt	LT	500	(none)	2	10
Articulated Dump Truck		!0401!	111.9	79.4	PWL-Pt	ATD	500	(none)	2	10
Water Truck		!0401!	112.9	80.4	PWL-Pt	WTru	500	(none)	2	10
Light Truck Forman	~	!0402!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	~	!0402!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Articulated Dump Truck	~	!0402!	108	75.5	PWL-Pt	ATD	500	(none)	1	6.2
Water Truck	~	!0402!	108	75.5	PWL-Pt	WTru	500	(none)	1	6.2
Light Truck Forman	~	!0403!	99.9	67.4	PWL-Pt	LT	500	(none)	1	10
Light Truck Forman	~	!0404!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	~	!0404!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Articulated Dump Truck	~	!0404!	111	78.5	PWL-Pt	ATD	500	(none)	2	6.2
Light Truck Forman	~	!0405!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	~	!0405!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Articulated Dump Truck	~	!0405!	115.9	83.4	PWL-Pt	ATD	500	(none)	5	10
Water Truck	~	!0405!	116.9	84.4	PWL-Pt	WTru	500	(none)	5	10
Light Truck Forman	~	!0406!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	~	!0406!	99	66.5	PWL-Pt	LT	500	(none)	1	6.2
Articulated Dump Truck	~	!0406!	121	88.5	PWL-Pt	ATD	500	(none)	20	6.2
Water Truck	~	!0406!	108	75.5	PWL-Pt	WTru	500	(none)	1	6.2
Light Truck Forman	~	!0407!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	~	!0407!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	~	!0407!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Forman	~	!0407!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2
Light Truck Crew	~	!0407!	102	69.5	PWL-Pt	LT	500	(none)	1	6.2

Table A- 24. Ogier Ponds CadnaA On-Site Construction Noise Results, FTA Calculation

Receiver		Height		Coordinates			V1	V2	V3	V4	V5	V6	V7	V8
Name	ID			X	Y	Z	Day	Day	Day	Day	Day	Day	Day	Day
		(ft)		(ft)	(ft)	(ft)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
R4 - Parkway Lakes RV Park	!05!	5	r	2020088	13501968.89	323.32	46.8	70.5	56	62.1	64.7	64.4	64.7	68.6
R1 - 9940 Monterey Hwy	!05!	5	r	2017727.34	13503959.68	314.31	34.3	56.9	42.9	50.7	45.8	51.8	49.1	48.2

Receiver		Height		Coordinates			V1	V2	V3	V4	V5	V6	V7	V8
Name	ID			X	Y	Z	Day	Day	Day	Day	Day	Day	Day	Day
		(ft)		(ft)	(ft)	(ft)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
R2 - 559 Monterey Hwy	!05!	5	r	2018386.47	13503434.75	315.39	44.2	66.5	56.8	54.6	60.4	61.8	62.9	60.3
R3 - 10000 Monterey Hwy	!05!	5	r	2019423.42	13502811.84	320.27	45.8	72.7	57	58.6	61	65.6	64.3	65
R7 - Santa Clara County	!05!	5	r	2021751	13501446.97	332.92	54.1	69.1	61.6	70.6	63.6	73.5	61.9	69.9
R5 - 210 Ogier Ave trailer	!05!	5	r	2020556.13	13502009.43	326.25	54.1	71.3	61.6	65.2	63.6	66.5	61.9	72.4
R6 - Marra Brother Distributing	!05!	5	r	2021128.38	13501879.25	329.62	54.1	70.1	61.6	70.3	63.6	67.8	61.9	75.3

Table A- 25. Ogier Ponds CadnaA On-Site Construction Noise Line Sources at BHBA, DNL Calculation

Name	ID	Result. PWL	Result. PWL'	Lw / Li		Freq.	Direct.	Moving Pt. Src	
				Type	Value			Number	Speed
		(dBA)	(dBA)			(Hz)			(mph)
Articulated Dump Trucks	!0109!	121.9	92.3	PWL-Pt	ADT	500	(none)	90	10

Table A- 26. Ogier Ponds CadnaA On-Site Construction Noise Results near BHBA, DNL Calculation

Name	ID	Level Lr	Height		Coordinates		
					X	Y	Z
		(dBA)	(ft)		(ft)	(ft)	(ft)
18720_Buena_Vista_Ct	!02!R01	49.2	9.84	r	2036199.31	13497204.95	405.64
Boys_Ranch	!02!R02	50.5	9.84	r	2036734.82	13497862.83	415.47
18780_Alicante_Circula	!02!R03	51.4	9.84	r	2036918.8	13497344.65	412.32
2015_Alicante_Pl	!02!R04	53.4	9.84	r	2037463.98	13497357.38	414.47
18675_Corte_Paterna	!02!R05	55	9.84	r	2037852.89	13497314.37	417.55
18625_Corte_Bautista	!02!R06	57.5	9.84	r	2038345.21	13497255.15	424.43
2225_Via_Santa_Elena	!02!R07	59.7	9.84	r	2038757.87	13496747.04	447.09
18290_Cochrane_Rd	!02!R08	61.4	9.84	r	2039941.42	13496201.61	573.71
18051_Barnard_Rd	!02!R09	53.6	9.84	r	2040681.07	13496192.93	708.58
17888_Holiday_Dr	!02!R10	34.3	9.84	r	2043416.6	13496287.04	747.95
3291_Butterfly_Ln	!02!R11	23	9.84	r	2048115.49	13493743.96	659.62
17106_Shady_Ln_Dr	!02!R12	18.9	9.84	r	2049896.39	13492799.21	659.59
3800_E_Dunne_Ave	!02!R13	31.8	9.84	r	2049085.37	13496052.59	849.74

Table A- 27. Ogier Ponds CadnaA On-Site Construction Noise Line Sources at BHBA, FTA Calculation

Name	ID	Result. PWL	Result. PWL'	Lw / Li		Freq.	Direct.	Moving Pt. Src	
				Type	Value			Number	Speed
		(dBA)	(dBA)			(Hz)			(mph)
Articulated Dump Trucks	!0109!	126.2	96.3	PWL-Pt	ADT	500	(none)	90	10

Table A- 28. Ogier Ponds CadnaA On-Site Construction Noise Results near BHBA, FTA Calculation

Name	ID	Level Lr	Height		Coordinates		
					X	Y	Z
		(dBA)	(ft)		(ft)	(ft)	(ft)
18720_Buena_Vista_Ct	!02!R01	51	9.84	r	2036199.31	13497204.95	405.64
Boys_Ranch	!02!R02	52.4	9.84	r	2036734.82	13497862.83	415.47
18780_Alicante_Circula	!02!R03	53.2	9.84	r	2036918.8	13497344.65	412.32
2015_Alicante_Pl	!02!R04	55.1	9.84	r	2037463.98	13497357.38	414.47
18675_Corte_Paterna	!02!R05	56.8	9.84	r	2037852.89	13497314.37	417.55
18625_Corte_Bautista	!02!R06	59.2	9.84	r	2038345.21	13497255.15	424.43
2225_Via_Santa_Elena	!02!R07	60.9	9.84	r	2038757.87	13496747.04	447.09
18290_Cochrane_Rd	!02!R08	62	9.84	r	2039941.42	13496201.61	573.71
18051_Barnard_Rd	!02!R09	55.8	9.84	r	2040681.07	13496192.93	708.58
17888_Holiday_Dr	!02!R10	38.3	9.84	r	2043416.6	13496287.04	747.95
3291_Butterfly_Ln	!02!R11	26.8	9.84	r	2048115.49	13493743.96	659.62
17106_Shady_Ln_Dr	!02!R12	22.9	9.84	r	2049896.39	13492799.21	659.59
3800_E_Dunne_Ave	!02!R13	34.1	9.84	r	2049085.37	13496052.59	849.74

PERCOLATION DAM
A. EQUIPMENT LIST AND SOUND LEVELS

Table A- 29. Percolation Dam Equipment List

Phase 2 Coyote Percolation Dam Conservation Measure Estimate of On-Site Equipment (02/03/2022)

#	Construction Activity	Construction Phase	Approx. Duration (months)	Utilization Factor	Equipment Quantity	Equipment Type	Assumed Equipment Description	Source/Notes	Fuel Type	Power Rating (HP)[3]	Operating Hours/Day	Days/ Week
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	0.9	1	Medium Bulldozer	CAT D8T	cat.com	Diesel	354	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	0.9	1	Medium excavator	CAT 330	cat.com	Diesel	273	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	0.9	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	0.9	1	Motor grader	CAT 16	cat.com	Diesel	290	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	1.0	1	Small backhoe	Cat 310	cat.com	Diesel	70	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	0.9	2	Track drill rig	PowerROC T35 (2½"–4½")	epiroc.com	Diesel	201	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	0.9	2	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	0.9	1	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	0.9	2	Articulated dump truck	CAT 745	cat.com	Diesel	496	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	0.9	2	Water truck	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	1.0	1	Pump for water trucks	GODWIN CD150M	xylem.com	Diesel	74	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 4	0.5	1.0	-	No Equipment - Crew	-	-	-	-	10	5
	Roughened Ramp	Year 5	5.0	0.9	1	Bulldozer	CAT D10T2	cat.com	Diesel	722	10	5
	Roughened Ramp	Year 5	5.0	0.9	1	Long-reach excavator	CAT 352 LRE	cat.com	Diesel	424	10	5
	Roughened Ramp	Year 5	5.0	1.0	1	Small backhoe	Cat 310	cat.com	Diesel	70	10	5
	Roughened Ramp	Year 5	5.0	0.9	1	Loader	CAT 966M XE	cat.com	Diesel	298	10	5
	Roughened Ramp	Year 5	5.0	0.9	1	Bobcat	S590 Skid-Steer Loader	bobcat.com	Diesel	68	10	5
	Roughened Ramp	Year 5	5.0	0.9	1	Light truck - Forman	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
	Roughened Ramp	Year 5	5.0	0.9	1	Light truck - Crew	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
	Roughened Ramp	Year 5	5.0	0.9	2	Articulated dump truck	CAT 745	cat.com	Diesel	496	10	5
	Roughened Ramp	Year 5	5.0	0.9	1	Water truck	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	10	5
	Roughened Ramp	Year 5	5.0	0.9	1	Pump for water trucks	GODWIN CD150M	xylem.com	Diesel	74	10	5
	Roughened Ramp	Year 5	5.0	1.0	-	No Equipment - Crew	-	-	-	-	10	5

B. CADNAA INPUTS AND RESULTS

Table A- 30. Percolation Dam CadnaA On-Site Construction Noise Point Sources

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Medium Bulldozer	!04000000!	115.8	Lw	MDozDNL	500	(none)	5	r	2001158.93	13522883.97	237.6
Medium Excavator	!04000000!	115.8	Lw	MExcDNL	500	(none)	5	r	2003388.93	13521400.18	247.78
Loader	!04000000!	110.8	Lw	LoadDNL	500	(none)	5	r	2002041.2	13522215.98	239.45
Motor Grader	!04000000!	115.8	Lw	MGradDNL	500	(none)	5	r	2003121.59	13521573.81	244.17
Small Backhoe	!04000000!	112.8	Lw	SBackhoeDNL	500	(none)	5	r	2001616.76	13522521.91	238.08
Track Drill Rig	!04000000!	122.8	Lw	TDrillRigDNL	500	(none)	5	r	2002429.81	13522083.69	241.12
Track Drill Rig	!04000000!	122.8	Lw	TDrillRigDNL	500	(none)	5	r	2001354.93	13522731.37	237.55
Pump for Water Truck	!04000000!	99.8	Lw	PumpWatTruDNL	500	(none)	5	r	2002355.31	13521991.09	241.03
Medium Bulldozer	!04000001!	119.8	Lw	MDozFTA	500	(none)	5	r	2001158.93	13522883.97	237.6
Medium Excavator	!04000001!	119.8	Lw	MExcFTA	500	(none)	5	r	2003388.93	13521400.18	247.78
Loader	!04000001!	114.8	Lw	LoadFTA	500	(none)	5	r	2002041.2	13522215.98	239.45
Motor Grader	!04000001!	119.8	Lw	MGradFTA	500	(none)	5	r	2003121.59	13521573.81	244.17
Small Backhoe	!04000001!	116.8	Lw	SBackhoeFTA	500	(none)	5	r	2001616.76	13522521.91	238.08
Track Drill Rig	!04000001!	129.8	Lw	TDrillRigFTA	500	(none)	5	r	2002429.81	13522083.69	241.12
Track Drill Rig	!04000001!	129.8	Lw	TDrillRigFTA	500	(none)	5	r	2001354.93	13522731.37	237.55
Pump for Water Truck	!04000001!	102.8	Lw	PumpWatTruFTA	500	(none)	5	r	2002355.31	13521991.09	241.03
Bulldozer	!04010000!	115.8	Lw	BDozDNL	500	(none)	5	r	2001007	13522553.59	235.19
Long Range Excavator	!04010000!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2000510.9	13522674.86	233.57
Small Backhoe	!04010000!	112.8	Lw	SBackhoeDNL	500	(none)	5	r	2000764.46	13522592.18	234.66
Loader	!04010000!	110.8	Lw	LoadDNL	500	(none)	5	r	2000637.68	13522729.98	233.56
Bob Cat	!04010000!	110.8	Lw	BobCatDNL	500	(none)	5	r	2000863.68	13522658.33	234.66
Pump for Water Truck	!04010000!	99.8	Lw	PumpWatTruDNL	500	(none)	5	r	2001055	13522511.82	235.33
Bulldozer	!04010001!	119.8	Lw	BDozFTA	500	(none)	5	r	2001007	13522553.59	235.19
Long Range Excavator	!04010001!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2000510.9	13522674.86	233.57
Small Backhoe	!04010001!	116.8	Lw	SBackhoeFTA	500	(none)	5	r	2000764.46	13522592.18	234.66
Loader	!04010001!	114.8	Lw	LoadFTA	500	(none)	5	r	2000637.68	13522729.98	233.56
Bob Cat	!04010001!	114.8	Lw	BobCatFTA	500	(none)	5	r	2000863.68	13522658.33	234.66
Pump for Water Truck	!04010001!	102.8	Lw	PumpWatTruFTA	500	(none)	5	r	2001055	13522511.82	235.33

Table A- 31. Percolation Dam CadnaA On-Site Construction Noise Line Sources

Name	ID	Result. PWL	Result. PWL'	Lw / Li		Freq.	Direct.	Moving Pt. Src	
				Type	Value			Number	Speed
		(dBA)	(dBA)			(Hz)			(mph)
Light Truck Forman	!04000000!	92.7	62.8	PWL-Pt	LTruForDNL	500	(none)	2	6.2
Light Truck Crew	!04000000!	89.7	59.8	PWL-Pt	LTruCrDNL	500	(none)	1	6.2
Articulated Dump Truck	!04000000!	107.7	77.8	PWL-Pt	ADTDNL	500	(none)	2	6.2
Water Truck	!04000000!	107.7	77.8	PWL-Pt	WTruDNL	500	(none)	2	6.2
Light Truck Forman	!04000001!	102.7	72.8	PWL-Pt	LTruForFTA	500	(none)	2	6.2
Light Truck Crew	!04000001!	99.7	69.8	PWL-Pt	LTruCrFTA	500	(none)	1	6.2
Articulated Dump Truck	!04000001!	111.7	81.8	PWL-Pt	ADTFTA	500	(none)	2	6.2
Water Truck	!04000001!	111.7	81.8	PWL-Pt	WTruFTA	500	(none)	2	6.2
Light Truck Forman	!04010000!	89.7	59.8	PWL-Pt	LTruForDNL	500	(none)	1	6.2
Light Truck Crew	!04010000!	89.7	59.8	PWL-Pt	LTruCrDNL	500	(none)	1	6.2
Articulated Dump Truck	!04010000!	107.7	77.8	PWL-Pt	ADTDNL	500	(none)	2	6.2
Water Truck	!04010000!	104.7	74.8	PWL-Pt	WTruDNL	500	(none)	1	6.2
Light Truck Forman	!04010001!	99.7	69.8	PWL-Pt	LTruForFTA	500	(none)	1	6.2
Light Truck Crew	!04010001!	99.7	69.8	PWL-Pt	LTruCrFTA	500	(none)	1	6.2
Articulated Dump Truck	!04010001!	111.7	81.8	PWL-Pt	ADTFTA	500	(none)	2	6.2
Water Truck	!04010001!	108.7	78.8	PWL-Pt	WTruFTA	500	(none)	1	6.2

Table A- 32. Percolation Dam CadnaA On-Site Construction Noise Results

Receiver		Height		Coordinates			V1	V2	V3	V4
Name	ID			X	Y	Z	Day	Day	Day	Day
		(ft)		(ft)	(ft)	(ft)	dB(A)	dB(A)	dB(A)	dB(A)
R1 - 7295 Forsum Rd	!05!	5	r	2000488.77	13522329.98	234.66	63.2	69.7	65.4	69.4
R2 - 7373 Forsum rd	!05!	5	r	2001279.32	13521475.67	237.89	62.6	69.1	56.3	60.3
R3 - 7026 Basking Ridge Ave	!05!	5	r	2001625.51	13523281.5	245.42	66.7	73.2	58.4	62.5
R4 - 7226 Basking Ridge Ave	!05!	5	r	2002613.01	13522622.9	268.79	65.3	71.9	54.3	58.4
R5 - 7358 Basking Ridge Ave	!05!	5	r	2003339.59	13522126.2	287.15	60.8	66.7	48.2	52.3

SEDIMENT AUGMENTATION
A. EQUIPMENT LIST AND SOUND LEVELS

Table A- 33. Sediment Augmentation Equipment List

Gravel Augmentation and Large Woody Debris Conservation Measure Estimate of On-Site Equipment (02/03/2022)

#	Construction Activity	Construction Phase	Approx. Duration (months)	Utilization Factor	Equipment Quantity	Equipment Type	CalEEMod Equipment Type	Assumed Equipment Description	Source/Notes	Fuel Type	Power Rating (HP)[3]	Operating Hours/Day	Days/ Week
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	0.9	2	Medium Bulldozer	Rubber Tired Dozers	CAT D8T	cat.com	Diesel	354	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	0.9	2	Medium excavator	Excavators	CAT 330	cat.com	Diesel	273	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	0.9	1	Motor grader	Graders	CAT 16	cat.com	Diesel	290	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	0.9	2	Track drill rig	Bore/Drill Rigs	PowerROC T35 (2½"–4½")	epiroc.com	Diesel	201	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	0.9	3	Light truck - Forman	--	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	0.9	1	Light truck - Crew	--	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	0.9	2	Articulated dump truck	Off-Highway Trucks	CAT 745	cat.com	Diesel	496	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	0.9	2	Water truck	Off-Highway Trucks	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	1.0	1	Pump for water trucks	Pumps	GODWIN CD150M	xylem.com	Diesel	74	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	0.9	1	Loader	Rubber Tired Loaders	CAT 966M XE	cat.com	Diesel	298	10	5
	Construction of the Haul Roads and Preparation of Stockpile Areas	Year 1	0.5	1.0	-	No Equipment - Crew	--	-	-	-	-	10	5
	Construct creek bypass system	Year 1	0.5	0.9	5	Long-reach excavator	Excavators	CAT 352 LRE	cat.com	Diesel	424	20	5
	Construct creek bypass system	Year 1	0.5	1.0	5	Generator (80 kW)	Generator Sets	Generac SD100	generac.com	Diesel	152	20	5
	Construct creek bypass system	Year 1	0.5	0.9	5	Light truck - Forman	--	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
	Construct creek bypass system	Year 1	0.5	0.9	5	Light truck - Crew	--	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
	Construct creek bypass system	Year 1	0.5	0.9	5	Articulated dump truck	Off-Highway Trucks	CAT 745	cat.com	Diesel	496	10	5
	Construct creek bypass system	Year 1	0.5	0.9	5	Water truck	Off-Highway Trucks	4000 gal Water truck	rbauction.com, 2020 KENWORTH T370 T/A	Diesel	330	10	5
	Construct creek bypass system	Year 1	0.5	0.9	5	Pump for water trucks	Pumps	GODWIN CD150M	xylem.com	Diesel	74	10	5
	Construct creek bypass system	Year 1	0.5	0.9	5	Loader	Rubber Tired Loaders	CAT 966M XE	cat.com	Diesel	298	10	5
	Construct creek bypass system	Year 1	0.5	1.0	-	No Equipment - Crew	--	-	-	-	-	10	5
	Dewater	Year 1	1.0	0.7	20	Pump	Pumps	GODWIN CD75	xylem.com	Diesel	17	24	5
	Dewater	Year 1	1.0	0.9	5	Long-reach excavator	Excavators	CAT 352 LRE	cat.com	Diesel	424	20	5
	Dewater	Year 1	1.0	1.0	5	Generator (80 kW)	Generator Sets	Generac SD100	generac.com	Diesel	152	20	5
	Dewater	Year 1	1.0	0.9	5	Light truck - Forman	--	Ford F150 XLT 3.3L V6	ford.com	Gasoline	290	10	5
	Dewater	Year 1	1.0	0.9	5	Loader	Rubber Tired Loaders	CAT 966M XE	cat.com	Diesel	298	10	5
	Dewater	Year 1	1.0	1.0	-	No Equipment - Crew	--	-	-	-	-	10	5

B. CADNAA INPUTS AND RESULTS

Table A- 34. Gravel Augmentation CadnaA On-Site Construction Noise Point Sources

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Medium Bulldozer	!04000000!	115.8	Lw	MDozDNL	500	(none)	5	r	2033691.91	13498775.85	379.02
Medium Bulldozer	!04000000!	115.8	Lw	MDozDNL	500	(none)	5	r	2032490.93	13498053.95	372.45
Medium Excavator	!04000000!	115.8	Lw	MExcDNL	500	(none)	5	r	2033160.33	13498933.36	379.02
Medium Excavator	!04000000!	115.8	Lw	MExcDNL	500	(none)	5	r	2032620	13498452.09	379.02
Motor Grader	!04000000!	115.8	Lw	MGradDNL	500	(none)	5	r	2032825.63	13498710.22	379.02
Track Drill Rig	!04000000!	122.8	Lw	TDrillRigDNL	500	(none)	5	r	2033409.72	13498883.04	379.02
Track Drill Rig	!04000000!	122.8	Lw	TDrillRigDNL	500	(none)	5	r	2032565.31	13498257.4	375.05
Pumps for Water Truck	!04000000!	99.8	Lw	PumpWatTruDNL	500	(none)	5	r	2032733.95	13498571.73	379.02
Loader	!04000000!	110.8	Lw	LoadDNL	500	(none)	5	r	2032963.14	13498835.65	379.02
Medium Bulldozer	!04000001!	119.8	Lw	MDozFTA	500	(none)	5	r	2033691.91	13498775.85	379.02
Medium Bulldozer	!04000001!	119.8	Lw	MDozFTA	500	(none)	5	r	2032490.93	13498053.95	372.45
Medium Excavator	!04000001!	119.8	Lw	MExcFTA	500	(none)	5	r	2033160.33	13498933.36	379.02
Medium Excavator	!04000001!	119.8	Lw	MExcFTA	500	(none)	5	r	2032620	13498452.09	379.02
Motor Grader	!04000001!	119.8	Lw	MGradFTA	500	(none)	5	r	2032825.63	13498710.22	379.02
Track Drill Rig	!04000001!	129.8	Lw	TDrillRigFTA	500	(none)	5	r	2033409.72	13498883.04	379.02
Track Drill Rig	!04000001!	129.8	Lw	TDrillRigFTA	500	(none)	5	r	2032565.31	13498257.4	375.05
Pumps for Water Truck	!04000001!	102.8	Lw	PumpWatTruFTA	500	(none)	5	r	2032733.95	13498571.73	379.02
Loader	!04000001!	114.8	Lw	LoadFTA	500	(none)	5	r	2032963.14	13498835.65	379.02
Long Reach Excavator	!04000100!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2029865.52	13498262.27	365.89
Long Reach Excavator	!04000100!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2029568.04	13498061.03	366.47
Long Reach Excavator	!04000100!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2019832.01	13503519.05	313.4
Long Reach Excavator	!04000100!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2020383.19	13502835.58	315.82
Long Reach Excavator	!04000100!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2029991.7	13497962.97	368.16
Generator	!04000100!	99.8	Lw	GenDNL	500	(none)	5	r	2030192.94	13498146.7	367.3
Generator	!04000100!	99.8	Lw	GenDNL	500	(none)	5	r	2029755.47	13497700.48	368.56
Generator	!04000100!	99.8	Lw	GenDNL	500	(none)	5	r	2020246.6	13503203.9	314.57
Generator	!04000100!	99.8	Lw	GenDNL	500	(none)	5	r	2019896.62	13503602	313.4
Generator	!04000100!	99.8	Lw	GenDNL	500	(none)	5	r	2020557.2	13502915.17	316.4
Loader	!04000100!	110.8	Lw	LoadDNL	500	(none)	5	r	2030503.39	13497936.76	368.87
Loader	!04000100!	110.8	Lw	LoadDNL	500	(none)	5	r	2030260.86	13497749.35	370.29

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Loader	!04000100!	110.8	Lw	LoadDNL	500	(none)	5	r	2030040.39	13497495.8	370.42
Loader	!04000100!	110.8	Lw	LoadDNL	500	(none)	5	r	2019835.88	13503320	313.4
Loader	!04000100!	110.8	Lw	LoadDNL	500	(none)	5	r	2020233.98	13502917.52	315.22
Pumps for Water Truck	!04000100!	99.8	Lw	PumpWatTruDNL	500	(none)	5	r	2019984.62	13503661.24	313.4
Pumps for Water Truck	!04000100!	99.8	Lw	PumpWatTruDNL	500	(none)	5	r	2020098.36	13503543.12	313.48
Pumps for Water Truck	!04000100!	99.8	Lw	PumpWatTruDNL	500	(none)	5	r	2020251.48	13503403.12	314.29
Pumps for Water Truck	!04000100!	99.8	Lw	PumpWatTruDNL	500	(none)	5	r	2029755.58	13497930.09	367.55
Pumps for Water Truck	!04000100!	99.8	Lw	PumpWatTruDNL	500	(none)	5	r	2030311.19	13497925.72	369.17
Long Reach Excavator	!04000101!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2029865.52	13498262.27	365.89
Long Reach Excavator	!04000101!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2029568.04	13498061.03	366.47
Long Reach Excavator	!04000101!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2019832.01	13503519.05	313.4
Long Reach Excavator	!04000101!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2020383.19	13502835.58	315.82
Long Reach Excavator	!04000101!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2029991.7	13497962.97	368.16
Generator	!04000101!	102.8	Lw	GenFTA	500	(none)	5	r	2030192.94	13498146.7	367.3
Generator	!04000101!	102.8	Lw	GenFTA	500	(none)	5	r	2029755.47	13497700.48	368.56
Generator	!04000101!	102.8	Lw	GenFTA	500	(none)	5	r	2020246.6	13503203.9	314.57
Generator	!04000101!	102.8	Lw	GenFTA	500	(none)	5	r	2019896.62	13503602	313.4
Generator	!04000101!	102.8	Lw	GenFTA	500	(none)	5	r	2020557.2	13502915.17	316.4
Loader	!04000101!	114.8	Lw	LoadFTA	500	(none)	5	r	2030503.39	13497936.76	368.87
Loader	!04000101!	114.8	Lw	LoadFTA	500	(none)	5	r	2030260.86	13497749.35	370.29
Loader	!04000101!	114.8	Lw	LoadFTA	500	(none)	5	r	2030040.39	13497495.8	370.42
Loader	!04000101!	114.8	Lw	LoadFTA	500	(none)	5	r	2019835.88	13503320	313.4
Loader	!04000101!	114.8	Lw	LoadFTA	500	(none)	5	r	2020233.98	13502917.52	315.22
Pumps for Water Truck	!04000101!	102.8	Lw	PumpWatTruFTA	500	(none)	5	r	2019984.62	13503661.24	313.4
Pumps for Water Truck	!04000101!	102.8	Lw	PumpWatTruFTA	500	(none)	5	r	2020098.36	13503543.12	313.48
Pumps for Water Truck	!04000101!	102.8	Lw	PumpWatTruFTA	500	(none)	5	r	2020251.48	13503403.12	314.29
Pumps for Water Truck	!04000101!	102.8	Lw	PumpWatTruFTA	500	(none)	5	r	2029755.58	13497930.09	367.55

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Pumps for Water Truck	!04000101!	102.8	Lw	PumpWatTruFTA	500	(none)	5	r	2030311.19	13497925.72	369.17
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2019938.06	13503716.11	313.4
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2019987.66	13503655.48	313.4
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2020020.74	13503625.16	313.4
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2020056.56	13503586.58	313.4
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2020100.66	13503536.97	313.5
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2020133.73	13503512.17	313.71
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2020161.29	13503481.85	313.9
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2020199.87	13503448.78	314.16
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2020232.94	13503426.73	314.26
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2020277.04	13503404.68	314.39
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2029618.01	13498123.68	366.22
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2030092.03	13498167.78	366.98
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2030455.82	13498057.54	367.97
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2029236.34	13498372.51	362.89
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2029567.06	13498240.22	365.89
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2029805.41	13497815.01	368.21
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2029451.36	13498204.4	365.89
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2029837.19	13497917.78	367.81
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2030156.88	13498127.24	367.39
Pump	!04000200!	96.8	Lw	PumpDNL	500	(none)	5	r	2030312.51	13497837.06	369.84
Long Range Excavator	!04000200!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2030608.85	13497983.93	367.95
Long Range Excavator	!04000200!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2030189.94	13497752.42	369.92
Long Range Excavator	!04000200!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2029624.97	13498083.16	366.44
Long Range Excavator	!04000200!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2019854.23	13503548.74	313.4
Long Range Excavator	!04000200!	115.8	Lw	LReaExcDNL	500	(none)	5	r	2020132.58	13503237.31	314.04
Generator	!04000200!	99.8	Lw	GenDNL	500	(none)	5	r	2020314.48	13502884.54	315.48
Generator	!04000200!	99.8	Lw	GenDNL	500	(none)	5	r	2019914.86	13503347.55	313.4
Generator	!04000200!	99.8	Lw	GenDNL	500	(none)	5	r	2029912.48	13497752.37	368.85
Generator	!04000200!	99.8	Lw	GenDNL	500	(none)	5	r	2030532.26	13497766.38	370.34
Generator	!04000200!	99.8	Lw	GenDNL	500	(none)	5	r	2030414.14	13498076.82	368
Loader	!04000200!	110.8	Lw	LoadDNL	500	(none)	5	r	2020015.72	13502980.15	314.98
Loader	!04000200!	110.8	Lw	LoadDNL	500	(none)	5	r	2019595.57	13503341.27	313.4

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Loader	!04000200!	110.8	Lw	LoadDNL	500	(none)	5	r	2020425.45	13502952.37	315.78
Loader	!04000200!	110.8	Lw	LoadDNL	500	(none)	5	r	2030405.56	13497391.24	372.34
Loader	!04000200!	110.8	Lw	LoadDNL	500	(none)	5	r	2029785.31	13498188.66	366.3
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2019938.06	13503716.11	313.4
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2019987.66	13503655.48	313.4
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2020020.74	13503625.16	313.4
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2020056.56	13503586.58	313.4
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2020100.66	13503536.97	313.5
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2020133.73	13503512.17	313.71
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2020161.29	13503481.85	313.9
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2020199.87	13503448.78	314.16
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2020232.94	13503426.73	314.26
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2020277.04	13503404.68	314.39
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2029618.01	13498123.68	366.22
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2030092.03	13498167.78	366.98
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2030455.82	13498057.54	367.97
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2029236.34	13498372.51	362.89
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2029567.06	13498240.22	365.89
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2029805.41	13497815.01	368.21
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2029451.36	13498204.4	365.89
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2029837.19	13497917.78	367.81
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2030156.88	13498127.24	367.39
Pump	!04000201!	96.8	Lw	PumpFTA	500	(none)	5	r	2030312.51	13497837.06	369.84
Long Range Excavator	!04000201!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2030608.85	13497983.93	367.95
Long Range Excavator	!04000201!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2030189.94	13497752.42	369.92
Long Range Excavator	!04000201!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2029624.97	13498083.16	366.44
Long Range Excavator	!04000201!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2019854.23	13503548.74	313.4
Long Range Excavator	!04000201!	119.8	Lw	LReaExcFTA	500	(none)	5	r	2020132.58	13503237.31	314.04
Generator	!04000201!	102.8	Lw	GenFTA	500	(none)	5	r	2020314.48	13502884.54	315.48
Generator	!04000201!	102.8	Lw	GenFTA	500	(none)	5	r	2019914.86	13503347.55	313.4
Generator	!04000201!	102.8	Lw	GenFTA	500	(none)	5	r	2029912.48	13497752.37	368.85
Generator	!04000201!	102.8	Lw	GenFTA	500	(none)	5	r	2030532.26	13497766.38	370.34
Generator	!04000201!	102.8	Lw	GenFTA	500	(none)	5	r	2030414.14	13498076.82	368
Loader	!04000201!	114.8	Lw	LoadFTA	500	(none)	5	r	2020015.72	13502980.15	314.98

Name	ID	Result. PWL	Lw / Li		Freq.	Direct.	Height		Coordinates		
			Type	Value					X	Y	Z
		(dBA)			(Hz)		(ft)		(ft)	(ft)	(ft)
Loader	!04000201!	114.8	Lw	LoadFTA	500	(none)	5	r	2019595.57	13503341.27	313.4
Loader	!04000201!	114.8	Lw	LoadFTA	500	(none)	5	r	2020425.45	13502952.37	315.78
Loader	!04000201!	114.8	Lw	LoadFTA	500	(none)	5	r	2030405.56	13497391.24	372.34
Loader	!04000201!	114.8	Lw	LoadFTA	500	(none)	5	r	2029785.31	13498188.66	366.3
Medium Bulldozer	!04000000!	115.8	Lw	MDozDNL	500	(none)	5	r	2037185.31	13497698.2	402.4
Medium Bulldozer	!04000000!	115.8	Lw	MDozDNL	500	(none)	5	r	2036658.36	13497517.42	401.18
Medium Excavator	!04000000!	115.8	Lw	MExcDNL	500	(none)	5	r	2036750.07	13497651.43	398.7
Motor Grader	!04000000!	115.8	Lw	MGradDNL	500	(none)	5	r	2036932.68	13497568.84	400.25
Loader	!04000000!	110.8	Lw	LoadDNL	500	(none)	5	r	2036966.42	13497741.46	398.7
Medium Bulldozer	!04000001!	119.8	Lw	MDozFTA	500	(none)	5	r	2037185.31	13497698.2	402.4
Medium Bulldozer	!04000001!	119.8	Lw	MDozFTA	500	(none)	5	r	2036658.36	13497517.42	401.18
Medium Excavator	!04000001!	119.8	Lw	MExcFTA	500	(none)	5	r	2036750.07	13497651.43	398.7
Motor Grader	!04000001!	119.8	Lw	MGradFTA	500	(none)	5	r	2036932.68	13497568.84	400.25
Loader	!04000001!	114.8	Lw	LoadFTA	500	(none)	5	r	2036966.42	13497741.46	398.7

Table A- 35. Gravel Augmentation CadnaA On-Site Construction Noise Line Sources

Name	M.	ID	Result. PWL	Result. PWL'	Lw / Li		Freq.	Direct.	Moving Pt. Src	
					Type	Value			Number	Speed
			(dBA)	(dBA)			(Hz)			(mph)
Light Truck Forman	~	!04000000!	100.4	64.6	PWL-Pt	LTruForDNL	500	(none)	3	6.2
Light Truck Crew	~	!04000000!	95.6	59.8	PWL-Pt	LTruCrDNL	500	(none)	1	6.2
Articulated Dump Truck	~	!04000000!	113.6	77.8	PWL-Pt	ADTDNL	500	(none)	2	6.2
WaterTruck	~	!04000000!	113.6	77.8	PWL-Pt	WTruDNL	500	(none)	2	6.2
Light Truck Forman	~	!04000001!	110.4	74.6	PWL-Pt	LTruForFTA	500	(none)	3	6.2
Light Truck Crew	~	!04000001!	105.6	69.8	PWL-Pt	LTruCrFTA	500	(none)	1	6.2
Articulated Dump Truck	~	!04000001!	117.6	81.8	PWL-Pt	ADTFTA	500	(none)	2	6.2
WaterTruck	~	!04000001!	117.6	81.8	PWL-Pt	WTruFTA	500	(none)	2	6.2

Name	M.	ID	Result. PWL	Result. PWL'	Lw / Li		Freq.	Direct.	Moving Pt. Src	
					Type	Value			Number	Speed
			(dBA)	(dBA)			(Hz)			(mph)
Light Truck Forman	~	!04000100!	104.1	66.8	PWL-Pt	LTruForDNL	500	(none)	5	6.2
Light Truck Crew	~	!04000100!	104.1	66.8	PWL-Pt	LTruCrDNL	500	(none)	5	6.2
Articulated Dump Truck	~	!04000100!	119.1	81.8	PWL-Pt	ADTDNL	500	(none)	5	6.2
Water Truck	~	!04000100!	119.1	81.8	PWL-Pt	WTruDNL	500	(none)	5	6.2
Light Truck Forman	~	!04000101!	114.1	76.8	PWL-Pt	LTruForFTA	500	(none)	5	6.2
Light Truck Crew	~	!04000101!	114.1	76.8	PWL-Pt	LTruCrFTA	500	(none)	5	6.2
Articulated Dump Truck	~	!04000101!	123.1	85.8	PWL-Pt	ADTFTA	500	(none)	5	6.2
Water Truck	~	!04000101!	123.1	85.8	PWL-Pt	WTruFTA	500	(none)	5	6.2
Light Truck Forman		!04000200!	104.1	66.8	PWL-Pt	LTruForDNL	500	(none)	5	6.2
Light Truck Forman	~	!04000201!	114.1	76.8	PWL-Pt	LTruForFTA	500	(none)	5	6.2

Table A- 36. Gravel Augmentation CadnaA On-Site Construction Noise Results

Receiver		Height		Coordinates			V1	V2	V3	V4	V5	V6
Name	ID			X	Y	Z	Day	Day	Day	Day	Day	Day
		(ft)		(ft)	(ft)	(ft)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
R01 - 18780 Alicante Circula	!05!	5	r	2036925.57	13497314.71	407.89	66.4	70.5	35.3	39.6	32	36.3
R02 - Boys Ranch	!05!	5	r	2036728.69	13497848.48	409.34	71	75	36.6	41	34.5	38.7
R03 - 18720 Buena Ventura Ct	!05!	5	r	2036203.68	13497174.71	401.06	59.2	63.5	39.3	43.5	36	40.1
R04 - 19129 Eagle View Dr	!05!	5	r	2033672.62	13498039.43	383.52	61.9	68	49.3	53.6	43.5	48
R05 - 19145 Eagle View Dr	!05!	5	r	2033317.09	13497507.52	386.39	60.1	66.3	49.1	53.4	44.6	48.9
R06 - 19250 Donna Ct	!05!	5	r	2031765.46	13497090.55	379.02	58.6	64.3	55.6	59.9	51.1	55.4
R07 - 910 Burnett Ave	!05!	5	r	2030428.76	13496983.59	372.45	52.8	58.6	56.5	61.8	59.9	63.9
R08 - 10806 Kirby Ave	!05!	5	r	2026050.56	13498308.53	353.58	45	49.9	49.2	53.5	42.1	46.7
R09 - RV Home at 230 Ogier Ave	!05!	5	r	2020550.76	13502011.62	319.94	30.2	34.6	60.8	64.2	57.2	61.3
R10 - Parkway Lakes RV Park	!05!	5	r	2020043.33	13501982	319.96	29.1	33.5	56.5	39.6	32	36.3
R11 - 10000 Monterey Hwy	!05!	5	r	2019423.69	13502806.88	314.43	25.9	30.3	59.9	59.8	56	60

APPENDIX 4 – ANDERSON DAM VIBRATION ANALYSIS

Table A- 37. On-Site Construction Equipment Vibration, Structural Damage – Excavation Area

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (PPV, in/sec)																								Significance Threshold (PPV, in/sec)	Significant Impact?
		Medium excavator	Loader	Motor grader	Track drill rig	Articulated dump truck	Water truck	Crane 150t	Concrete vibrator	Concrete pump truck	Vibratory plate	Tamper	Large excavator	Manlift	Bulldozer	Bulldozer w/discs	Large rigid-body dump truck	Bobcat	Road-header	Scooptrams	Jackhammer	Padfoot roller	Tamping foot roller	Small backhoe	Jacklegs	Vibratory smooth drum roller		
FTA Reference Vibration	25	0.003	0.089	0.089	0.089	0.076	0.076	0.008	0.035	0.076	0.035	0.035	0.089	0.003	0.089	0.089	0.076	0.003	0.19	0.089	0.035	0.21	0.089	0.003	0.035	0.21	--	--
18625 Corte Bautista	480	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.001	0.000	0.002	0.001	0.000	0.002	0.001	0.000	0.000	0.002	0.12	No

Table A- 38. On-Site Construction Equipment Vibration, Indoor Impact – Excavation Area

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (VdB)																								Significance Threshold (VdB)	Significant Impact?
		Medium excavator	Loader	Motor grader	Track drill rig	Articulated dump truck	Water truck	Crane 150t	Concrete vibrator	Concrete pump truck	Vibratory plate	Tamper	Large excavator	Manlift	Bulldozer	Bulldozer w/discs	Large rigid-body dump truck	Bobcat	Road-header	Scooptrams	Jackhammer	Padfoot roller	Tamping foot roller	Small backhoe	Jacklegs	Vibratory smooth drum roller		
FTA Reference Vibration	25	58	87	87	87	86	86	66	79	86	79	79	87	58	87	87	86	58	94	87	79	94	87	58	79	94	--	--
18625 Corte Bautista	480	19	48	48	48	47	47	28	40	47	40	40	48	19	48	48	47	19	55	48	40	56	48	19	40	56	72	No

Table A- 39. On-Site Construction Equipment Vibration, Structural Damage – Staging Area 1

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (PPV, in/sec)																											Significance Threshold (PPV, in/sec)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Crane 150t	Concrete vibrator	Concrete pump truck	Large excavator	Manlift	Bulldozer	Bulldozer w/discs	Large rigid-body dump truck	Bobcat	Road-header	Scooptrams	Jackhammer	Padfoot roller	Tamping foot roller	Excavator-mounted hoe-ram	Mini excavator	Small backhoe	Loader	Highway dump truck	Vibratory smooth drum roller	Asphalt paving machine	Asphalt compactor		
FTA Reference Vibration	25	0.003	0.089	0.089	0.089	0.089	0.076	0.076	0.008	0.035	0.076	0.089	0.003	0.089	0.089	0.076	0.003	0.19	0.089	0.035	0.21	0.089	0.089	0.003	0.003	0.089	0.076	0.21	0.08	0.21	--	--
2015 Alicante Pl	180	0.000	0.005	0.005	0.005	0.005	0.004	0.004	0.000	0.002	0.004	0.005	0.000	0.005	0.005	0.004	0.000	0.010	0.005	0.002	0.011	0.005	0.005	0.000	0.000	0.005	0.004	0.011	0.004	0.011	0.12	No
18720 Buena Ventura Ct	270	0.000	0.003	0.003	0.003	0.003	0.002	0.002	0.000	0.001	0.002	0.003	0.000	0.003	0.003	0.002	0.000	0.005	0.003	0.001	0.006	0.003	0.003	0.000	0.000	0.003	0.002	0.006	0.002	0.006	0.12	No
Boys Ranch	120	0.000	0.008	0.008	0.008	0.008	0.007	0.007	0.001	0.003	0.007	0.008	0.000	0.008	0.008	0.007	0.000	0.018	0.008	0.003	0.020	0.008	0.008	0.000	0.000	0.008	0.007	0.020	0.008	0.020	0.12	No

Table A- 40. On-Site Construction Equipment Vibration, Indoor Impact – Staging Area 1

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (VdB)																											Significance Threshold (VdB)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Crane 150t	Concrete vibrator	Concrete pump truck	Large excavator	Manlift	Bulldozer	Bulldozer w/discs	Large rigid-body dump truck	Bobcat	Road-header	Scooptrams	Jackhammer	Padfoot roller	Tamping foot roller	Excavator-mounted hoe-ram	Mini excavator	Small backhoe	Loader	Highway dump truck	Vibratory smooth drum roller	Asphalt paving machine	Asphalt compactor		
FTA Reference Vibration	25	58	87	87	87	87	86	86	66	79	86	87	58	87	87	86	58	94	87	79	94	87	87	58	58	87	86	94	86	94	--	--
2015 Alicante Pl	180	32	61	61	61	61	60	60	40	53	60	61	32	61	61	60	32	68	61	53	69	61	61	32	32	61	60	69	60	69	72	No
18720 Buena Ventura Ct	270	26	56	56	56	56	55	55	35	48	55	56	26	56	56	55	26	63	56	48	63	56	56	26	26	56	55	63	55	63	72	No
Boys Ranch	120	37	67	67	67	67	65	65	46	58	65	67	37	67	67	65	37	73	67	58	74	67	67	37	37	67	65	74	66	74	72	Yes

Table A- 41. On-Site Construction Equipment Vibration, Structural Damage – Staging Area 2

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (PPV, in/sec)													Significance Threshold (PPV, in/sec)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Crane 150t	Concrete vibrator	Concrete pump truck	Manlift	Bobcat	Small backhoe	Jacklegs		
FTA Reference Vibration	25	0.003	0.089	0.089	0.089	0.089	0.076	0.076	0.008	0.035	0.076	0.003	0.003	0.003	0.035	--	--
MH Vallee Vineyards (18285 Cochrane Rd)	180	0.000	0.005	0.005	0.005	0.005	0.004	0.004	0.000	0.002	0.004	0.000	0.000	0.000	0.002	0.12	No

Table A- 42. On-Site Construction Equipment Vibration, Indoor Impact – Staging Area 2

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (VdB)														Significance Threshold (VdB)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Crane 150t	Concrete vibrator	Concrete pump truck	Manlift	Bobcat	Small backhoe	Jacklegs		
FTA Reference Vibration	25	58	87	87	87	87	86	86	66	79	86	58	58	58	79	--	--
MH Vallee Vineyards (18285 Cochrane Rd)	180	32	61	61	61	61	60	60	40	53	60	32	32	32	53	75	No

Table A- 43. On-Site Construction Equipment Vibration, Structural Damage – Staging Area 4

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (PPV, in/sec)																	Significance Threshold (PPV, in/sec)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Crane 150t	Concrete vibrator	Concrete pump truck	Vibratory plate	Tamper	Large excavator	Manlift	Bobcat	Road-header	Scooptrams	Vibratory smooth drum roller		
FTA Reference Vibration	25	0.003	0.089	0.089	0.089	0.089	0.076	0.076	0.008	0.035	0.076	0.035	0.035	0.089	0.003	0.003	0.19	0.089	0.21	--	--
R6	340	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.001	0.002	0.001	0.001	0.002	0.000	0.000	0.004	0.002	0.004	0.2	No
R32	110	0.000	0.010	0.010	0.010	0.010	0.008	0.008	0.001	0.004	0.008	0.004	0.004	0.010	0.000	0.000	0.021	0.010	0.023	0.2	No

Table A- 44. On-Site Construction Equipment Vibration, Indoor Impact – Staging Area 4

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (VdB)																	Significance Threshold (VdB)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Crane 150t	Concrete vibrator	Concrete pump truck	Vibratory plate	Tamper	Large excavator	Manlift	Bobcat	Road-header	Scooptrams	Vibratory smooth drum roller		
FTA Reference Vibration	25	58	87	87	87	87	86	86	66	79	86	79	79	87	58	58	94	87	94	--	--
R6	340	23	53	53	53	53	52	52	32	45	52	45	45	53	23	23	60	53	60	72	No
R32	110	38	68	68	68	68	66	66	47	60	66	60	60	68	38	38	74	68	75	72	Yes

Table A- 45. On-Site Construction Equipment Vibration, Structural Damage – Stockpile Area E

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (PPV, in/sec)														Significance Threshold (PPV, in/sec)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Large excavator	Bulldozer	Bulldozer w/discs	Large rigid-body dump truck	Padfoot roller	Tamping foot roller	Small backhoe	Vibratory smooth drum roller		
FTA Reference Vibration	25	0.003	0.089	0.089	0.089	0.089	0.076	0.076	0.089	0.089	0.089	0.076	0.21	0.089	0.003	0.21	--	--
2015 Alicante Pl	290	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.002	0.000	0.005	0.12	No
Boys Ranch	250	0.000	0.003	0.003	0.003	0.003	0.002	0.002	0.003	0.003	0.003	0.002	0.007	0.003	0.000	0.007	0.12	No

Table A- 46. On-Site Construction Equipment Vibration, Indoor Impact – Stockpile Area E

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (VdB)														Significance Threshold (VdB)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Large excavator	Bulldozer	Bulldozer w/discs	Large rigid-body dump truck	Padfoot roller	Tamping foot roller	Small backhoe	Vibratory smooth drum roller		
FTA Reference Vibration	25	58	87	87	87	87	86	86	87	87	87	86	94	87	58	94	--	--
2015 Alicante Pl	290	26	55	55	55	55	54	54	55	55	55	54	62	55	26	62	72	No
Boys Ranch	250	28	57	57	57	57	56	56	57	57	57	56	64	57	28	64	72	No

Table A- 47. On-Site Construction Equipment Vibration, Structural Damage – Stockpile Area K North

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (PPV, in/sec)															Significance Threshold (PPV, in/sec)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Large excavator	Bulldozer	Bulldozer w/discs	Large rigid-body dump truck	Padfoot roller	Tamping foot roller	Small backhoe	Vibratory smooth drum roller		
FTA Reference Vibration	25	0.003	0.089	0.089	0.089	0.089	0.076	0.076	0.089	0.089	0.089	0.076	0.21	0.089	0.003	0.21	--	--
3291 Butterfly Ln	320	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.002	0.000	0.005	0.12	No

Table A- 48. On-Site Construction Equipment Vibration, Indoor Impact – Stockpile Area K North

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (VdB)															Significance Threshold (VdB)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Large excavator	Bulldozer	Bulldozer w/discs	Large rigid-body dump truck	Padfoot roller	Tamping foot roller	Small backhoe	Vibratory smooth drum roller		
FTA Reference Vibration	25	58	87	87	87	87	86	86	87	87	87	86	94	87	58	94	--	--
3291 Butterfly Ln	320	24	54	54	54	54	52	52	54	54	54	52	61	54	24	61	72	No

Table A- 49. On-Site Construction Equipment Vibration, Structural Damage – Stockpile Area K South

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (PPV, in/sec)															Significance Threshold (PPV, in/sec)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Large excavator	Bulldozer	Bulldozer w/discs	Large rigid-body dump truck	Padfoot roller	Tamping foot roller	Small backhoe	Vibratory smooth drum roller		
FTA Reference Vibration	25	0.003	0.089	0.089	0.089	0.089	0.076	0.076	0.089	0.089	0.089	0.076	0.21	0.089	0.003	0.21	--	--
17106 Shady Ln Dr	310	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.002	0.000	0.005	0.12	No

Table A- 50. On-Site Construction Equipment Vibration, Indoor Impact – Stockpile Area K South

Sensitive Receptor	Approx. Distance to Receptor (ft)	Vibration Per Equipment (VdB)															Significance Threshold (VdB)	Significant Impact?
		Medium excavator	Loader	Medium Bulldozer	Motor grader	Track drill rig	Articulated dump truck	Water truck	Large excavator	Bulldozer	Bulldozer w/discs	Large rigid-body dump truck	Padfoot roller	Tamping foot roller	Small backhoe	Vibratory smooth drum roller		
FTA Reference Vibration	25	58	87	87	87	87	86	86	87	87	87	86	94	87	58	94	--	--
17106 Shady Ln Dr	310	25	54	54	54	54	53	53	54	54	54	53	62	54	25	62	72	No

APPENDIX 5 – BLASTING ANALYSIS

Table A- 51. Vibration Energy below 3 Hz

Calculation Sheet

RAMBOLL

Maximum Charge Weight per Delay

Project Name:	**Anderson Dam Seismic Retrofit Project (ADSRP)**	**Date:**	3/10/2023
Project Number:	**1690016353**		
Receptor ID:	**18051 Barnard Rd**		

Data Input

	Unit System	U.S.
Ground Vibration	**Industry**	Construction
	Confidence Level	Upper Bound
Air-Overpressure	**Blasting Type**	Construction (average)
	Statistical Type	Best Fit

Distance from Blasting	**R**	**240**	ft.
Peak Particle Velocity	**PPV**	**0.50**	in./sec.
Air-Overpressure	**P**		psi
Peak Overpressure Level	**SPL**	**133**	dB

Calculation Results

Ground Vibration $PPV = A \times (SD_2)^{-B}$

Square Root Scaled Distance	**SD_2**	**47.6**	ft./lb. $^{1/2}$
Charge-Weight per delay	**W**	**25.37**	lb.
	A	**242**	
	B	**-1.60**	

Air-Overpressure $P = A \times (SD_3)^{-B}$

Cube Root Scaled Distance	**SD_3**	**52.0**	ft./lb. $^{1/3}$
Charge-Weight per delay	**W**	**98.32**	lb.
	A	**1**	
	B	**-1.10**	
Calculated Air-Overpressure from SPL	**P**	**0.01**	psi

Maximum Charge-Weight per delay	**W**	**25.4**	lb.

References

Blaster's Handbook of International Society of Explosive Engineers (ISEE) - 18th Edition

Table A- 52. Vibration Energy 3 Hz and above

Calculation Sheet

RAMBOLL

Maximum Charge Weight per Delay

Project Name:	**Anderson Dam Seismic Retrofit Project (ADSRP)**	**Date:**	3/10/2023
Project Number:	**1690016353**		
Receptor ID:	**18051 Barnard Rd**		

Data Input

	Unit System	U.S.
Ground Vibration	**Industry**	Construction
	Confidence Level	Upper Bound
Air-Overpressure	**Blasting Type**	Construction (average)
	Statistical Type	Best Fit

Distance from Blasting	**R**	**240**	ft.
Peak Particle Velocity	**PPV**	**0.1884**	in./sec.
Air-Overpressure	**P**		psi
Peak Overpressure Level	**SPL**	**133**	dB

Calculation Results

Ground Vibration $PPV = A \times (SD_2)^{-B}$

Square Root Scaled Distance	**SD_2**	**87.7**	ft./lb. $^{1/2}$
Charge-Weight per delay	**W**	**7.49**	lb.
	A	**242**	
	B	**-1.60**	

Air-Overpressure $P = A \times (SD_3)^{-B}$

Cube Root Scaled Distance	**SD_3**	**52.0**	ft./lb. $^{1/3}$
Charge-Weight per delay	**W**	**98.32**	lb.
	A	**1**	
	B	**-1.10**	
Calculated Air-Overpressure from SPL	**P**	**0.01**	psi

Maximum Charge-Weight per delay	**W**	**7.5**	lb.

References

Blaster's Handbook of International Society of Explosive Engineers (ISEE) - 18th Edition

Table A- 53. Air Overpressure

Calculation Sheet

RAMBOLL

Maximum Charge Weight per Delay

Project Name:	**Anderson Dam Seismic Retrofit Project (ADSRP)**	**Date:**	3/10/2023
Project Number:	**1690016353**		
Receptor ID:	**18051 Barnard Rd**		

Data Input

	Unit System	U.S.
Ground Vibration	**Industry**	Construction
	Confidence Level	Upper Bound
Air-Overpressure	**Blasting Type**	Construction (average)
	Statistical Type	Best Fit

Distance from Blasting	**R**	**240**	ft.
Peak Particle Velocity	**PPV**		in./sec.
Air-Overpressure	**P**		psi
Peak Overpressure Level	**SPL**	**133**	dB

Calculation Results

Ground Vibration $PPV = A \times (SD_2)^{-B}$

Square Root Scaled Distance	**SD_2**	**-**	ft./lb. $^{1/2}$
Charge-Weight per delay	**W**	**-**	lb.
	A	**242**	
	B	**-1.60**	

Air-Overpressure $P = A \times (SD_3)^{-B}$

Cube Root Scaled Distance	**SD_3**	**52.0**	ft./lb. $^{1/3}$
Charge-Weight per delay	**W**	**98.32**	lb.
	A	**1**	
	B	**-1.10**	
Calculated Air-Overpressure from SPL	**P**	**0.01**	psi

Maximum Charge-Weight per delay	**W**	**98.3**	lb.

References

Blaster's Handbook of International Society of Explosive Engineers (ISEE) - 18th Edition



Valley Water

Clean Water • Healthy Environment • Flood Protection

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