Lake Fordyce Dam Seepage Mitigation Project (Lake Fordyce, Nevada County)

STATE WATER RESOURCES CONTROL BOARD

Prepared for:
Pacific Gas and Electric (PG&E)

Prepared by:
AECOM

May 2023 and amended May 2024

AECOM Project No. 60700848

ADDENDUM to the

Initial Study and Mitigated Negative Declaration and Previous Addendum for the Lake Fordyce Dam Seepage Mitigation Project

SCH No. 2020090506

Addendum Prepared by AECOM

Prepared for the State Water Resources Control Board

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TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

APE	Area of Potential Effects
BMP	best management practice
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CO_2	carbon dioxide
CGP	Construction General Permit
dB	decibel(s)
EIR	environmental impact report
GHG	greenhouse gas
GPM	gallons per minute
I-80	Interstate 80
in/sec	inch per second
IS/MND	Initial Study/Mitigated Negative Declaration
LLO	Low-Level Outlet
MCU	Modular Control Unit
MM	Mitigation Measure
MMRP	Mitigation Monitoring and Reporting Plan
MT CO_2e	metric tons carbon dioxide equivalents
N/A	not applicable
NOD	Notice of Determination
NO_X	nitrogen oxides
NRHP	National Register of Historic Places
NSAQMD	Northern Sierra Air Quality Management District
PCAPCD	Placer County Air Pollution Control District
PG&E	Pacific Gas and Electric Company
PM_{10}	particulate matter 10 micrometers in diameter or less
$PM_{2.5}$	particulate matter 2.5 micrometers in diameter or less
PPV	peak particle velocity
psi	pounds per square inch
ROG	reactive organic gases
State Water Board	State Water Resources Control Board
SWPPP	Stormwater Pollution Prevention Plan
USFWS	U.S. Fish and Wildlife Service
VdB	vibration decibel levels
VMT	vehicle miles traveled

1. Introduction

This Addendum concerns modifications to the Lake Fordyce Dam Seepage Mitigation Project proposed by Pacific Gas and Electric Company (PG&E) after the adoption of the 2020 California Environmental Quality Act (CEQA) Initial Study/Mitigated Negative Declaration (2020 IS/MND) (State Water Resources Control Board, 2020)[1] and 2021 CEQA Addendum (2021 Addendum) (State Water Resources Control Board, 2021).[2] This Addendum describes PG&E's proposed modifications and discusses potential environmental effects resulting from these modifications (as compared to the impacts analyzed in the 2020 IS/MND and 2021 Addendum).

On October 30, 2020, the State Water Resources Control Board (State Water Board), the CEQA Lead Agency, adopted the 2020 IS/MND and Mitigation Monitoring and Reporting Plan (MMRP) for the original Lake Fordyce Dam Seepage Mitigation Project. Prior to this adoption, the State Water Board released a Notice of Intent to Adopt a Mitigated Negative Declaration and made a draft IS/MND available for a 30-day public and agency review period that began on September 24, 2020. On October 30, 2020, the State Water Board filed a Notice of Determination (NOD) with the Office of Planning and Research.

In 2021, PG&E determined that to increase the stability of the proposed bin-wall cofferdam, additional dredging and related changes would be needed. PG&E proposed changes to the original Lake Fordyce Dam Seepage Mitigation Project and the 2021 Addendum was prepared to analyze those changes (2021 Revised Project). Modifications addressed in the 2021 Addendum related to dredging (both the method used for dredging and the volume of material dredged), amount of imported material associated with cofferdam construction, disposal of dredged sediments, and construction timing. On August 20, 2021, the State Water Board filed an NOD with the Office of Planning and Research.

Following the 2021 construction season (Construction Year One), PG&E determined that a new rockfill cofferdam design would be preferable and paused construction in May 2022, prior to commencing Construction Year Two activities. In addition to and in association with a new rockfill cofferdam, major proposed changes include: (1) on-site blasting and quarrying of rock for the cofferdam at two nearby quarry locations (as opposed to trucking rock in as was analyzed in the previous documents); (2) modifications

[1] State Water Resources Control Board, Lake Fordyce Dam Seepage Mitigation Project Initial Study/Mitigated Negative Declaration, October 2020, available at https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/docs/fordyce/2310a_20201030_ismnd_signed.pdf.

[2] State Water Resources Control Board, Addendum to the Lake Fordyce Dam Seepage Mitigation Project Initial Study/Mitigated Negative Declaration, August 2021, available at https://www.waterboards.ca.gov/waterrights/water_issues/programs//water_quality_cert/docs/fordyce/fordyce_addendum_2021.pdf.

to the pH management system; and (3) a revised construction schedule, with the potential for an additional season of construction (Construction Year Five) if work cannot be completed in the remaining three construction seasons described in the 2021 Addendum and potential for non-consecutive construction seasons if needed due to weather conditions such as wet winters. This Addendum describes PG&E's proposed modifications and evaluates their potential environmental impacts. The term Proposed Project, as used in this Addendum, refers to the Lake Fordyce Dam Seepage Mitigation Project as originally proposed in 2020 and revised in 2021, together with PG&E's currently proposed modifications.

CEQA Guidelines section 15164, subdivision (b) states that an addendum to an adopted negative declaration may be prepared "if only minor technical changes or additions are necessary or none of the conditions described in Section 15162" calling for a subsequent environmental impact report (EIR) or negative declaration have occurred. CEQA Guidelines section 15162 requires the lead agency to prepare a subsequent EIR if "substantial changes are proposed in the project which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects." (Cal. Code Regs., tit. 14, § 15162, subd. (a)(1).) CEQA Guidelines section 15164, subdivision (c) provides that an addendum need not be circulated for public review but can be included in or attached to the final adopted negative declaration.

This document has been prepared in accordance with the requirements of CEQA (Pub. Resources Code, § 21000 et seq.) and the CEQA Guidelines (Cal. Code Regs., tit. 14, § 15000 et seq.). This Addendum relies on expert opinion, technical studies, and other evidence to substantiate its findings.

2. Proposed Changes to the Project

The Proposed Project consists of several major project components, including access road improvements, construction of a cofferdam and water diversion to allow construction at the upstream base of the dam in dry conditions, a geotechnical investigation, and the seepage repair of the dam itself. The primary changes to the Lake Fordyce Dam Seepage Mitigation Project as analyzed in the 2020 IS/MND and 2021 Addendum include: (1) changes in cofferdam design, (2) the introduction of on-site quarrying of rock for the cofferdam, as opposed to trucking rock in as was analyzed in the previous documents, (3) changes in pH monitoring, containment, and treatment methods, and (4) a revised construction schedule. These changes are summarized in Table 2-1 and described in this section.

Table 2-1. Summary of Changes to Major Project Components

Project Component	Summary of Changes
Cofferdam	Changes to the cofferdam include: • Change from bin-wall cofferdam as described in the 2020 IS/MND and 2021 Addendum to a trapezoidal rockfill cofferdam • Larger cofferdam footprint and fill volume as compared to the 2020 IS/MND and 2021 Addendum (resulting from the change to a trapezoidal rockfill cofferdam) • Development of on-site quarry(ies) to source rock for the cofferdam • Potential for limited hydraulic dredging of cofferdam footprint to bedrock, in addition to the mechanical dredging included in the 2021 Addendum • Smaller dredging quantities as compared to the 2020 IS/MND and 2021 Addendum (resulting from the change to a trapezoidal rockfill cofferdam) • Installation of rockfill for cofferdam embankment • Installation of new seepage cutoff liner at upstream slope of cofferdam • Installation of a downstream rock buttress that would abut the cofferdam
pH Management	No changes to pH management described in 2020 IS/MND *except*: • Daily observations for seepage would occur prior to and during all grouting activity in the Proposed Project work area (upstream toe of the dam). If 25 gallons per minute (GPM) or more of seepage is measured flowing into Fordyce Creek, a pH containment and treatment system would be used. This monitoring and as-needed treatment is a change from the pH monitoring and treatment system described in the 2020 IS/MND. • If 25 GPM of seepage or more is measured flowing into Fordyce Creek, one to three ponds would be created to isolate seepage

Project Component	Summary of Changes
	water and ensure it does not enter Fordyce Creek prior to testing and potential treatment for pH. The conditional one- to three-pond system is a change from the unconditional three-pond system described in the 2020 IS/MND. • If needed, pH neutralization would involve the use of muriatic acid or bicarbonate, or the use of carbon dioxide (CO_2) as described in the 2020 IS/MND. If muriatic acid is used, chlorine would be monitored and potentially treated downstream of Lake Fordyce Dam.
Construction Schedule	• Updates to the construction schedule which include the potential for an additional season of construction (Construction Year Five) if work cannot be completed in the remaining three construction seasons described in the 2021 Addendum and potential for non-consecutive construction seasons if needed due to weather conditions such as wet winters.

Cofferdam: The Proposed Project would no longer use a bin-wall cofferdam, as previously proposed in the 2020 IS/MND (as carried forward and modified in the 2021 Addendum to include additional dredging and associated changes), and instead would use a trapezoidal rockfill cofferdam in the same location and along the same alignment as the previous bin-wall cofferdam with a slightly larger bottom footprint (Figure 2- and Figure 2-2). The rockfill cofferdam would be approximately 25 feet wide at the crest (the same as the previous bin-wall design), 23 feet tall, and span an approximate length of 450 feet across the reservoir. The bottom footprint of the proposed rockfill cofferdam would be approximately one acre, approximately 0.47 acre larger than the prior bin-wall cofferdam design, due to the trapezoidal shape of the rockfill cofferdam (see Table 2-12).

The upstream face of the cofferdam would be covered with a membrane liner to limit leakage through the cofferdam. The membrane would be placed on the surface of the lakebed and held in place by crushed rock or other aggregate ballast, sand tubes, or rock filled sacks. Installation of the membrane would require dredging for a cutoff trench in the area immediately upstream of the cofferdam. The cutoff trench would have an approximate width of 20 feet and extend along the full length of the cofferdam, approximately 450 feet. Mechanical dredging and/or limited hydraulic suction dredging would be used to remove an additional 1,100 cubic yards of mud, silt, sand, and gravel for the cutoff trench.

The cofferdam would be installed to allow dewatering of the work area on the upstream side of Lake Fordyce Dam and provide a dry workspace, while maintaining the Instream Flow Release to Fordyce Creek. The flow bypass system is unchanged from the 2020 IS/MND. Before installation of the cofferdam, Lake Fordyce would be drained to the minimum level allowed (a water surface elevation of 6,245.4 feet), referred to as minimum

pool. The main section of the proposed rockfill cofferdam would require approximately 15,500 cubic yards of material. In addition, a downstream rock buttress would be installed, which would require approximately 1,500 cubic yards of larger rock material. In total, the rockfill cofferdam and its associated buttress would require approximately 17,000 cubic yards of material.

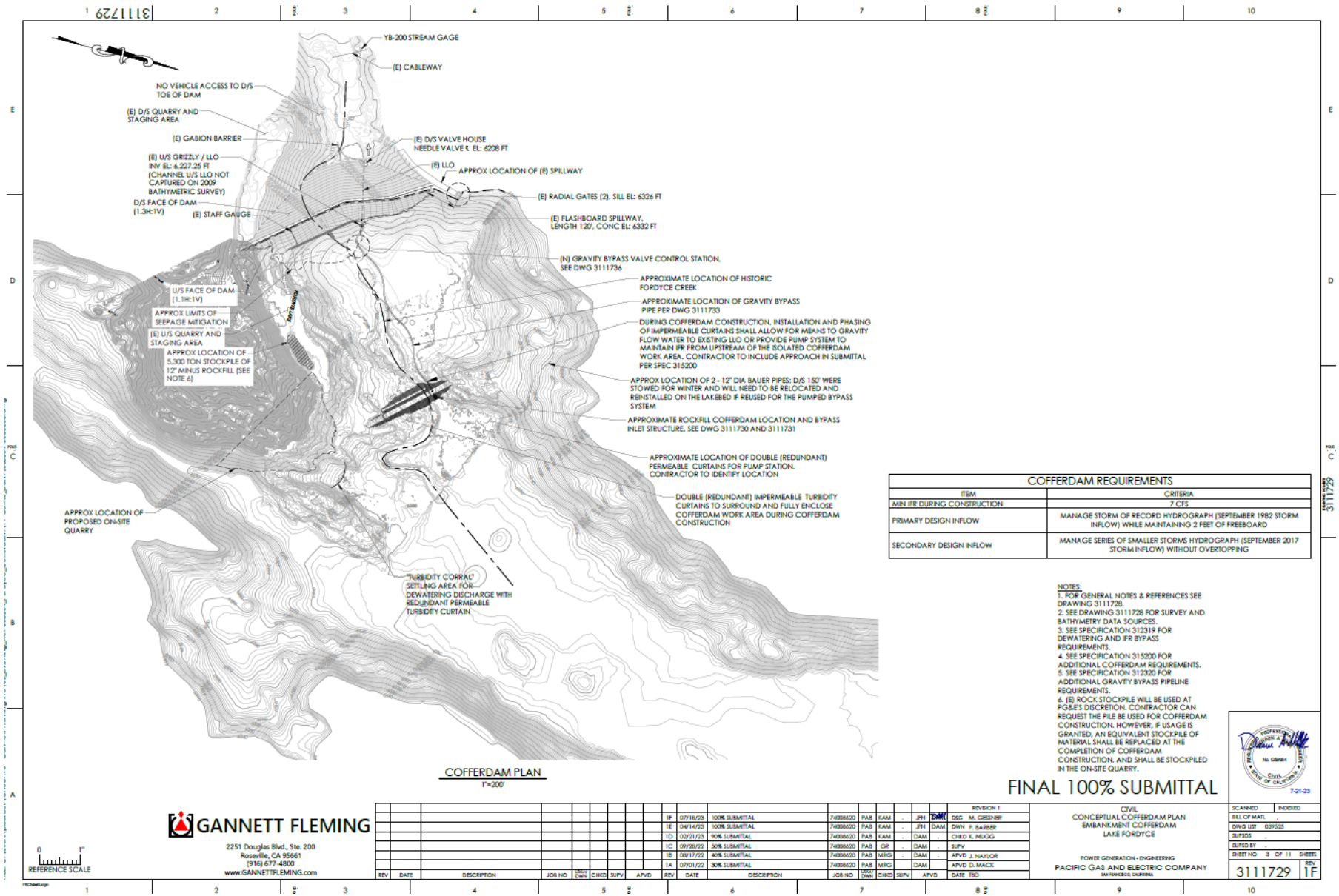
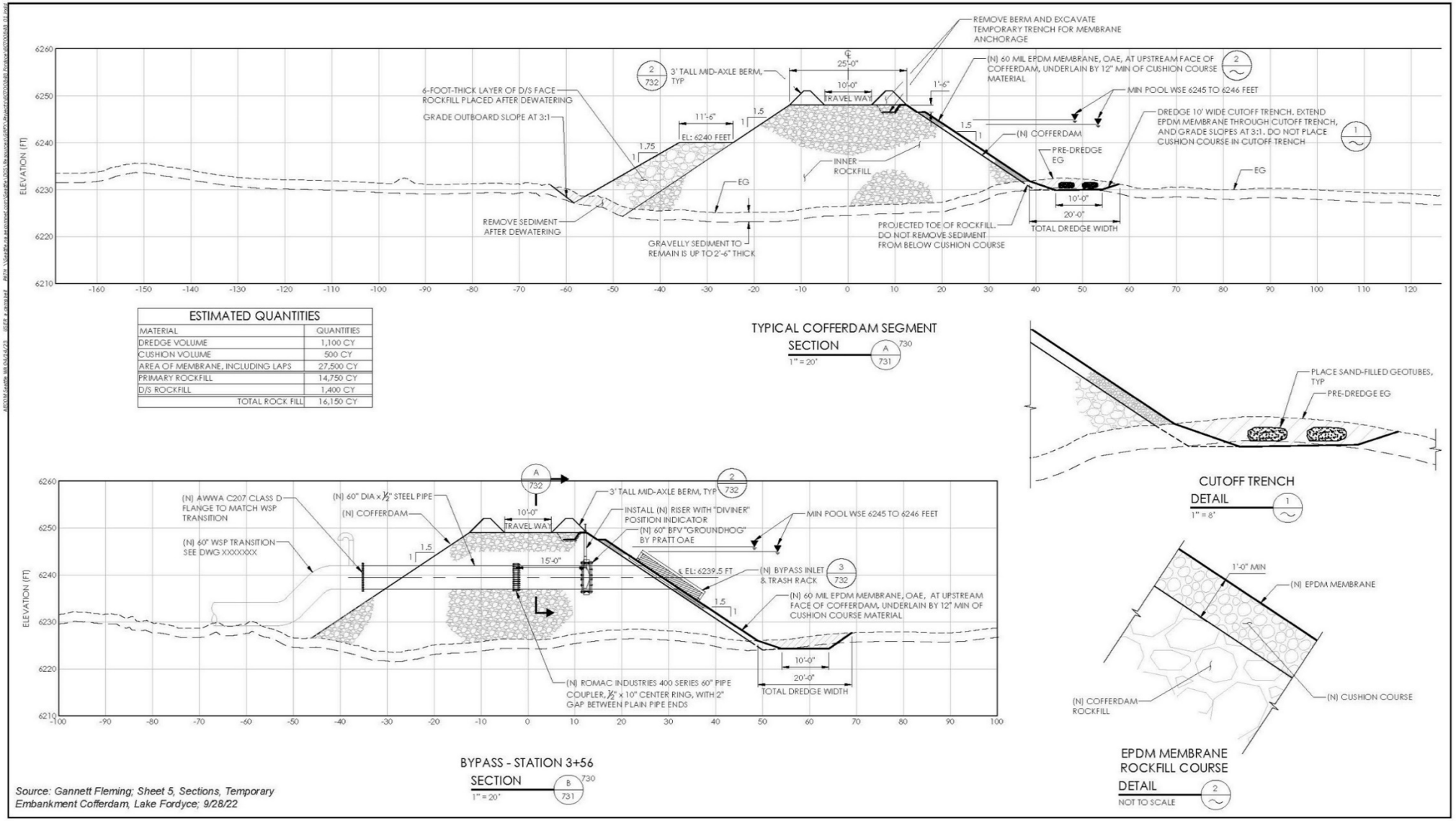


Figure 2-1. Work Area Components



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Lake Fordyce Dam Seepage Mitigation Project

FIGURE 2
Modified Cofferdam Details

Figure 2-2. Modified Cofferdam Details

Table 2-2 provides the dredging/excavation and fill quantities required for PG&E's proposed modifications to cofferdam construction. This table also provides a comparison to the dredge/excavation and fill associated with the former bin-wall cofferdam design described in the 2021 Addendum. Truck trips to deliver materials would vary by construction season, construction phase, and the availability of storage space in the staging areas. A maximum of 50 material delivery trips would occur during a single day, which would be limited to the period of cofferdam construction (same number of maximum daily trips as described in the 2021 Addendum).

Table 2-2. Approximate Excavation and Fill Quantities for Previous and New Cofferdam Design

Component	Excavation Volume (cubic yards)	Excavation Area (square feet)	Fill Volume (cubic yards)	Fill Area (square feet)	Fill Material Source
2021 Addendum (No Longer Proposed)					
Bin-Wall Cofferdam (deleted component)	5,000	32,400	14,200	23,400	Teichert Cool Cave quarry
Proposed Project Design					
Proposed Rockfill Cofferdam	4,100[a]	25,000	17,000 (cofferdam)[b]	45,000[c]	On-site quarry[d]
On-Site Quarry	16,500	90,000	N/A	N/A	N/A

Notes:
[a] 3,000 cubic yards were completed in 2021. 1,100 cubic yards remain for Construction Year Two.
[b] Includes 1,500 cubic yards for the rock buttress.
[c] 45,000 square feet inclusive of cofferdam and downstream rock buttress.
[d] If larger rock is needed from offsite, this would be sourced from the Teichert Cool Cave quarry (located in Auburn, CA, 60 miles one-way from the work site) or similar facility.

Compared to the design analyzed in the 2021 Addendum, the Proposed Project would reduce the excavation volume for the cofferdam by approximately 900 cubic yards and the excavation area by approximately 7,400 square feet (0.17 acre). After the modified project is complete, rock from the cofferdam would become permanent fill in Lake Fordyce, as was discussed for rockfill associated with the bin-wall cofferdam design in the 2020 IS/MND. As indicated in Table 2-2, the permanent fill volume for the cofferdam would increase to 17,000 cubic yards, an increase of 2,800 cubic yards. The total permanent fill volume would increase by approximately 4,300 cubic yards and the permanent fill area would increase by 21,600 square feet (0.5 acre) due to the wider base for the rockfill cofferdam and downstream rock buttress. The Proposed Project would also add additional excavation volume and area for the on-site quarry(ies).

To provide a positive cutoff at the upstream toe of the cofferdam, the lake bottom along the cofferdam footprint would be mechanically dredged to stable bedrock using an excavator, clamshell dredge, or similar equipment. Approximately 1,100 cubic yards of additional surficial mud, sand, and gravel would be removed from the lakebed for the positive cutoff at the upstream toe of the cofferdam (3,000 cubic yards already removed during Construction Year One). The dredged material would consist of a relatively thin layer of surficial silt, and the remainder of the material would consist primarily of sand and gravel. Mechanically dredged material would be loaded into a material barge, taken to the shore, then loaded into haul or dump trucks and placed at the staging area downstream of the dam. If needed, mechanical dredging may be supplemented with limited hydraulic (suction) dredging. If limited hydraulic dredging is needed, this dredged material would be moved to the shore via a pipe, deposited into an area contained with berms or similar containment, and then loaded into haul or dump trucks and placed at the staging area downstream of the dam. Dredged material placed in the staging area would be confined and stabilized to eliminate any turbid runoff entering the lake or Fordyce Creek.[3]

To minimize turbidity in Lake Fordyce during the cofferdam construction, management practices described in Section 2.6 of the 2020 IS/MND (Water Quality Control Practices) would be employed, including conducting the work within the confines of an impermeable turbidity curtain(s).

On-Site Rock Quarrying: One or two local quarry areas would be developed to source rock for the cofferdam embankment and associated rock buttress. This includes a preferred quarry area and alternate quarry area (Figure 2-). The preferred quarry area is near the abandoned upstream quarry, which was used to source rock for Lake Fordyce Dam. If the preferred upstream quarry area cannot produce enough of the main embankment material, or the larger buttress rockfill, then the alternate quarry area near the existing downstream quarry would be developed. Compared to the alternate quarry location, the preferred quarry location is farther from the dam, reducing the potential risk of damage to the dam from blasting operations; and is closer to the cofferdam location, reducing on-site hauling distance and time.

The proposed quarry areas would cover up to approximately three acres if both locations are used. Development of the quarry area(s) would include temporary access for equipment to drill and blast the rock, as well as equipment to remove and sort the rock before transporting it to the cofferdam for placement. As a fallback option should both quarries fail to produce large enough rock to buttress the cofferdam, the Proposed Project would import up to 1,500 cubic yards of material for the rock buttress. Therefore, for the

[3] On July 30, 2021, PG&E obtained a Notice of Applicability of Waiver of Report of Waste Discharge and Waste Discharge Requirements from the Central Valley Regional Water Quality Control Board for implementation of the Lake Fordyce Dam Seepage Mitigation Project that addresses the disposal of dredged material to land.

assessment of potential impacts, three potential quarry scenarios or options are addressed:

1. All rock is quarried from the preferred upstream quarry site;
2. Rock is quarried from both the preferred and alternate sites; and
3. Rock is quarried from both sites, but larger rock is brought in from off-site.

The maximum daily emissions associated with the Proposed Project would occur under Option 3. Additional detail on emissions, including quantitative analysis of impacts, is provided in Section 3.2 *Air Quality*.

Blasting operations would be conducted to break the rock, then excavators, loaders, and dump trucks would be used to move the rock for cofferdam construction. Blasting would involve drilling up to 100 vertical holes in the rock and loading each hole with approximately 24 pounds of explosive. The charges would be detonated in series with an approximately 25-millisecond delay between individual detonations; therefore, each blasting event would last approximately 2.5 seconds. Single blasting events would be conducted over a total of approximately 15 non-consecutive days, with several days in between each single event to move rock, and drill and place charges for the next blasting event.

Rock sourced from the quarry area(s) would be tested for suitability for construction purposes. It is conservatively assumed that approximately 50 percent of the material in either quarry location would be unsuitable for use in cofferdam construction and would remain in the quarry area or be used for other miscellaneous rockfill.

pH Management: pH management actions would prevent high-pH seepage water from entering Fordyce Creek as a result of grouting. Daily observations for seepage would occur prior to and during all grouting activity in the Proposed Project work area (upstream toe of the dam). Monitoring would take place by visual inspection prior to the start of construction each day. If seepage is present, it would be measured by timing volumetric flow or utilizing a flow measuring weir. If 25 GPM of seepage or more is measured flowing into Fordyce Creek, then grouting activities would only occur with the pH monitoring ponds and the pH treatment system in place and in use. If flows measure or exceed 25 GPM during grouting, operations would stop until the pH ponds have been constructed and the pH management system is operational.

Prior to and during grouting activities, if seepage water is observed and measured as described above, one to three ponds would be used to isolate seepage water and ensure it does not enter Fordyce Creek. Water in the pond(s) would be pumped through a system monitored via a Modular Control Unit (MCU). The MCU flow capacity would be two cubic feet per second (about 1,000 GPM), or greater if necessary to accommodate

actual seepage flows. The two cubic feet per second flow capacity is based on historic seepage measurements taken when Lake Fordyce is at minimum pool.[4] If more seepage is flowing than historically measured, the treatment system would be upsized to accommodate. The MCU would provide real-time pH results (15-minute sampling intervals), allowing for the correct amount of treatment to be administered. The MCU would automatically determine if water can be safely discharged downstream, or if it requires further recirculation and treatment. The MCU would operate the pump valves automatically to switch between recirculation and discharge, depending on the pH of the effluent water. Commercial methods of raising or lowering pH would involve the use of muriatic acid, bicarbonate, or CO_2 treatment (described in detail in Section 3.8 *Hydrology and Water Quality*). In addition, if 25 GPM of seepage or more is measured and the pH treatment system is employed, a temporary check dam composed of existing rocks would be installed approximately 150 feet downstream from Lake Fordyce Dam and act as a dissipation structure (as discussed in the original Lake Fordyce Dam Seepage Mitigation Project description).

These proposed pH treatment methods represent minor changes from the methods described in the 2020 IS/MND. The original Lake Fordyce Dam Seepage Mitigation Project design, analyzed in the 2020 IS/MND, included the construction and use of a pH monitoring, containment, and treatment system (regardless of whether seepage was observed or measured) composed of a three-ponds and using CO_2 treatment if necessary.

Modified Project Area: Figure 2- depicts the Proposed Project Area in the vicinity of the dam. The addition of the quarry locations has increased the total Proposed Project Area by approximately 2.3 acres. The change in cofferdam design is contained in the original Lake Fordyce Dam Seepage Mitigation Project Area described in the 2020 IS/MND and 2021 Addendum. The Proposed Project Area along the access road is unchanged by the proposed modifications.

Modified Project Schedule: The Proposed Project construction schedule includes a likely four total seasons of construction (consistent with the 2021 Addendum); the newly added potential for an additional season of construction (Construction Year Five) if the scope of work cannot be completed in the remaining three construction seasons as a result of weather conditions; and newly added potential for non-consecutive construction seasons if needed due to weather conditions such as wet winters.

In July 2021, PG&E commenced construction and completed the following Construction Year One activities:

[4] Typical seepage measurements at Lake Fordyce Dam vary with lake level. Under normal operations, seepage ranges between 1,000 GPM (at minimum pool) and 27,000 GPM.

- access road improvements;
- mobilization and establishment of staging/laydown areas;
- stockpiling project material;
- dredging; and
- geotechnical exploration and testing above minimum pool.

PG&E is planning to initiate the remaining construction activities after CEQA compliance is completed and all relevant required permits and approvals are obtained. The likely year-by-year construction sequence includes the following activities:

Construction Year Two:

- lowering Lake Fordyce to minimum pool;
- maintaining road improvements;
- developing site quarry areas to source rock for the cofferdam;
- conducting cofferdam construction and installing in-stream flow bypass system;
- dewatering of the work area;
- conducting geotechnical exploration and testing below minimum pool;
- investigating abandoned Low-Level Outlet (LLO); and
- rewatering of the work area.

Construction Year Three:

- maintaining road improvements and in-stream flow bypass system;
- dewatering the work area;
- constructing seepage berm and placing granular fill pad material;
- constructing concrete plinth;
- constructing grout curtain;
- beginning liner installation; and
- rewatering the work area.

Construction Year Four:

- maintaining road improvements and in-stream flow bypass system;
- dewatering the work area;
- performing selected grouting to the abandoned LLO;
- completing liner installation;
- completing site restoration;
- rewatering the work area; and
- removing the membrane liner from the cofferdam and potentially creating a notch in the crest of the cofferdam.

3. Potential Impacts of the Proposed Changes

This section considers the potential environmental impacts associated with PG&E's proposed modifications (as discussed in Section 2 *Proposed Changes to the Project*) to potentially affected resource areas. Previously adopted mitigation measures (MMs) identified in the 2020 IS/MND and MMRP are still applicable and required for the Proposed Project.

The following resource areas have been eliminated from further analysis in this section because PG&E's proposed modifications have no potential to affect these resources. The 2020 IS/MND's analyses of these resource areas remain current and applicable, even with the proposed modifications:

- Agriculture and Forestry Resources
- Energy
- Land Use/Planning
- Mineral Resources
- Population and Housing
- Public Services
- Wildfire
- Mandatory Findings of Significance

The following sections provide further analysis of resources areas that could potentially be affected by PG&E's proposed modifications.

3.1 Aesthetics

As discussed in the 2020 IS/MND, the Proposed Project Area is not an officially designated scenic vista, but it is in the Tahoe National Forest, which is considered to be a scenic resource. The surrounding area has high visual quality because it generally remains unaltered by human activities. Viewers of the Proposed Project Area include motorists using four-wheel drive vehicles and off-highway vehicles; whitewater boaters; hikers; and campers. Panoramic views of the Proposed Project Area are possible from Signal Peak, Black Buttes, and Old Man Mountain.

Construction of a cofferdam and the seepage mitigation project were assessed in the 2020 IS/MND. Potential aesthetic impacts due to modified construction activities would be attributable to the proposed rockfill cofferdam and other changes described in Section 2 *Proposed Changes to the Project*. During construction of the redesigned cofferdam, the work site may be visible from areas of higher elevation; however, the redesigned

cofferdam would not affect scenic vistas because of the distances between the Proposed Project and viewing points, and the temporary nature of the construction work.

During Proposed Project construction, the permanent rockfill for the cofferdam would have potential visual impacts similar to those of the bin-wall cofferdam. Following completion of the Proposed Project, the rockfill cofferdam would remain and is likely to be below the water surface except at the lowest lake levels. PG&E would remove the membrane liner and either create a notch in the crest of the cofferdam down to a water surface elevation of approximately 6237 feet or leave the 60-inch bypass pipe in place and in the open position. Minimum lake levels of 6,245.4 feet typically only occur in the fall. As the rockfill for the cofferdam would be visually similar to and consistent with the existing rocky character of the nearby abandoned upstream quarry (which would also be partially visible at the lowest lake levels), this would not substantially change the potential long-term visual impacts.

The preferred and alternate rock quarries are expansions of the existing quarries that were used to originally construct Lake Fordyce Dam. Figure 3-1 and Figure 3-2 indicate the preferred and alternate quarry locations, respectively.

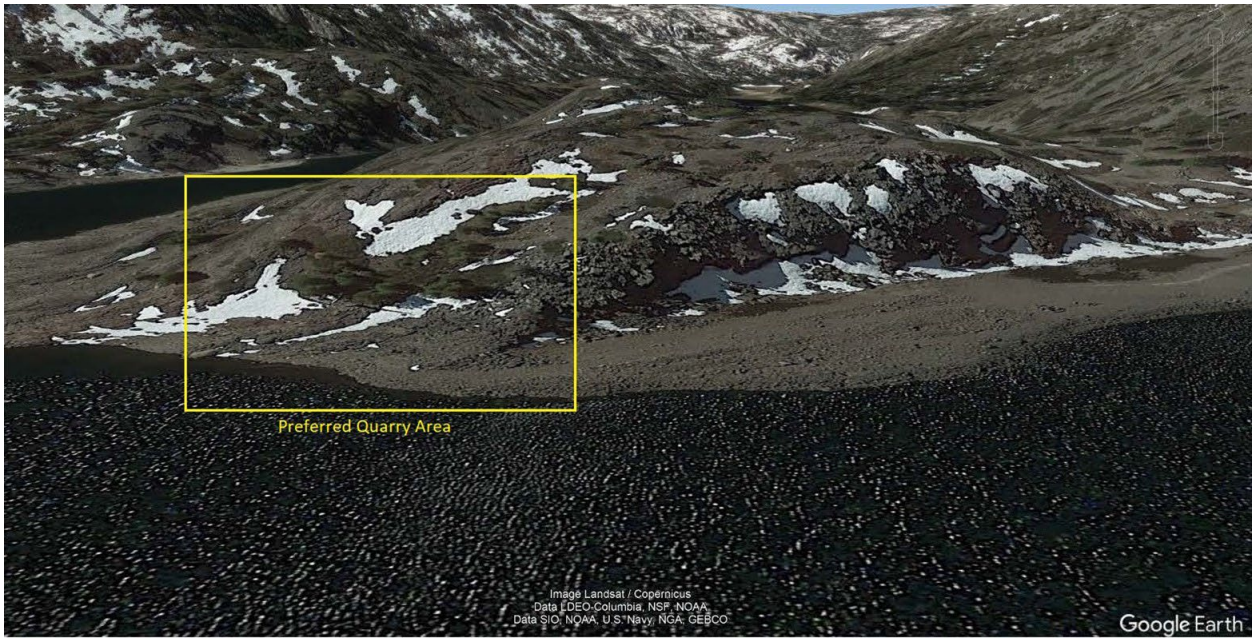

Figure 3-1. Existing View of Preferred Quarry Location/Upstream Staging Area. (Rock would be removed from the tip of the peninsula to the left of the existing rock face)

Figure 3-2. Existing View of Alternate Quarry/Downstream Staging Area. (Rock would be removed from the existing rock face)

Quarrying rock for the cofferdam at the preferred location would result in the creation of a new rock face at the tip of the peninsula, adjacent to the existing rock face. However, most of the preferred quarry area (approximately 75 percent) would be below the full reservoir water line and would not be visible for much of the year. Quarrying rock at the alternate location would similarly result in a slight change to the appearance of the existing rock face.

PG&E's proposed modifications would not result in any additional light or glare, or additional nighttime work shifts, which would adversely affect daytime or nighttime views in the Proposed Project Area. The proposed modifications would also not change the distance to any scenic highway, thus there would be no new aesthetic impacts to scenic highways. Although the Proposed Project would require a full fourth year of construction and potentially a fifth season, the presence of construction equipment, materials, and the cofferdam structure would still only cause temporary and/or limited impacts to the visual environment. The 2020 IS/MND and 2021 Addendum considered and analyzed a fourth year of construction, if needed to accommodate weather conditions. The aesthetic impacts of the Proposed Project, including quarrying, would remain less than significant with mitigation incorporated due to the remote nature of the Proposed Project site; the relative lack of viewers; the Proposed Project Area's distant location from viewpoints; the minimal visual changes resulting from the quarrying; and view obstruction of the preferred quarry and permanent rockfill for the cofferdam due to inundation for much of the year. PG&E's proposed modifications would not result in new or substantially increased impacts on aesthetics.

3.2 Air Quality

An analysis of the construction activities associated with PG&E's proposed modifications was conducted to evaluate whether the proposed changes to the cofferdam and the introduction of on-site quarrying of rock to the cofferdam would result in new or increased potential impacts to air quality. The air quality analysis evaluated the three potential quarry scenarios described in Section 2 *Proposed Changes to the Project*. For the purposes of the air quality analysis, the scenario in which rock is quarried from the preferred upstream quarry site is described as Option 1; the scenario in which rock is quarried from both the preferred and alternate quarry sites is Option 2; and the scenario in which rock is quarried from both sites but supplemental rock is brought in from off-site is Option 3. The maximum daily emissions associated with the Proposed Project would occur under Option 3, as discussed in this section.

Mass Emissions of Criteria Air Pollutants

The Proposed Project would involve the use of off-road equipment, haul trucks, work boats and tugboats, and worker commute trips, which would generate temporary emissions of precursors to ozone (reactive organic gases [ROG] and nitrogen oxides

[NO_X]), carbon monoxide, particulate matter 10 micrometers in diameter or less (PM_{10}), and particulate matter 2.5 micrometers in diameter or less ($PM_{2.5}$). Consistent with the approach to the analyses in the 2020 IS/MND and 2021 Addendum, emissions associated with the Proposed Project were estimated using emission factors from the California Air Resources Board (CARB) OFFROAD and EMFAC 2021[5] inventory models. Construction emissions from the operation of diesel-fueled off-road equipment were estimated by multiplying estimated daily use (in hours) by equipment-specific emissions factors, based on equipment types, usage hours, and horsepower provided by PG&E. Emissions from on-road motor vehicles were estimated using vehicle trips, vehicle miles traveled (VMT), and EMFAC 2021 mobile source emission factors. The off-road and on-road emission factors represent the fleet-wide average and vehicle-specific emission factors in Nevada County. Fugitive dust emissions were estimated using the U.S. Environmental Protection Agency's Compilation of Air Pollutant Factors (AP-42) and are based on material loading, VMT, blasting approach, and earthwork quantities.

As discussed in the 2020 IS/MND and 2021 Addendum, the Proposed Project is largely in Nevada County, which is under the jurisdiction of the Northern Sierra Air Quality Management District (NSAQMD). Approximately 1,400 feet of access road for the Proposed Project are located within the Placer County Air Pollution Control District (PCAPCD) jurisdiction. As part of their efforts to attain ambient air quality standards, NSAQMD and PCAPCD have developed maximum daily thresholds of significance for evaluating proposed projects.

PG&E identified the various on-road, off-road, and harbor craft equipment types, quantities, hours of operation, and blasting activities that would be required during the most intensive construction workday associated with the proposed modifications. The most intensive construction workday under both the original Lake Fordyce Dam Seepage Mitigation Project and Proposed Project was determined to occur during construction of the cofferdam. For the original Lake Fordyce Dam Seepage Mitigation Project evaluated in the 2020 IS/MND, cofferdam construction would involve the use of off-road equipment, a work boat, worker trips, and off-site aggregate material delivery trips. Under the Proposed Project, the cofferdam construction would also involve the use of off-road equipment, a tugboat, and on-site blasting activities, but the off-site aggregate material delivery trips would no longer be needed (if material can be obtained from the on-site quarries under Option 1 or Option 2), or would be substantially reduced (if large rock must be imported for the cofferdam buttress under Option 3). Each of these components, including any changes from the original Lake Fordyce Dam Seepage Mitigation Project evaluated in the 2020 IS/MND, was considered in the emissions calculations presented below (additional detail provided in Appendix A). Note that if limited hydraulic dredging is

[5] The 2020 IS/MND used CARB OFFROAD and EMFAC 2017 inventory models, which were the latest inventory models available at the time.

needed, there would be a negligible reduction in emissions from reduced tugboat use to move scows.

Maximum daily emissions associated with Option 1 through Option 3 are presented in Table 3-1. For reference, Table 3-1 also presents the maximum daily emissions associated with the original Lake Fordyce Dam Seepage Mitigation Project evaluated in the 2020 IS/MND and 2021 Revised Project evaluated in the 2021 Addendum, as well as the NSAQMD and PCAPCD thresholds. As previously noted, a portion of the access road is located within PCAPCD jurisdiction. The emissions that occur on the access road and within the jurisdiction of the PCAPCD are limited to on-road construction vehicle trips; therefore, other emission sources such as off-road construction activity are not included for comparison to the PCAPCD thresholds. Consistent with the analyses in the 2020 IS/MND and 2021 Addendum, Table 3-1 takes a conservative approach and also shows the total daily on-road emissions for comparison to the PCAPCD thresholds.

Table 3-1. Maximum Daily Construction-Related Emissions[1]

	ROG (lb/day)	NO_X (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)	CO (lb/day)
NSAQMD Maximum Daily Emissions and Thresholds					
Option 1 Maximum Daily Emissions [1, 2]	7.27	74.24	33.54	8.69	148.88
Option 2 Maximum Daily Emissions [1, 2]	7.49	75.76	33.59	8.74	150.34
Option 3 Maximum Daily Emissions [1, 2]	7.54	79.60	53.03	10.80	150.58
Original Proposed Project Maximum Daily Emissions (2020 IS/MND) [3]	11.77	103.71	101.53	13.12	218.05
2021 Revised Project Maximum Daily Emissions (2021 Addendum) [4]	11.95	126.10	125.07	15.74	220.53
NSAQMD Level A Thresholds	24	24	79	N/A	N/A
Exceeds Level A Threshold?	No	Yes	No	N/A	N/A
NSAQMD Level B Thresholds	136	136	136	N/A	N/A
Exceeds NSAQMD Level B Threshold?	No	No	No	N/A	N/A
PCAPCD Maximum On-Road Daily Emissions and Thresholds					
Option 1 Maximum On-Road Daily Emissions [5]	0.04	1.02	0.11	0.04	1.92
Option 2 Maximum On-Road Daily Emissions [5]	0.04	1.02	0.11	0.04	1.92
Option 3 Maximum On-Road Daily Emissions [5]	0.09	4.87	0.40	0.16	2.17
Project Maximum On-Road Daily Emissions (2020 IS/MND) [3]	0.43	17.92	0.67	0.32	10.00
2021 Revised Project Maximum On-Road Emissions (2021 Addendum)	0.60	40.30	1.18	0.58	12.48
PCAPCD Thresholds	82	82	82	N/A	N/A
Exceeds PCAPCD Threshold?	No	No	No	N/A	N/A

Notes:

[1] Maximum daily emissions include emissions associated with off-road and on-road equipment exhaust; crew and tugboat exhaust; blasting activities, including emissions from the explosive composition and particulate matter emissions; and fugitive dust associated with material movement, earthwork activities, and paved and unpaved road travel.
[2] Refer to Appendix A, pages 2, 3, and 4, for additional methodology details, assumptions, calculations, and thresholds.
[3] Refer to 2020 IS/MND for additional details.
[4] Refer to 2021 Addendum for additional details.
[5] Maximum on-road emissions conservatively include total daily emissions associated with on-road vehicle travel for comparison to the PCAPCD thresholds due to the portion of the access road (approximately 1,400 feet) located within PCAPCD jurisdiction.

lb/day = pounds per day

Source: 2009, NSAQMD

As shown in Table 3-1, the maximum daily emissions associated with the Proposed Project would occur under Option 3, the scenario in which rock is quarried from both the preferred and alternate quarry sites with supplemental rock being brought in from an off-site location. Maximum daily emissions associated with the Proposed Project would be less than the emissions estimated under the original Lake Fordyce Dam Seepage Mitigation Project evaluated in the 2020 IS/MND and the 2021 Revised Project evaluated in the 2021 Addendum; however, emissions, specifically NO_X, would still exceed NSAQMD Level A thresholds, and emissions would be within the NSAQMD's Level B range. This analysis shows that emissions associated with the Proposed Project would be reduced to a less-than-significant level through implementation of the previously adopted mitigation measures in the 2020 IS/MND, including MM AQ-1 (Mitigations for Use during Project Design and Construction) and MM AQ-2 (Recommended Dust Control Plan Conditions). PG&E's proposed modifications would not result in new or increased impacts on air quality associated with mass emissions of criteria pollutants.

Toxic Air Contaminants and Odor

The greatest potential for toxic air contaminant emissions is diesel particulate matter emissions which would be associated with the use of on-site diesel-fueled construction equipment. Potential construction-related sources of odors associated with the Proposed Project include diesel equipment that would emit exhaust. As discussed in the 2020 IS/MND and 2021 Addendum, there are no sensitive receptors near the Proposed Project work area, and any recreational visitors at informal campgrounds or for summer camp programs would not be exposed to construction-related emissions for an extended period. Therefore, consistent with the findings from the 2020 IS/MND and 2021 Addendum, considering the lack of sensitive receptors in the Proposed Project Area and the limited duration of construction, construction-related activities due to the modified Proposed Project would not expose sensitive receptors to substantial pollutant concentrations.

Construction of the Proposed Project would result in emissions of diesel particulate matter and emissions leading to odors, similar to those identified in the 2020 IS/MND and 2021 Addendum. The potential impact would be minimal due to the temporary nature of these emissions, the highly diffusive properties of diesel exhaust, and the lack of nearby receptors. Therefore, PG&E's proposed modifications would not result in new or increased impacts on air quality associated with the exposure of sensitive receptors to substantial pollutant concentrations of toxic air contaminants or other emissions leading to odors.

3.3 Biological Resources

A review of publicly available aerial imagery and mapping was conducted to evaluate potential biological resources that could be affected by PG&E's proposed modifications. The aerial images were combined with a review of online databases to identify locations where special-status species, wetlands and waters of the United States, and other sensitive biological resources would have the potential to occur within and in the vicinity of the Proposed Project footprint associated with PG&E's proposed modifications. Queries of the California Natural Diversity Database (CNDDB) (CDFW, 2023) and the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Conservation online tool (USFWS, 2023) were conducted to identify special-status species that have potential to occur in the Proposed Project Area as well as the surrounding area. The CNDDB list and an official species list were obtained from the USFWS Information for Planning and Conservation online tool website (CDFW, 2023; USFWS, 2023). A query of observations in eBird (an online data source provided by the National Audubon Society) was reviewed to obtain a list of bird species that may occur in the Proposed Project Area (eBird, 2023). No new field surveys were conducted to assess potential impacts associated with PG&E's proposed modifications.

Special-Status Plant Species

Field surveys for special-status plant species were conducted on July 29–31, 2019, for the original Lake Fordyce Dam Seepage Mitigation Project. These field surveys were comprehensive for vascular plants, meaning that "every plant taxon that occurs on site [was] identified to the taxonomic level necessary to determine rarity and listing status" (Stillwater Sciences, 2019). Of the 37 special-status plant species identified during the desktop review, none were observed during the field surveys. These surveys covered the original Lake Fordyce Dam Seepage Mitigation Project Area but did not include the entirety of the new quarry locations. Based on a review of aerial imagery, habitat in the new quarry locations appears to be similar to habitat documented in the adjacent areas assessed for the 2020 IS/MND. Specifically, the surveyed quarry areas are associated with sparse conifer tree cover, which may include incense cedar (*Calocedrus decurrens*), red fir (*Abies magnifica*), white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*), and potentially lodgepole pines (*Pinus contorta*). However, satellite images show the newly

added quarry areas as primarily barren and devoid of vegetation, likely because of rocky and steep terrain with little to no soil layer. Given that the new quarry areas would be an expansion of an existing disturbed environment already being used by PG&E and include the same or less vegetated habitat than the other previously surveyed portions of the Proposed Project footprint, it is not likely that special-status plants would occur in the Proposed Project footprint or be impacted by construction. Therefore, no new or increased impacts to special-status plants are expected due to PG&E's proposed modifications.

Special-Status Wildlife Species

The 2020 IS/MND identified six special-status wildlife species with a moderate or greater potential to occur in the original Lake Fordyce Dam Seepage Mitigation Project Area, and two species, bald eagle and northern goshawk, were confirmed to be in the original Lake Fordyce Dam Seepage Mitigation Project Area.

In addition, western pond turtle and foothill yellow-legged frog were determined to be unlikely to occur and absent from the original Lake Fordyce Dam Seepage Mitigation Project Area, respectively; however, it was determined that the modified flow regime required to construct the project could result in potential effects to these species in the South Yuba River, downstream of Spaulding Reservoir. Therefore, these species were also assessed in the 2020 IS/MND. PG&E's proposed modifications are not expected to result in any changes to the flow regime; therefore, the proposed modifications would have no impact on western pond turtle or foothill yellow-legged frog.

Bald Eagle and Northern Goshawk: Potential impacts to bald eagle and northern goshawk from blasting and construction noise were assessed in the 2020 IS/MND. Blasting to source rock from the quarry area(s) has been added to the Proposed Project, and although blasting related to the Proposed Project access road was assessed in the 2020 IS/MND, the amount of blasting would increase and the location of blasting would be different under the Proposed Project. The schedule for blasting would overlap with the nesting season for both of these species. In addition, because the new blasting locations are immediately adjacent to Lake Fordyce, the noise from this blasting has the potential to travel further across open water.

Bald eagles and northern goshawks are sensitive to noise generation and have the potential to abandon active nests due to elevated noise levels. However, quarry blasting would occur on average only once per day. In addition, the 2020 IS/MND considered the potential for bald eagle and northern goshawk presence and potential habitat disruption. MM BIO-5 would reduce potential impacts to these species to the same level as assessed in the 2020 IS/MND by implementing preconstruction surveys by a qualified biologist and developing appropriate nest avoidance buffers. Overall, potential impacts from Proposed

Project blasting activities at the quarry sites are expected to be similar to the potential impacts described for the original Lake Fordyce Dam Seepage Mitigation Project assessed in the 2020 IS/MND. The addition of a potential fifth season of construction would not result in additional blasting or impacts to these species. With implementation of MM BIO-5, impacts to these species would remain less than significant with mitigation incorporated.

Sierra Nevada Yellow-Legged Frog and Southern Long-Toed Salamander: No new or increased potential impacts to Sierra Nevada yellow-legged frog or Southern long-toed salamander are expected to occur from PG&E's proposed modifications. These species may occur in Rattlesnake Creek and in small ponds (Mossy Pond) east of Lake Fordyce. As none of PG&E's proposed modifications occur in Sierra Nevada yellow-legged frog or Southern long-toed salamander habitat, the proposed modifications would not impact these species.

Western Bumble Bee: Potential impacts to western bumble bee from PG&E's proposed modifications are expected to be similar in type and scale to potential impacts assessed in the 2020 IS/MND. The new quarry sites would be an expansion of existing disturbed environments used as staging and disposal areas which are routinely cleared of vegetation. Direct effects on the western bumble bee may occur from noise or vibrations from or collisions with construction equipment during clearing/grubbing of the new quarry locations. Potential impacts to this species may occur if those activities disturb burrows containing nests or hibernation sites, or if such burrows are inadvertently filled. The addition of a potential fifth season of construction would have negligible or no additional effect on this species, as the extent or duration of clearing/grubbing of the new quarry locations would be minimally affected or unaffected by this change. As described in 2020 IS/MND, indirect effects are likely to be negligible because these activities would be confined to small areas with few flowering plants. For these reasons, PG&E's proposed modifications are not expected to substantially increase temporary effects on the western bumble bee; therefore, potential impacts of the Proposed Project would remain less than significant.

California Spotted Owl: California spotted owls may abandon active nests from construction-generated noise up to 0.25 mile away, and potentially at greater distances for helicopter operations or blasting. Blasting operations at the new quarry sites would be immediately adjacent to Lake Fordyce, and the blasting noise has the potential to travel further distances across open water. However, no nesting habitat for California spotted owls is present in the immediate Proposed Project Area. The nearest record of a spotted owl sighting is 3.6 miles north of the Proposed Project, and the nearest primary activity center is 7.1 miles southwest of the Proposed Project. Although blasting would generate short-term noise events (up to about fifteen 2.5-second blasting events, with one to several days between each blasting event), there is intervening topography, including

multiple ridges between the known spotted owl occurrences and primary activity centers. As sound from a source spreads, it dissipates and the topography acts as a barrier to the spreading sounds waves. Therefore, blasting at either of the proposed quarry locations is not expected to result in potential impacts to nesting California spotted owls. MM BIO-5 from the 2020 IS/MND would continue to further reduce the potential for impacts to nesting spotted owls. MM BIO-5 requires preconstruction nesting bird surveys in suitable nesting habitat for California spotted owl within 0.25 mile of Proposed Project components and step-by-step methods for potential impact avoidance should an active nest be detected.

Potential impacts to foraging California spotted owls and potential indirect impacts to California spotted owls from work at the new quarry locations would be similar to those described in the 2020 IS/MND for other Proposed Project activities such as cofferdam installation and road improvements. The addition of a potential fifth season of construction is unlikely to result in additional effects to this species, as road improvements, blasting for cofferdam material and cofferdam construction would already have occurred; impacts from helicopter use and general construction activities associated with a potential Construction Year Five would be similar to previous construction years and with implementation of MM BIO-5 would result in a negligible additional impact. With implementation of MM BIO-5, potential impacts to this species from the Proposed Project would remain less than significant with mitigation included.

Townsend's Big-eared Bat and Pallid Bat: Potential impacts to Townsend's big-eared bat and pallid bat from blasting and construction noise were assessed in the 2020 IS/MND. Blasting at the quarry areas has been added to the Proposed Project, and although blasting was assessed in the 2020 IS/MND, the amount of blasting would increase and the location of blasting (immediately adjacent to Lake Fordyce) would be different than the location of the blasting assessed in the 2020 IS/MND, which was confined to the Proposed Project access road. Sudden, loud noises have the potential to disturb bats and cause abandonment of roosts. However, blasting associated with the Proposed Project would occur on average once per day and not exceed the instantaneous magnitude analyzed in the 2020 IS/MND. In addition, MM BIO-6 would require that PG&E first avoid, if possible, the sensitive maternity season or complete a preconstruction survey in advance of any rock or tree removal to identify signs of potential bat use. If any potential roosting habitat or active bat roosts are found in trees to be removed, measures would be implemented to reduce impacts on bats. PG&E's Proposed Project includes measures to protect bat roosts in light of rock removal that would occur during quarrying. MM BIO-6 and PG&E's additional bat protections ensure that during rock or tree removal, specific measures must be followed if potential bat roosting habitat or active roosts are identified, including conducting removal when bats are active, having a qualified biologist present if bat roosts are confirmed in trees or rocks, and ensuring supervision by a biologist for removal involving suspected roost sites.

Blasting rock outcrops in the new quarry areas could also temporarily alter roosting habitat. Quarrying of the rock for the cofferdam at the preferred location would result in the creation of a new rock face at the tip of the peninsula, adjacent to the existing rock face. These changes are anticipated to have negligible effects on bat roosting or behavior, as post-construction conditions would be functionally similar to existing conditions.

Implementation of MM BIO-6 from the 2020 IS/MND and PG&E's bat protection measures would reduce potential impacts from the Proposed Project to Townsend's big-eared bat and pallid bat to the same level as assessed in the 2020 IS/MND. Therefore, the impacts of PG&E's Proposed Project are expected to be similar to potential impacts from the original Lake Fordyce Dam Seepage Mitigation Project assessed in the 2020 IS/MND, and there would be no new or increased potential impacts to these species due to PG&E's proposed modifications.

Wetlands

Using a review of aerial imagery, the National Wetlands Inventory, and California Resources Inventory Wetlands, no waters or wetlands are expected to occur in the upland portions of the new quarry areas. There are no signs of ponding or vegetation that would suggest wet areas. The areas are granitic with limited soil development. In addition, there are no signs of linear hydrologic features; likely because the new quarry areas are on rocky hills that do not drain water from any other upland locations. A portion of the preferred quarry area is below the spillway elevation of Lake Fordyce (2.275 acres lie below the ordinary high water level), and is therefore within the lake boundary, which is considered Other Waters of the United States and State. Up to 16,500 cubic yards of material could be removed from this quarry area below ordinary high water, which would be subject to regulatory approval by the State Water Board and U.S. Army Corps of Engineers. Quarrying at the preferred location would be conducted when the lake is drawn down and the quarry area is dry. Once construction is complete, this portion of the preferred quarry area would be inundated annually.

Previously adopted MMs BIO-2(a) through BIO-2(h) from the 2020 IS/MND, which remain applicable and required, would be implemented to ensure that no soil-laden waters or pollutants would enter Lake Fordyce from the new quarry areas. These measures require that all equipment and vehicles remain in designated work areas, erosion control materials are employed where needed, spill management materials are available on site, all equipment is monitored for leaks, and stockpile management is employed. In addition, PG&E's Proposed Project is subject to the requirements of the Construction General Permit (CGP). Soils on steep slopes are often highly erodible, especially during heavy rain events, and can result in soil erosion. PG&E would adhere to regulatory erosion control planning and permitting requirements and would implement erosion control best

management practices (BMPs). Under the statewide CGP, a Stormwater Pollution Prevention Plan (SWPPP) would be prepared and implemented, which would contain BMPs to control erosion and effects on water quality. The SWPPP would be prepared by the contractor as part of the application for coverage under the CGP and could include BMPs such as using silt fences and wattles, covering stockpiled soils and aggregate, using energy dissipaters at culvert outlets, taking vegetative slope stabilization measures (e.g., hydroseeding), and using a rock apron as needed.

With the implementation of MMs BIO-2 (a) through BIO-2 (h) from the 2020 IS/MND and required compliance with the CGP, PG&E's proposed modifications would not result in any new or increased potential impacts to wetlands compared to the assessment in the 2020 IS/MND.

Movement of Native Resident or Migratory Fish or Wildlife Species

There are no special-status or anadromous fish species present in the Proposed Project Area. As discussed in the 2020 IS/MND, cofferdam installation and reservoir drawdown each construction season would result in a portion of Lake Fordyce becoming unavailable to aquatic species. The new cofferdam design is sited in the same orientation and location as the bin-wall cofferdam design included in the 2020 IS/MND and 2021 Addendum. Following completion of the Proposed Project, the rockfill cofferdam would remain and is likely to be below the water surface except at the lowest lake levels. In the last construction year of the Proposed Project, the membrane liner would be removed from the upstream face of the cofferdam and PG&E may create a notch in the crest of the cofferdam down to a water surface elevation of approximately 6237 feet. As minimum lake levels of 6,245.4 feet typically only occur in the fall, the rockfill cofferdam is likely to be below the water surface except at the lowest lake level. If a notch is created, a portion of the crest of the rockfill cofferdam would be below the water surface, even at the lowest lake level. If notching does not occur, fish would be able to pass through the cofferdam via the 60-inch bypass pipe through the cofferdam, which would be left in place and in the open position. The flow bypass system used to pass water from the cofferdam to the LLO would be removed, allowing fish to enter and exit the 60-inch bypass pipe on both sides of the cofferdam. Therefore, there would be no change to the level of potential impacts to the movement of fish species from the new cofferdam design, as no changes to fish passage would occur. The potential for an additional fifth season of construction could, however, extend the period when a portion of Lake Fordyce is unavailable to aquatic species during construction. Given the small increase in unavailability due to a potential fifth construction season with a duration of approximately three months, PG&E's proposed modifications are not anticipated to result in new or substantially increased impacts to movement of native aquatic species.

Construction activities in the new quarry area(s) are not expected to result in any impacts to species movement because the proposed quarry areas are extensions of the original quarry sites used for the dam, and they terminate in steep slopes that would not be migration corridors.

Conflicts with Local Policies

All of PG&E's proposed modifications are located in Nevada County, and no proposed modifications are located in Placer County. The development of new quarry site(s) would most likely require the removal of sparse trees; however, similar to the original Lake Fordyce Dam Seepage Mitigation Project assessed in the 2020 IS/MND, this is not expected to conflict with the Nevada County General Plan. While the Nevada County General Plan includes measures to protect trees, these measures are intended to discourage "intrusion and encroachment by incompatible land uses in significant and sensitive habitat" (Directive Policy 13.2) (Nevada County, 2014). Quarry activities for the Proposed Project would not constitute the intrusion or encroachment of incompatible land uses, and the trees which may be removed are not located in sensitive habitat (Directive Policy 13.1) (Nevada County, 2014). Therefore, the Proposed Project would continue to have no impact related to conflicts with local policies or ordinances protecting biological resources.

Conflicts with Habitat Conservation Plans

The Proposed Project Area, including modified components, is not within the boundaries of any adopted Habitat Conservation Plan or Natural Communities Conservation Plan. Therefore, the Proposed Project would continue to have no impact related to conflicts with habitat conservation plans or other adopted plans.

3.4 Cultural Resources

Cofferdam construction would occur in largely the same footprint analyzed previously in the 2020 IS/MND and 2021 Addendum, with the addition of the new quarry area(s). The Area of Potential Effects (APE) that was developed for National Historic Preservation Act Section 106 consultation in support of the original Lake Fordyce Dam Seepage Mitigation Project analyzed in the 2020 IS/MND included all areas of direct and indirect potential impacts, and encompassed all construction landing zones, access routes, and staging areas as well as the complete boundaries of any cultural sites that intersect the construction footprint. The Section 106 APE was synonymous with the project study area identified in the 2020 IS/MND and 2021 Addendum for CEQA purposes.

The 2020 IS/MND identified three potential cultural resource areas that overlap with the new quarry areas included in the Proposed Project, but these potential resource areas were determined to be ineligible for listing in the National Register of Historic Places

(NRHP) with State Historic Preservation Officer concurrence and are therefore not considered to be an archaeological resource under CEQA. As shown in Figure 3-3, these partially overlapping ineligible sites include P-29-004025 (Fordyce Quarry No. 1), P-29-002959 (Fordyce Quarry No. 2), and P-29-004024 (remnants of the Fordyce Dam Construction Camp).

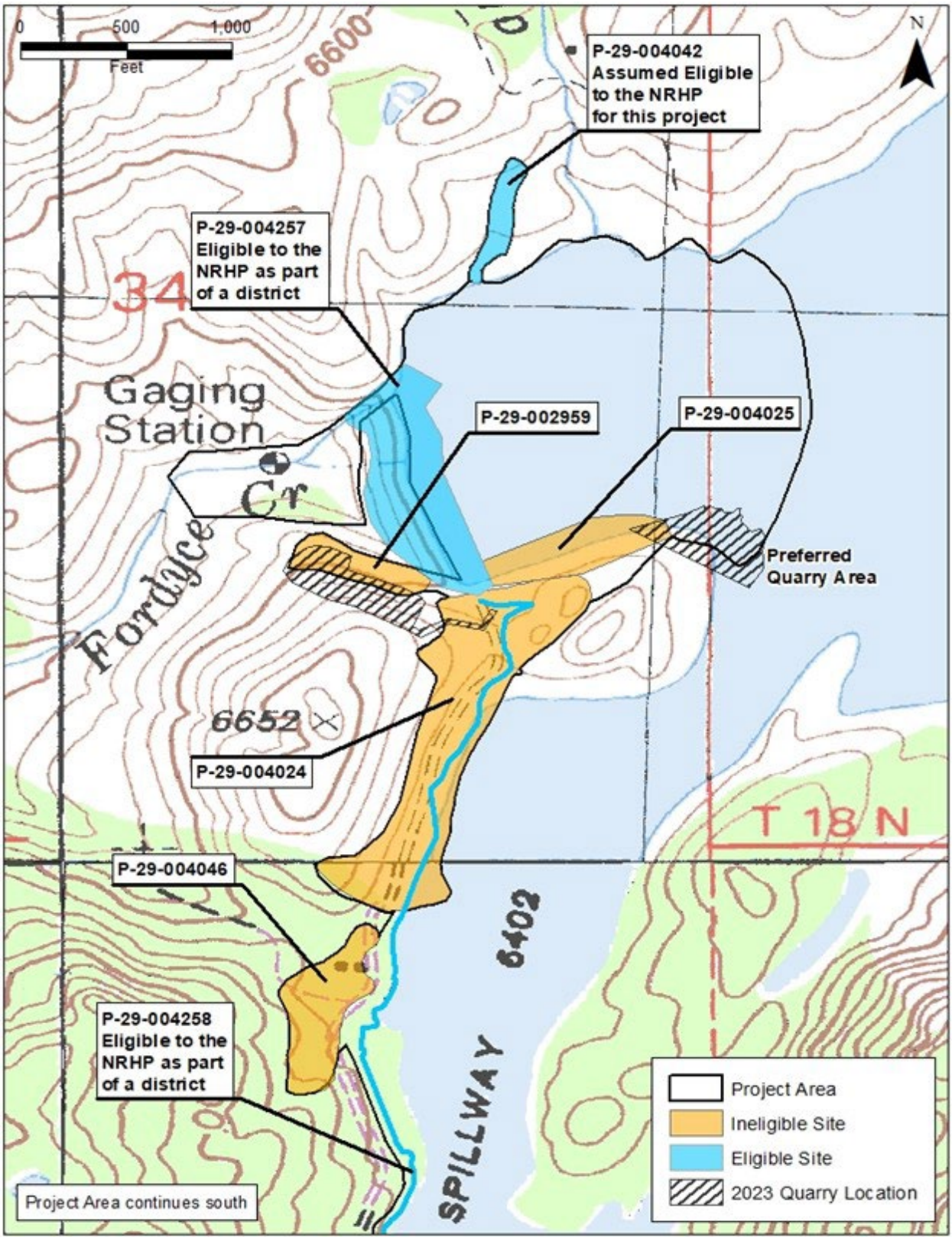

Figure 3-3. Previously Assessed Project Area, Cultural Sites, and New Quarry Areas

The eastern segment of the preferred quarry area and southern segment of the alternate quarry area are just outside the study area evaluated in the 2020 IS/MND, as shown in Figure 3-3. The portion of the preferred quarry area that was not submerged by Lake Fordyce was surveyed in 2011, and no cultural resources were identified (Information Center Study No. 10561). The northern portion of the alternate quarry area was surveyed for cultural resources in 2011, by Study No. 10561, and in 2020, as part of the original Lake Fordyce Dam Seepage Mitigation Project; no cultural resources were identified. Although the Proposed Project includes additional quarry areas outside of the study area considered in the 2020 IS/MND and 2021 Addendum, the absence of recorded cultural resources in the newly added areas and the non-depositional, steep terrain, and results from neighboring investigations indicate that there is a low probability of encountering cultural resources in these areas.

Sites eligible or assumed eligible for NRHP listing within the original Lake Fordyce Dam Seepage Mitigation Project and Proposed Project Area are also depicted in Figure 3-3 and were considered in the 2020 IS/MND. The 2020 IS/MND determined that the original Lake Fordyce Dam Seepage Mitigation Project would result in no adverse impact to eligible sites P-29-004257 (Lake Fordyce Dam) and P-29-004258 (Lake Fordyce Road), and less than significant impacts to assumed eligible site P-29-004042 (Abandoned Road Grade, Mining Features, and Refuse) with implementation of MM CUL-1. Similar to the original Lake Fordyce Dam Seepage Mitigation Project and analysis in the 2020 IS/MND, the Proposed Project would result in functional improvements to Lake Fordyce Dam and Lake Fordyce Road and would not adversely affect these sites. The Proposed Project would not affect P-29-004042 (Abandoned Road Grade, Mining Features, and Refuse), which occurs outside of the modified cofferdam design area. Additionally, MM CUL-1 (Procedures to Avoid Impacts on Archeological Resources) remains applicable and required.

Should cultural resources be identified in the newly added quarry areas or in association with the modified cofferdam, previously adopted MMs including MM CUL-2 (Procedures for Unanticipated Discovery of Archaeological Resources) and MM CUL-3 (Worker Training) would remain applicable and required. Impacts due to unanticipated discovery of an unknown archaeological resource would continue to be mitigated through these MMs. These measures would remain in place if the proposed potential fifth year of construction is required. Therefore, PG&E's proposed modifications would not result in new or increased impacts on cultural resources.

3.5 Geology and Soils

PG&E's proposed modifications would not result in a change in potential impacts to geology and soils as analyzed in the 2020 IS/MND. There is low to moderate seismicity in the area, and placing rock at the cofferdam location would not pose an increased threat to Fordyce Dam. The modified cofferdam was designed to increase stability of the

cofferdam structure. The additional permanent rockfill would be 700 feet upstream of Fordyce Dam and would be unlikely to migrate toward the dam during a seismic event.

Construction of the modified cofferdam design and quarrying would occur in volcanic and metavolcanic rock and granite, so paleontological sensitivity of the Proposed Project Area is low. To address the inadvertent discovery of paleontological resources during dredging, previously adopted MM GEO-1 (Discovery of Paleontological Resources) remains applicable and required, and would avoid or reduce the potential for impact to a less-than-significant level. Therefore, PG&E's proposed modifications would not result in new or increased potential impacts on geology and soils.

3.6 Greenhouse Gas Emissions

An analysis of the construction activities associated with the Proposed Project was conducted to evaluate whether the proposed changes to the cofferdam and the introduction of on-site quarrying of rock for the cofferdam would result in new or increased potential impacts to greenhouse gas (GHG) emissions. Construction-related GHG emissions were estimated using the same methodology discussed in Section 3.2 *(Air Quality)* of this Addendum for each of the three quarry options. Table 3-2 presents the additional construction-related GHG emissions associated with Options 1 through 3 for the Proposed Project relative to 2021 Revised Project, as well as total construction-related GHG emissions for the original Lake Fordyce Dam Seepage Mitigation Project analyzed in the 2020 IS/MND, total construction-related GHG emissions for the 2021 Revised Project, and total construction-related GHG emissions for the Proposed Project with Options 1 through 3.

Table 3-2. Maximum Daily Construction-Related GHG Emissions

Description	GHG Emissions (MT CO_2e)	Amortized Construction Emissions (MT CO_2e/year) [a]
Option 1 (additional emissions) [b]	287	10
Option 2 (additional emissions) [b]	266	9
Option 3 (additional emissions) [b]	301	10
Original Lake Fordyce Dam Seepage Mitigation Project [c]	3,888	130
2021 Revised Project [d]	5,634	188
Proposed Project with Option 1	5,921	198
Proposed Project with Option 2	5,900	197
Proposed Project with Option 3	5,935	198

Notes:
MT CO_2e = metric tons carbon dioxide equivalents

[a] Consistent with the analysis in the 2020 IS/MND, construction-related emissions are amortized assuming a 30-year lifetime for the Proposed Project.

[b] Additional emissions for Options 1 through 3 are relative to the 2021 Revised Project

[c] Total and amortized construction-related GHG emissions from the 2020 IS/MND.

[d] Total and amortized construction-related GHG emissions for the 2021 Revised Project can be found in appendix A.

As shown in Table 3-2, Option 3 would result in the maximum total GHG emissions for the Proposed Project due to the activities associated with quarrying from both the preferred and alternate quarry sites with supplemental rock being brought in from an off-site location. With Option 3, the total and amortized construction-related GHG emissions that would result from the Proposed Project would be 5,935 MT CO_2e and 198 MT CO_2e per year, respectively.

As noted in the 2020 IS/MND, although most of the Proposed Project Area is located in Nevada County and under the jurisdiction of the NSAQMD, neither the NSAQMD nor Nevada County has established GHG emission thresholds. Relevant GHG thresholds discussed in the 2020 IS/MND include the California Air Pollution Control Officers Association's annual threshold of 900 MT CO_2e for residential, commercial, or industrial projects; Sacramento Metropolitan Air Quality District's annual threshold of 1,100 MT CO_2e for construction and operational emissions; and PCAPCD's annual threshold of 10,000 MT CO_2e for construction. These annual thresholds help provide context for the Proposed Project's GHG emissions.

The Proposed Project's amortized construction-related GHG emissions of 197 or 198 MT CO_2e per year, which are the combination of additional GHG emissions from PG&E's proposed modifications with the 2021 Revised Project's total construction-related emissions, would continue to be substantially less than any of the relevant GHG thresholds summarized above. Increased GHG emissions of the 2021 Revised Project as compared to the original Lake Fordyce Dam Seepage Mitigation Project analyzed in the 2020 IS/MND occurred primarily as a result of cofferdam construction modifications that would have required additional material delivery truck trips, alternate but similar construction equipment, and an extended construction timeline to accommodate the additional dredging and fill activities. GHG emissions increases under the Proposed Project relative to the 2021 Revised Project occur primarily from the addition of onsite quarrying and transportation of material. Total construction-related GHG emissions of the Proposed Project shown in Table 3-2 include all 2021 Revised Project construction-related GHG emissions. This approach to calculating the Proposed Project's GHG emissions is conservative because it does not reduce the GHG emissions associated with the previously proposed bin-wall cofferdam, which would no longer be used by the Proposed Project.

Proposed Project-related GHG emissions include both construction-related emissions and emissions associated with the potential loss of hydropower production. The Proposed Project would not result in any additional potential loss in hydroelectric generation not already considered in the 2020 IS/MND. As the 2020 IS/MND explained, construction would require water storage at Lake Fordyce above minimum pool to be reduced during construction years. This could result in the potential for additional water to spill at Lake Spaulding, causing a potential loss in hydropower generated by the Drum-Spaulding Hydroelectric Project. As discussed in the 2020 IS/MND, under the worst-case scenario of a wet water year, the potential amortized GHG emissions increase associated with reduced hydropower generation would be 479 MT CO_2e per year. Adding this amortized emissions increase to the conservative estimate of amortized construction-related GHG emissions of the Proposed Project with Option 3 (198 MT CO_2e) results in a total of 677 MT CO_2e per year. This total value is also notably less than any of the relevant thresholds summarized above.

Therefore, PG&E's proposed modifications would not result in new or substantially increased impacts on GHG emissions.

3.7 Hazards and Hazardous Materials

As discussed in the 2020 IS/MND, Proposed Project construction would include the routine transport, storage, use, and disposal of small quantities of hazardous materials, including explosives to be used for quarrying the cofferdam source rock. Many products used during construction, such as gasoline, diesel, hydraulic fluid, lubricants, adhesives, and solvents, are categorized as hazardous materials and are highly regulated by federal, state, and local laws and regulations.

Construction of the Proposed Project would require excavation of soils in the dewatered reservoir at the toe of the dam resulting in a lower volume of excavation and slightly different alignment than the 2021 Addendum. Additionally, the Proposed Project would require dredging on the cofferdam alignment (along a similar alignment as the previous 2021 Addendum bin-wall cofferdam but with a slightly larger bottom footprint) and include excavation of rock materials at the newly added quarry site(s). Previous representative sampling discussed in the 2020 IS/MND indicated that contaminated soils are not anticipated in the original Lake Fordyce Dam Seepage Mitigation Project site. The newly added quarry sites are in granite, and no contamination in these areas is expected. Accordingly, similar to the 2020 IS/MND and 2021 Addendum, no contamination is anticipated in materials excavated by the Proposed Project.

Any potential increase in the risk of a spill or release of hazardous materials from the additional work would still be reduced by the implementation of a SWPPP. MM HAZ-1 (Unanticipated Contamination) would still apply to the Proposed Project components.

Therefore, PG&E's proposed modifications would not result in any new or increased potential impacts related to hazards or hazardous materials.

3.8 Hydrology and Water Quality

Modifications included as part of the Proposed Project that could affect water quality or hydrology include:

1. Changes to cofferdam construction;
2. Development of on-site quarry area(s) to source rock for the cofferdam; and
3. Changes to pH control activities, including:
    a. specific seepage monitoring and triggers for pH system implementation;
    b. the potential use of a one- to three-pond pH containment and treatment system; and
    c. the potential use of muriatic acid or bicarbonate (in addition to CO_2, as previously considered) to neutralize pH, if needed.

The potential for new or increased impacts, including potential changes to water quality that could cause an exceedance of a water quality objective and cause adverse effects to beneficial uses, is discussed below. No changes are anticipated to on-site or off-site flooding and/or changes to groundwater quantity and quality due to proposed modifications.

Cofferdam Construction

A trapezoidal rockfill cofferdam would be placed along the same alignment as the bin-wall cofferdam described in the 2020 IS/MND but would have a larger bottom footprint and fill volume. Although the footprint of the cofferdam would increase and thus additional excavation/dredging would be needed, turbidity would continue to be minimized in Lake Fordyce during construction through the water quality control practices described in Section 2.6.1 of the 2020 IS/MND, with some proposed modifications as described below.

As described in the 2020 IS/MND, dredging and cofferdam construction would be conducted in the confines of a turbidity curtain system, and the agitation and disruption of lake sediments would be minimized during dredging. Dredged materials (sediment-water slurry) would be handled largely as discussed in the 2020 IS/MND and as altered in the 2021 Addendum, including their placement and stabilization in the staging area downstream of the dam. Placement and stabilization in the staging area downstream of the dam would occur for both mechanical and limited hydraulic dredging (if needed), the latter of which represents a change from the methods described in the 2020 IS/MND and 2021 Addendum (see Section 2 *Proposed Changes to the Project*). Geotubes, which were included in the original Lake Fordyce Dam Seepage Mitigation Project to contain dredged material, would not be used. Diver assisted dredging, which was proposed in the

original Lake Fordyce Dam Seepage Mitigation Project but removed in the 2021 Revised Project, is also no longer a component of the Proposed Project.

As described in the 2020 IS/MND, a water quality management plan has been developed and would be implemented during construction per MM HYD-1. Turbidity, dissolved oxygen, pH, and temperature would be monitored during construction (with changes to the pH system monitoring and adaptive management, as described later in this section); and if, for example, turbidity levels approach values that would cause sublethal effects to fish, adaptive management actions would be implemented to reduce turbidity. Water quality control practices and mitigation measures would continue to be applicable and required. Therefore, PG&E's proposed modifications would not result in new or increased potential impacts to water quality during cofferdam construction.

Rock Quarry Activities

Up to two local quarry areas (preferred and alternate) would be developed to provide source rock for the cofferdam embankment and downstream rock buttress. The preferred quarry area is upstream and east of the proposed cofferdam area, located near the abandoned upstream quarry which was used to source rock for Lake Fordyce Dam. The bench created by the abandoned upstream quarry area would be used as the upstream staging area for the Proposed Project. The alternate quarry area is located slightly upland and southwest (downstream) of the existing dam, near the downstream staging area. A portion of this alternate quarry area was formerly used to quarry material for the construction of Lake Fordyce Dam. Rock would be drilled and blasted at the quarry area(s). Standard erosion control measures would be used during construction as per the Proposed Project SWPPP; however, material that is not suitable for use at the cofferdam would remain at the quarry after construction is complete. This remnant material is expected to be primarily gravels or rocks, including some rocks that are larger in size than gravels, but not of suitable size for use in cofferdam construction. When quarried, granite rock can come off in plates, and materials that are approximately one inch thick or less are expected to be unusable for the proposed rockfill cofferdam.

If the preferred quarry area is developed, this quarry would likely be at a similar elevation as the original abandoned upstream quarry, and the new quarry area would be partially inundated annually when the reservoir fills. If the alternate quarry is developed, the materials left behind are expected to receive precipitation and experience stormwater runoff similar to the existing conditions at the downstream staging area.

As discussed in the 2020 IS/MND, turbidity is low in the region, with turbidity in Fordyce Creek typically at or below approximately 10 nephelometric turbidity units. This is not expected to change with development of the quarries. The remnant materials at the quarry area(s) are expected to be generally the same particle size as the materials left

behind at the existing quarry areas. This is generally gravel-size or larger material that is less likely to be transported by stormwater or mobilized as the reservoir level rises. Turbidity from annual inundation of the preferred quarry location and/or turbidity from runoff at the alternate quarry location after construction is expected to be similar to current conditions at these areas. Therefore, these modifications to the Proposed Project are not expected to result in new or increased impacts to water quality.

pH Management

pH management actions would prevent high-pH water from entering Fordyce Creek as a result of grouting. Changes from the pH management actions in the original Lake Fordyce Dam Seepage Mitigation Project analyzed in the 2020 IS/MND are described and discussed below.

Under the Proposed Project, a pH containment and treatment system would only be installed and employed if seepage occurs prior to or during grouting operations. This is a change from the original Lake Fordyce Dam Seepage Mitigation Project, where the pH monitoring, containment, and treatment system discussed in Section 2.6.2 of the 2020 IS/MND would have been installed and employed regardless of whether seepage water was observed or present.

Under the Proposed Project, daily observations for seepage would occur prior to and during all grouting activity in the Proposed Project work area (upstream toe of the dam). Monitoring would take place by visual inspection prior to start of construction each day. If seepage is present, it would be measured by timing volumetric flow or utilizing a flow measuring weir. If 25 GPM of seepage or more is measured flowing into Fordyce Creek, then grouting activities would only occur with the pH monitoring ponds and the pH treatment system in place and in use.

The Proposed Project would also include the potential use of a one- to three-pond pH containment and treatment system to isolate seepage water and ensure it does not enter Fordyce Creek prior to testing for pH, whereas the original Lake Fordyce Dam Seepage Mitigation Project analyzed in the 2020 IS/MND specified a three-pond system. Under the Proposed Project, water in the pond(s) would be pumped through a system monitored via an MCU. The MCU flow capacity would be two cubic feet per second (about 1,000 GPM), or greater if necessary to accommodate actual seepage flows. The two cubic feet per second flow capacity is based on historic seepage measurements taken when Lake Fordyce is at minimum pool.[6] If more seepage is flowing than historically measured, the treatment system would be upsized to accommodate. The MCU would provide real-time

[6] As previously noted, typical seepage measurements at Lake Fordyce Dam vary with lake level. Under normal operations, seepage ranges between 1,000 GPM (at minimum pool) and 27,000 GPM.

pH results (15-minute sampling intervals), allowing for the correct amount of treatment to be administered. The MCU would automatically determine if water can be safely discharged downstream or if it requires further recirculation and treatment. The MCU would operate the pump valves automatically to switch between recirculation and discharge, depending on the pH of the effluent water. The MCU would also measure chlorine if muriatic acid is used.

Additional modifications to the original Lake Fordyce Dam Seepage Mitigation Project's pH treatment system include additional potential commercial methods of raising or lowering pH. In addition to the CO_2 treatment discussed in the 2020 IS/MND (which would remain an option under the Proposed Project), muriatic acid or bicarbonate could also be used to lower or raise pH.

Muriatic acid is highly effective at treating alkaline water that has a pH greater than 9.5, while CO_2 (in the form of dry ice or gas) can be used to treat water with a pH less than 9.5. Muriatic acid is a diluted solution of hydrochloric acid. Hydrochloric acid is a strong acid that completely dissociates in water into its component parts—the hydrogen ion (H+) and the chlorine anion (Cl-). Muriatic acid lowers the pH of alkaline waters, but during this process, it produces a chlorine residual. Muriatic acid is used in active treatment systems for groundwater and stormwater treatment applications; during these types of applications, concentrations of chlorine residuals are typically so low they are undetectable. If muriatic acid is used for pH treatment and chlorine residuals are measured in the treatment system, sodium thiosulfate or Vita-D-Chlor tablets would be used to remove residual chlorine. Vita-D-Chlor is an organic acid (primarily ascorbic acid or Vitamin C), and sodium thiosulfate is a sulfur-based inorganic compound that is commonly used to dechlorinate tap water. Bicarbonate would be used to raise the pH if measured below the allowable range.[7] Baking soda would be applied to the water by hand-spreading on the water surface of the treatment pond(s).

As discussed above, if the pH of the seepage is within the allowable range for discharge, then the seepage would be released without treatment. If high pH is present in the seepage, then minimal treatment would be used to neutralize the pH, and if needed, any chlorine residuals. Therefore, the proposed modifications to pH management would not result in new or substantially increased impacts on water quality.

3.9 Noise

As discussed in the 2020 IS/MND, there are no substantial noise sources in the Proposed Project Area, which is undeveloped and uninhabited. The limited noise currently

[7] The Water Quality Control Plan for the Sacramento and San Joaquin River Basins provides that the pH of Fordyce Creek "shall not be depressed below 6.5 nor raised above 8.5" (Central Valley Regional Water Quality Control Board, 2019).

generated in the area comes from intermittent vehicles and off-highway vehicles using local roads, and potentially from timber harvest operations. Occasionally, PG&E requires helicopter operations to bring personnel or materials to the dam site.

Noise-sensitive land uses are those uses for which quiet is an essential element of their purpose and function. Residential noise-sensitive uses are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Schools, places of worship, hotels, libraries, health facilities, parks, and recreation areas are other places that are also considered noise-sensitive land uses. Recreational use would be the only noise-sensitive land use in the Proposed Project Area, because the area surrounding Fordyce Dam is uninhabited.

There are no formal campgrounds at Lake Fordyce, although there is one informal campsite at the lake. Recreational visitors to Lake Fordyce would be considered noise-sensitive receptors; however, the informal campground nearest to Lake Fordyce would be closed during construction, and other recreational opportunities would be limited for the duration of construction as stated in the 2020 IS/MND. The nearest campgrounds not at Lake Fordyce include Sterling Lake Campground and Robert E. Cole Campground, approximately 2 miles south of the Proposed Project site. Camping also occurs at Meadow Lake, approximately 2 miles northeast of Lake Fordyce.

The nearest highway, Interstate 80 (I-80), is approximately 5 miles south of the work area at the dam, but at a much lower elevation than the dam, with a mountain crest between the highway and the work area.

Construction vehicles (e.g., excavators, loaders, or dump trucks) and construction noise in the Proposed Project Area associated with the modified cofferdam design are expected to be similar to the original Lake Fordyce Dam Seepage Mitigation Project assessed in the 2020 IS/MND. The addition of a potential fifth season of construction could extend the duration of construction noise, but construction activities would remain exempt from Nevada County's noise standards.

Although blasting noise for road construction was assessed in the 2020 IS/MND, the Proposed Project includes blasting at quarry sites. Blasting noise and vibration from the newly added quarry sites is assessed below. Formulas used to calculate blasting noise and vibration and calculations of blasting noise and vibration are presented in Appendix B.

Short-Term Blasting Noise

Blasting to quarry cofferdam source materials is anticipated to generate the highest noise levels associated with construction of the Proposed Project. During each blasting event, approximately 100 individual 24-pound charges would be detonated in series over approximately 2.5 seconds. The quarry operation would involve up to approximately 15

blasting events (i.e., fifteen 2.5-second sound intervals) with no more than one event per day, on non-consecutive days. The highest noise level would be from a single 24-pound charge as the sound from each individual charge is not additive.

Noise levels at the Proposed Project site during construction are estimated to reach a maximum of approximately 149 dB. The nearest human noise receptors (aside from construction workers at the site) would be at Sterling Lake Campground, Robert E. Cole Campground, and Meadow Lake Campground, each approximately 2 miles from the Proposed Project site. Accounting for the intervening topography (mountain ridges that function as sound barriers) between the Proposed Project site and the nearest campgrounds, Proposed Project-related blasting activities would generate a maximum noise level of up to 53 to 63 dB at these campgrounds, the nearest noise-sensitive uses. The upper end of this range is roughly equivalent to the noise level of highway traffic at 500 feet, and the sound would last only up to 2.5 seconds during the intermittent blasting events. Because the two proposed quarry sites are in relatively close proximity to one another, there would be no substantial difference in noise experienced at receptor locations between blasting at the preferred or alternate quarry site. Noise levels at I-80 would be substantially lower than at the nearest campgrounds given the additional distance and similar intervening topography.

In the Nevada County Land Use Development Code, Chapter II, Zoning Regulations (Section L-II 4.1.7, Noise; 2014, Nevada County), construction activities are exempt from Nevada County's noise standards. Although the proposed additional blasting would generate noise, it would be temporary, very brief in duration, and would cease after the quarrying activities are complete in Construction Year Two. The potential additional fifth year of construction would not entail any blasting, and construction would remain exempt from county noise standards.

Short-Term Blasting Vibration

Construction activities have the potential to result in varying degrees of temporary ground-borne vibration effects, depending on the specific construction equipment used, the location of construction activities relative to sensitive receptors, and the operations/activities involved. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. Construction equipment vibration from the original Lake Fordyce Dam Seepage Mitigation Project was assessed in the 2020 IS/MND, including from bin-wall cofferdam construction. Construction equipment types have not changed significantly since the 2020 IS/MND assessment, and the change in cofferdam design is not expected to result in impacts that differ from that assessment. Although the Proposed Project includes a potential fifth season of construction, associated vibration impacts for that season would remain less

than significant given that there are no sensitive receptors near Lake Fordyce and recreational opportunities would be limited for the duration of construction.

Blasting at the rock quarries could generate substantial ground-borne vibration. The California Department of Transportation (Caltrans) has developed criteria that are commonly applied as an industry standard to determine the potential impacts of Proposed Project vibration relative to human annoyance and structural damage. Caltrans has determined that a vibration level of 80 vibration decibel levels (VdB; 0.04 in/sec PPV) would be distinctly perceptible (Caltrans, 2020). Therefore, vibration levels less than 80 VdB or 0.04 in/sec PPV would avoid human annoyance. As discussed in the 2020 IS/MND, public access at Lake Fordyce would be restricted during construction, including during the potential fifth season of construction under the Proposed Project. As also discussed in the 2020 IS/MND, there are no sensitive receptors near Lake Fordyce Dam. The informal campground nearest Lake Fordyce would be closed, and other recreational opportunities would be limited for the duration of construction. Prior to blasting, all PG&E personnel and contractors would participate in a safety meeting to ensure everyone onsite has a clear understanding of the progression of events, protocols, and responsibilities. During past test blasts, PG&E and contractor personnel have been approximately 1000 feet away from the blast area. Prior to blasting, all personnel would be cleared to a safe distance and all approaches to the blast area would be blocked off.

Lake Fordyce Dam, the vibration-sensitive use nearest to the proposed blasting sites, is located approximately 1,000 feet from the preferred quarry site and approximately 300 feet from the alternative quarry site. The resulting vibration level from the blasting would range between 0.0048 in/sec PPV and 0.0488 in/sec PPV at 1,000 feet, and range between 0.0332 in/sec PPV and 0.3346 in/sec PPV at 300 feet. Although there are no general thresholds for dams, these vibration levels would be well below the 0.5 in/sec PPV recommended by Caltrans for structural damage to buildings (Caltrans, 2020). Short-term construction operations of the Proposed Project would not exceed the threshold for structural damage.

Therefore, PG&E's proposed modifications would not result in new or substantially increased noise or vibration impacts.

3.10 Recreation

As discussed in the 2020 IS/MND, informal recreational opportunities at Lake Fordyce would be restricted during construction because Lake Fordyce Road would be closed at the northern side of Fordyce Summit near its intersection with Lake Sterling Road. Reservoir drawdown to accommodate construction could also result in loss of whitewater boating conditions in Fordyce Creek. These effects would also occur under the Proposed Project. However, under the Proposed Project, PG&E would continue to maintain contact with recreation groups to provide information on closures and potential times when the

road may be open (e.g., certain Sundays and holidays if work would not be occurring) or may make other arrangements with the groups to allow limited access. Multiple similar whitewater boating opportunities in the region would also continue to remain available for use under the Proposed Project, depending on seasonal flows.

The Proposed Project includes the potential for a fifth year of construction if the work cannot be completed in the remaining three construction seasons. A fifth season of construction would result in longer disruption to recreation than the four full years of construction analyzed in the 2021 Addendum.[8] However, interruptions to recreation during this potential fifth year of construction would be temporary and similar to those analyzed for the prior four construction seasons in the 2020 IS/MND and 2021 Addendum and would be avoided or minimized through the same methods summarized above.

Under the Proposed Project, a rockfill cofferdam would be constructed instead of the bin-wall design previously analyzed. Following completion of the Proposed Project, rockfill placed for the redesigned cofferdam would be either left intact or a notch may be created in the crest of the cofferdam. The notch would be approximately 8 feet wide at the bottom and 8 feet deep (elevation 6,237 feet). The side slopes of the rockfill cofferdam would be laid back to a stable configuration with a top width up to 24 feet wide. If a notch is not created, the bypass pipe would be left in place and opened to allow for flow and fish passage. Flatwater boating access may be segmented by the cofferdam when Fordyce Reservoir is at minimum pool (approximately 6245.4 feet) if a notch is not created.

As discussed in the 2020 IS/MND, recreational opportunities in the Proposed Project Area include camping, hiking, angling, whitewater boating (non-motorized), all-terrain vehicle and off-highway vehicle use in the summer, and cross-country skiing and snowmobiling in the winter. While motorized boating in Lake Fordyce is possible, no formal boat launch exists and driving on the lake bottom is discouraged.[9] The recreation use study completed as part of the relicensing process for the Drum-Spaulding Hydroelectric Project (Hydroelectric Project) found that overall recreation use at the Hydroelectric Project is significantly skewed towards the peak recreation season (90 percent) from Memorial Day through Labor Day (PG&E, 2011). The United States Forest Service officially closes Lake Fordyce Road on December 31 each year, however depending on snowfall it may close earlier in the year. The short window in fall when PG&E typically draws Lake Fordyce down to minimum pool, combined with the period recreationalists

[8] No project-related recreation area or road closures occurred at Lake Fordyce in 2022 or 2023.

[9] As part of the relicensing process for the Drum-Spaulding Hydroelectric Project, PG&E committed to pursue an ordinance that prohibits motorized vehicle use below the high-water line at Lake Fordyce.

typically utilize Lake Fordyce and when Lake Fordyce Road is open and accessible,[10] result in a limited temporal range when recreation in Lake Fordyce could be segmented due to the cofferdam if notching does not occur (PG&E, 2011). For these reasons, PG&E's proposed modifications would not result in new or substantially increased impacts on recreation.

3.11 Transportation

The Proposed Project would not affect existing transportation facilities for pedestrians, bicyclists, or motorists and would not result in development that would affect the transit system. Changes in the cofferdam design and the development of on-site quarries to source rock for the cofferdam would result in a reduced number of truck trips on I-80 for materials delivery compared with the scenarios assessed in the 2020 IS/MND and 2021 Addendum, both of which entailed importing rock from off-site to construct the bin-wall cofferdam. The 2020 IS/MND concluded that the addition of 10 to 50 trucks per day would be a fractional increase in traffic volume and would be unlikely to cause substantial effects on I-80 based on existing freeway traffic levels and the location of the original Lake Fordyce Dam Seepage Mitigation Project area. The 2021 Addendum included additional truck trips to transport the increased quantity of dredged material and rock fill and concluded that this change would not result in new or substantially increased impacts on transportation. As discussed in the 2020 IS/MND and 2021 Addendum, construction vehicles on roadways during construction would not conflict with policies in the adopted transportation plans for Nevada and Placer Counties. The Proposed Project does not include any changes that would alter these analyses or conclusions.

The Proposed Project would not include new land uses or transportation facilities that would result in additional VMT. The modifications to the Proposed Project would remain consistent with CEQA Guidelines section 15064.3, subdivision (b).

PG&E's proposed modifications would not result in any new public roads or changes to any existing public roads. The proposed modifications would not require altering access road improvements assessed in the 2020 IS/MND and constructed in 2021. Therefore, the proposed modifications would not increase hazards because of roadway geometric design features. Emergency access would remain unchanged from to the assessment the 2020 IS/MND.

Accordingly, PG&E's proposed modifications would not result in new or increased impacts on transportation.

3.12 Tribal Cultural Resources

[10] Prime recreation season at Lake Fordyce occurs between early July and the middle of September (PG&E 2011).

Proposed Project activities and cofferdam construction would occur in largely the same footprint analyzed previously in the 2020 IS/MND, with the addition of the new quarry area(s). As discussed in Section 3.4 *Cultural Resources*, portions of the Proposed Project quarry area(s) were evaluated and described in the 2020 IS/MND as lacking potential for cultural resources. The portions of the newly added quarry areas outside of the 2020 IS/MND analysis have a low probability of containing cultural resources based on the non-depositional, steep terrain and results from neighboring investigations. Previously adopted MMs in the 2020 IS/MND, including MM CUL-1 (Procedures to Avoid Impacts on Archaeological Resources), MM CUL-2 (Procedures for Unanticipated Discovery of Archaeological Resources), and MM CUL-3 (Worker Training), remain applicable and required. PG&E's proposed modifications would therefore not result in new or increased impacts on tribal cultural resources.

On March 29, 2023, the State Water Board notified the Buena Vista Rancheria of Me-Wuk Indians and the United Auburn Indian Community of the Auburn Rancheria of the opportunity for consultation related to the Proposed Project modifications. The State Water Board did not receive a request for consultation or any other response.

3.13 Utilities/Service Systems

Similar to the original Lake Fordyce Dam Seepage Mitigation Project assessed in the 2020 IS/MND, the Proposed Project would not require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities. PG&E's proposed modifications would not result in the need for treatment of water at a waste management facility and would not increase solid wastes sent to landfills above what was assessed in the 2020 IS/MND.

The redesigned cofferdam would not affect water supply from Lake Fordyce. The volume of rock for the new cofferdam design would increase fill in Lake Fordyce by 4,300 cubic yards compared to the 2021 Revised Project's bin-wall cofferdam design. As described in Section 2 *Proposed Changes to the Project*, the total fill volume for the rockfill cofferdam and buttress is 17,000 cubic yards. This would slightly lower the volume of water in Lake Fordyce because the rock would be permanently left in place after construction of the seepage mitigation repair. This reduction in volume conservatively represents 0.002 percent of the approximately 50,000-acre-foot capacity of Lake Fordyce, a de minimis decrease in water supply from the reservoir. Additionally, if the preferred quarry location is used, much of the rock would be excavated from below the normal water line of Lake Fordyce, thereby offsetting some or all changes in reservoir volume.

PG&E's proposed modifications would not result in new or increased impacts on utilities and service systems.

4. Conclusion

Based on the above analysis, PG&E's proposed modifications do not alter the conclusions of the 2020 IS/MND or 2021 Addendum regarding environmental impacts. As discussed in Section 3, the State Water Board has determined that PG&E's proposed modifications would not create any new potentially significant effects or substantially increase the severity of any previously identified potentially significant effects. No substantial changes to the circumstances under which the Proposed Project would be undertaken have occurred, and no new information of substantial importance regarding effects of the Proposed Project or previously adopted mitigation measures has been identified. Therefore, the State Water Board has determined that preparation of a subsequent MND is not required pursuant to CEQA Guidelines section 15162 and has prepared this Addendum.

This Addendum, the 2020 IS/MND, and the 2021 Addendum are available on the State Water Board's Drum-Spaulding Project web page.[11] The State Water Board, as the CEQA Lead Agency, will consider this Addendum with the previously adopted 2020 IS/MND and 2021 Addendum prior to making a decision on the Proposed Project in accordance with CEQA Guidelines section 15164, subdivision (d).

[11] https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/drum_spaulding_ferc2310.html#FordyceDam

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Appendix A Air Quality and Greenhouse Gas Emission Estimates Summary

Air Quality and Greenhouse Gas Emission Estimates Summary

Maximum Daily Emissions - Option 1 (lbs/day)

Project Component/Source	**ROG**	**NOx**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Off-Road Construction Equipment	2.74	21.07	20.12	0.82	0.75
On-Road Construction Equipment	0.04	1.02	1.92	0.11	0.04
Crew and Barge Tug Boats	4.49	24.10	16.28	1.36	1.22
Blasting	-	28.05	110.55	0.01	0.01
Fugitive Dust	-	-	-	31.25	6.67
Total Maximum Daily Emissions	**7.27**	**74.24**	**148.88**	**33.54**	**8.69**
NSAQMD Level B Threshold	136	136	N/A	136	136
Exceeds Threshold?	No	No	No	No	No

Maximum Daily Emissions - Option 2 (lbs/day)

Project Component/Source	**ROG**	**NOx**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Off-Road Construction Equipment	2.96	22.58	21.59	0.87	0.80
On-Road Construction Equipment	0.04	1.02	1.92	0.11	0.04
Crew and Barge Tug Boats	4.49	24.10	16.28	1.36	1.22
Blasting	-	28.05	110.55	0.01	0.01
Fugitive Dust	-	-	-	31.25	6.67
Total Maximum Daily Emissions	**7.49**	**75.76**	**150.34**	**33.59**	**8.74**
NSAQMD Level B Threshold	136	136	N/A	136	136
Exceeds Threshold?	No	No	No	No	No

Maximum Daily Emissions - Option 3 (lbs/day)

Project Component/Source	**ROG**	**NOx**	**CO**	**PM_{10}**	**$PM_{2.5}$**
Off-Road Construction Equipment	2.96	22.58	21.59	0.87	0.80
On-Road Construction Equipment	0.09	4.87	2.17	0.40	0.16
Crew and Barge Tug Boats	4.49	24.10	16.28	1.36	1.22
Blasting	-	28.05	110.55	0.01	0.01
Fugitive Dust	-	-	-	50.40	8.61
Total Maximum Daily Emissions	**7.54**	**79.60**	**150.58**	**53.03**	**10.80**
NSAQMD Level B Threshold	136	136	N/A	136	136
Exceeds Threshold?	No	No	No	No	No

Total Construction Related GHG Emissions

Option	**Project Component/Source**	**MT CO_2e**
Option 1	Off-Road Construction Equipment	267
	On-Road Construction Equipment	9
	Crew and Barge Tug Boats	6
	Blasting	4
	Total GHG Emissions	**287**
Option 2	Off-Road Construction Equipment	246
	On-Road Construction Equipment	9
	Crew and Barge Tug Boats	6
	Blasting	4
	Total GHG Emissions	**266**
Option 3	Off-Road Construction Equipment	252
	On-Road Construction Equipment	38
	Crew and Barge Tug Boats	6
	Blasting	4
	Total GHG Emissions	**301**

Maximum Daily Emissions of Cofferdam Design Update - Option 3

Construction Equipment	Equipment Type	Number	Daily Usage (hrs/day)	Total Days of Use	Horsepower	Load Factor	Emissions Factors (g/bhp-hr)						gal/hp-hr	Total Gallons	g/gal		Emissions (lbs/day)					Total Metric Tons			Total MT
							VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	CO_2			CH_4	N_2O	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Artic. Dmp Trk CAT 735	Off-Highway Trucks	4	9	35	424	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	4029.20	0.94	0.87	0.90	6.07	5.86	0.22	0.20	41.02	0.0038	0.0035	42.05
Crane Hydraulic GRT 880	Cranes	1	6	5	275	0.29	0.08	0.91	0.49	0.04	0.03	151.60	0.01	35.40	0.94	0.87	0.09	0.95	0.51	0.04	0.04	0.36	0.0000	0.0000	0.37
Portable Jaw Crusher CRJ3042	Crushing/Proc. Equipment	1	9	30	215	0.78	0.03	0.17	0.31	0.01	0.01	161.03	0.02	716.22	0.94	0.87	0.09	0.57	1.03	0.02	0.02	7.29	0.0007	0.0006	7.48
Dozer CAT XE D6	Rubber Tired Dozers	1	9	58	215	0.40	0.21	2.28	1.50	0.10	0.09	208.49	0.02	919.39	0.94	0.87	0.35	3.90	2.55	0.17	0.16	9.36	0.0009	0.0008	9.60
CAT Dozer D8	Rubber Tired Dozers	1	9	23	354	0.40	0.16	1.59	1.29	0.07	0.06	209.84	0.02	604.20	0.94	0.87	0.45	4.45	3.61	0.20	0.18	6.15	0.0006	0.0005	6.31
CAT 324/326 SLR Excavator	Excavators	1	9	7	201	0.38	0.05	0.43	0.42	0.01	0.01	201.30	0.02	95.63	0.94	0.87	0.08	0.66	0.65	0.02	0.02	0.97	0.0001	0.0001	1.00
CAT 336 Thumb Excavator	Excavators	1	9	56	300	0.38	0.05	0.43	0.42	0.01	0.01	201.30	0.02	1141.83	0.94	0.87	0.12	0.99	0.96	0.03	0.03	11.62	0.0011	0.0010	11.92
CAT 349 Thumb Excavator	Excavators	2	9	48	424	0.38	0.05	0.32	0.40	0.01	0.01	200.75	0.02	2758.90	0.94	0.87	0.30	2.02	2.57	0.07	0.06	28.09	0.0026	0.0024	28.79
CAT 374 Excavator	Excavators	1	9	24	484	0.38	0.05	0.32	0.40	0.01	0.01	200.75	0.02	787.33	0.94	0.87	0.17	1.16	1.47	0.04	0.04	8.01	0.0007	0.0007	8.22
Generator 65-74 KW	Generator Sets	1	10	5	84	0.74	0.05	0.43	1.23	0.04	0.03	161.03	0.02	49.16	0.94	0.87	0.07	0.59	1.69	0.05	0.05	0.50	0.0000	0.0000	0.51
CAT 966 Loader	Rubber Tired Loaders	1	8	66	321	0.36	0.08	0.65	0.49	0.02	0.02	189.82	0.02	1143.39	0.94	0.87	0.16	1.33	1.00	0.05	0.05	11.64	0.0011	0.0010	11.93
CAT 980 Loader	Tractors/Loaders/Backhoes	1	8	38	393	0.37	0.06	0.43	0.45	0.02	0.02	193.29	0.02	839.32	0.94	0.87	0.14	1.09	1.14	0.04	0.04	8.54	0.0008	0.0007	8.76
CAT CS34 Roller	Rollers	1	4.5	71	80	0.38	0.08	0.88	0.57	0.03	0.03	197.64	0.02	186.19	0.94	0.87	0.02	0.26	0.17	0.01	0.01	1.90	0.0002	0.0002	1.94
CAT 140H Motor Grader	Graders	1	4.5	71	187	0.41	0.11	1.19	0.52	0.04	0.04	215.20	0.02	516.20	0.94	0.87	0.08	0.90	0.39	0.03	0.03	5.25	0.0005	0.0004	5.39
Light Tower Vertical Mast 4-6.9KW	Other Construction Equipment	2	10	8	8	0.42	0.13	1.57	1.63	0.07	0.06	179.01	*0.02*	9.35	0.94	0.87	0.02	0.23	0.24	0.01	0.01	0.10	0.0000	0.0000	0.10
Ford F250 Ford Truck	Off-Highway Trucks	2	8	69	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	3347.17	0.94	0.87	0.38	2.56	2.47	0.09	0.08	34.07	0.0031	0.0029	34.93
Ford F450 Flatbed Truck	Off-Highway Trucks	1	5	43	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	*0.02*	651.85	0.94	0.87	0.12	0.80	0.77	0.03	0.03	6.64	0.0006	0.0006	6.80
CAT 277/279 Skid Steer	Skid Steer Loaders	1	6	14	74	0.37	0.41	2.90	1.52	0.29	0.27	192.43	0.02	43.30	0.94	0.87	0.15	1.05	0.55	0.10	0.10	0.44	0.0000	0.0000	0.45
Telehandler CAT TL 1255	Aerial Lifts	1	6	3	142	0.31	0.03	0.18	0.88	0.01	0.01	162.23	0.02	12.55	0.94	0.87	0.02	0.10	0.51	0.00	0.00	0.13	0.0000	0.0000	0.13
Mechanics Truck Ford F550	Off-Highway Trucks	1	6	52	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	945.94	0.99	0.92	0.14	0.96	0.93	0.03	0.03	9.63	0.0009	0.0009	9.89
Water Truck 4000G	Off-Highway Trucks	2	9	71	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	3874.71	0.99	0.92	0.43	2.88	2.78	0.10	0.09	39.44	0.0038	0.0036	40.50
Hyd Drill Sandvick DX6006	Bore/Drill Rigs	2	8	30	225	0.50	0.06	0.56	0.53	0.02	0.02	263.10	0.03	1402.60	0.94	0.87	0.23	2.24	2.12	0.07	0.07	14.28	0.0013	0.0012	14.64
Total Off-Road Emissions																	**4.53**	**35.75**	**33.96**	**1.45**	**1.33**	**245.44**	**0.02**	**0.02**	**251.70**
Maximum Daily Off-Road Emissions																	**2.96**	**22.58**	**21.59**	**0.87**	**0.80**				

Highlighted yellow tabs assumed to operate on a worst-case day; Ford F250/F450 modeled as off-highway trucks conservatively.

On-Road Construction Emissions

On-Road Emissions	One-Way Trips/Day	Trip Distance (one-way)	Daily VMT	Total Trips	Emissions Factors (g/mi)								Emissions (lbs/day)					Metric Tons			
					ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Construction Workers[1]	50	16.8	840	180	0.015904	0.091634	1.014928	0.017483	0.006138	305.5531	0.0037336	0.00743	0.029452	0.169695	1.87953	0.03237741	0.011367	0.923992	1.12903E-05	2.24677E-05	0.930263
End Dumps (Teichert Cool Cave)	16	60.2	963.2	280	0.022646	1.810167	0.114251	0.136748	0.056616	1685.692	0.0010519	0.265581	0.048089	3.84388	0.2426115	0.29038311	0.120223	28.41403	1.77301E-05	0.004476642	29.60083
10-wheelers (Material Delivery Trips)[2]	4	60.2	240.8	80	0.014647	1.605601	0.081725	0.1375	0.058554	1554.686	0.0006803	0.244941	0.007776	0.852371	0.0433857	0.07299527	0.031085	7.487368	3.27638E-06	0.001179638	7.800064
												Maximum Daily On-Road Emissions Totals	0.085317	4.865946	2.1655272	0.39575579	0.162675	36.82539	3.22968E-05	0.005678747	38.33116

Notes:

[1] Assumes maximum daily emissions with 25 workers. Trip distance assumed to be 16.8 miles consistent with CalEEMod Appendix D Data Tables.

[2] Maximum daily emissions estimated based on assumed 2 material delivery trips per day.

Conversion Factors

Ratio of N_2O to CH_4: 0.45

1 lb = 453.592 g

2204.62 lbs = 1 metric ton

GWP CH_4 = 28

GWP N_2O = 265

1 MT = 1000000 g

Maximum Daily Emissions of Cofferdam Design Update - Option 2

Construction Equipment	Equipment Type	Number	Daily Usage (hrs/day)	Total Days of Use	Horsepower	Load Factor	Emissions Factors (g/bhp-hr)						gal/hp-hr	Total Gallons	g/gal		Emissions (lbs/day)					Total Metric Tons			Total MT
							VOC	NO_x	CO	PM_{10}	$PM_{2.5}$	CO_2			CH_4	N_2O	VOC	NO_x	CO	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Artic. Dmp Trk CAT 735	Off-Highway Trucks	4	9	34	424	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	3914.08	0.94	0.87	0.90	6.07	5.86	0.22	0.20	39.85	0.0037	0.0034	40.85
Crane Hydraulic GRT 880	Cranes	1	6	5	275	0.29	0.08	0.91	0.49	0.04	0.03	151.60	0.01	35.40	0.94	0.87	0.09	0.95	0.51	0.04	0.04	0.36	0.0000	0.0000	0.37
Portable Jaw Crusher CRJ3042	Crushing/Proc. Equipment	1	9	30	215	0.78	0.03	0.17	0.31	0.01	0.01	161.03	0.02	716.22	0.94	0.87	0.09	0.57	1.03	0.02	0.02	7.29	0.0007	0.0006	7.48
Dozer CAT XE D6	Rubber Tired Dozers	1	9	55	215	0.40	0.21	2.28	1.50	0.10	0.09	208.49	0.02	871.83	0.94	0.87	0.35	3.90	2.55	0.17	0.16	8.88	0.0008	0.0008	9.10
CAT Dozer D8	Rubber Tired Dozers	1	9	23	354	0.40	0.16	1.59	1.29	0.07	0.06	209.84	0.02	604.20	0.94	0.87	0.45	4.45	3.61	0.20	0.18	6.15	0.0006	0.0005	6.31
CAT 324/326 SLR Excavator	Excavators	1	9	7	201	0.38	0.05	0.43	0.42	0.01	0.01	201.30	0.02	95.63	0.94	0.87	0.08	0.66	0.65	0.02	0.02	0.97	0.0001	0.0001	1.00
CAT 336 Thumb Excavator	Excavators	1	9	56	300	0.38	0.05	0.43	0.42	0.01	0.01	201.30	0.02	1141.83	0.94	0.87	0.12	0.99	0.96	0.03	0.03	11.62	0.0011	0.0010	11.92
CAT 349 Thumb Excavator	Excavators	2	9	47	424	0.38	0.05	0.32	0.40	0.01	0.01	200.75	0.02	2701.42	0.94	0.87	0.30	2.02	2.57	0.07	0.06	27.50	0.0025	0.0024	28.19
CAT 374 Excavator	Excavators	1	9	24	484	0.38	0.05	0.32	0.40	0.01	0.01	200.75	0.02	787.33	0.94	0.87	0.17	1.16	1.47	0.04	0.04	8.01	0.0007	0.0007	8.22
Generator 65-74 KW	Generator Sets	1	10	5	84	0.74	0.05	0.43	1.23	0.04	0.03	161.03	0.02	49.16	0.94	0.87	0.07	0.59	1.69	0.05	0.05	0.50	0.0000	0.0000	0.51
CAT 966 Loader	Rubber Tired Loaders	1	8	63	321	0.36	0.08	0.65	0.49	0.02	0.02	189.82	0.02	1091.41	0.94	0.87	0.16	1.33	1.00	0.05	0.05	11.11	0.0010	0.0009	11.39
CAT 980 Loader	Tractors/Loaders/Backhoes	1	8	38	393	0.37	0.06	0.43	0.45	0.02	0.02	193.29	0.02	839.32	0.94	0.87	0.14	1.09	1.14	0.04	0.04	8.54	0.0008	0.0007	8.76
CAT CS34 Roller	Rollers	1	4.5	71	80	0.38	0.08	0.88	0.57	0.03	0.03	197.64	0.02	186.19	0.94	0.87	0.02	0.26	0.17	0.01	0.01	1.90	0.0002	0.0002	1.94
CAT 140H Motor Grader	Graders	1	4.5	71	187	0.41	0.11	1.19	0.52	0.04	0.04	215.20	0.02	516.20	0.94	0.87	0.08	0.90	0.39	0.03	0.03	5.25	0.0005	0.0004	5.39
Light Tower Vertical Mast 4-6.9KW	Other Construction Equipment	2	10	8	8	0.42	0.13	1.57	1.63	0.07	0.06	179.01	*0.02*	9.35	0.94	0.87	0.02	0.23	0.24	0.01	0.01	0.10	0.0000	0.0000	0.10
Ford F250 Ford Truck	Off-Highway Trucks	2	8	64	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	3104.62	0.94	0.87	0.38	2.56	2.47	0.09	0.08	31.61	0.0029	0.0027	32.40
Ford F450 Flatbed Truck	Off-Highway Trucks	1	5	43	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	*0.02*	651.85	0.94	0.87	0.12	0.80	0.77	0.03	0.03	6.64	0.0006	0.0006	6.80
CAT 277/279 Skid Steer	Skid Steer Loaders	1	6	14	74	0.37	0.41	2.90	1.52	0.29	0.27	192.43	0.02	43.30	0.94	0.87	0.15	1.05	0.55	0.10	0.10	0.44	0.0000	0.0000	0.45
Telehandler CAT TL 1255	Aerial Lifts	1	6	3	142	0.31	0.03	0.18	0.88	0.01	0.01	162.23	0.02	12.55	0.94	0.87	0.02	0.10	0.51	0.00	0.00	0.13	0.0000	0.0000	0.13
Mechanics Truck Ford F550	Off-Highway Trucks	1	6	52	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	945.94	0.99	0.92	0.14	0.96	0.93	0.03	0.03	9.63	0.0009	0.0009	9.89
Water Truck 4000G	Off-Highway Trucks	2	9	71	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	3874.71	0.99	0.92	0.43	2.88	2.78	0.10	0.09	39.44	0.0038	0.0036	40.50
Hyd Drill Sandvick DX6006	Bore/Drill Rigs	2	8	30	225	0.50	0.06	0.56	0.53	0.02	0.02	263.10	0.03	1402.60	0.94	0.87	0.23	2.24	2.12	0.07	0.07	14.28	0.0013	0.0012	14.64
Total Off-Road Emissions																	**4.53**	**35.75**	**33.96**	**1.45**	**1.33**	**240.20**	**0.02**	**0.02**	**246.33**
Maximum Daily Off-Road Emissions																	**2.96**	**22.58**	**21.59**	**0.87**	**0.80**				

Highlighted yellow tabs assumed to operate on a worst-case day; Ford F250/F450 modeled as off-highway trucks conservatively.

On-Road Construction Emissions

On-Road Emissions	One-Way Trips/Day	Trip Distance (one-way)	Daily VMT	Total Trips	Emissions Factors (g/mi)								Emissions (lbs/day)					Metric Tons			
					ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Construction Workers[1]	50	16.8	840	180	0.015904	0.091634	1.014928	0.017483	0.006138	305.5531	0.003734	0.00743	0.029452	0.169695	1.87953	0.03237741	0.011367	0.923992	1.12903E-05	2.24677E-05	0.930263
10-wheelers (Material Delivery Trips)[2]	4	60.2	240.8	80	0.014647	1.605601	0.081725	0.1375	0.058554	1554.686	0.00068	0.244941	0.007776	0.852371	0.0433857	0.07299527	0.031085	7.487368	3.27638E-06	0.001179638	7.800064
												Maximum Daily On-Road Emissions Totals	0.037227	1.022066	1.9229157	0.10537268	0.042452	8.411361	1.45667E-05	0.001202106	8.730327

Notes:

[1] Assumes maximum daily emissions with 25 workers. Trip distance assumed to be 16.8 miles consistent with CalEEMod Appendix D Data Tables.

[2] Maximum daily emissions estimated based on assumed 2 material delivery trips per day.

Conversion Factors

Ratio of N_2O to CH_4: 0.45

1 lb = 453.592 g

2204.62 lbs = 1 metric ton

GWP CH_4 = 28

GWP N_2O = 265

1 MT = 1000000 g

Maximum Daily Emissions of Cofferdam Design Update - Option 1

							Emissions Factors (g/bhp-hr)									g/gal		Emissions (lbs/day)					Total Metric Tons			Total MT
Construction Equipment	Equipment Type	Number	Daily Usage (hrs/day)	Total Days of Use	Horsepower	Load Factor	VOC	NO_x	CO	PM_{10}	$PM_{2.5}$	CO_2	gal/hp-hr	Total Gallons	CH_4	N_2O	VOC	NO_x	CO	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Artic. Dmp Trk CAT 735	Off-Highway Trucks	3	9	40	424	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	3453.60	0.94	0.87	0.68	4.55	4.40	0.16	0.15	35.16	0.0032	0.0030	36.04
Crane Hydraulic GRT 880	Cranes	1	6	5	275	0.29	0.08	0.91	0.49	0.04	0.03	151.60	0.01	35.40	0.94	0.87	0.09	0.95	0.51	0.04	0.04	0.36	0.0000	0.0000	0.37
Portable Jaw Crusher CRJ3042	Crushing/Proc. Equipment	1	9	30	215	0.78	0.03	0.17	0.31	0.01	0.01	161.03	0.02	716.22	0.94	0.87	0.09	0.57	1.03	0.02	0.02	7.29	0.0007	0.0006	7.48
Dozer CAT XE D6	Rubber Tired Dozers	1	9	47	215	0.40	0.21	2.28	1.50	0.10	0.09	208.49	0.02	745.02	0.94	0.87	0.35	3.90	2.55	0.17	0.16	7.58	0.0007	0.0006	7.78
CAT Dozer D8	Rubber Tired Dozers	1	9	23	354	0.40	0.16	1.59	1.29	0.07	0.06	209.84	0.02	604.20	0.94	0.87	0.45	4.45	3.61	0.20	0.18	6.15	0.0006	0.0005	6.31
CAT 324/326 SLR Excavator	Excavators	1	9	7	201	0.38	0.05	0.43	0.42	0.01	0.01	201.30	0.02	95.63	0.94	0.87	0.08	0.66	0.65	0.02	0.02	0.97	0.0001	0.0001	1.00
CAT 336 Thumb Excavator	Excavators	1	9	49	300	0.38	0.05	0.43	0.42	0.01	0.01	201.30	0.02	999.10	0.94	0.87	0.12	0.99	0.96	0.03	0.03	10.17	0.0009	0.0009	10.43
CAT 349 Thumb Excavator	Excavators	2	9	93	424	0.38	0.05	0.32	0.40	0.01	0.01	200.75	0.02	5345.37	0.94	0.87	0.30	2.02	2.57	0.07	0.06	54.42	0.0050	0.0047	55.79
CAT 374 Excavator	Excavators	1	9	24	484	0.38	0.05	0.32	0.40	0.01	0.01	200.75	0.02	787.33	0.94	0.87	0.17	1.16	1.47	0.04	0.04	8.01	0.0007	0.0007	8.22
Generator 65-74 KW	Generator Sets	1	10	5	84	0.74	0.05	0.43	1.23	0.04	0.03	161.03	0.02	49.16	0.94	0.87	0.07	0.59	1.69	0.05	0.05	0.50	0.0000	0.0000	0.51
CAT 966 Loader	Rubber Tired Loaders	1	8	56	321	0.36	0.08	0.65	0.49	0.02	0.02	189.82	0.02	970.15	0.94	0.87	0.16	1.33	1.00	0.05	0.05	9.88	0.0009	0.0008	10.13
CAT 980 Loader	Tractors/Loaders/Backhoes	1	8	38	393	0.37	0.06	0.43	0.45	0.02	0.02	193.29	0.02	839.32	0.94	0.87	0.14	1.09	1.14	0.04	0.04	8.54	0.0008	0.0007	8.76
CAT CS34 Roller	Rollers	1	4.5	93	80	0.38	0.08	0.88	0.57	0.03	0.03	197.64	0.02	243.88	0.94	0.87	0.02	0.26	0.17	0.01	0.01	2.48	0.0002	0.0002	2.55
CAT 140H Motor Grader	Graders	1	4.5	93	187	0.41	0.11	1.19	0.52	0.04	0.04	215.20	0.02	676.15	0.94	0.87	0.08	0.90	0.39	0.03	0.03	6.88	0.0006	0.0006	7.06
Light Tower Vertical Mast 4-6.9KW	Other Construction Equipment	2	10	8	8	0.42	0.13	1.57	1.63	0.07	0.06	179.01	*0.02*	9.35	0.94	0.87	0.02	0.23	0.24	0.01	0.01	0.10	0.0000	0.0000	0.10
Ford F250 Ford Truck	Off-Highway Trucks	2	8	64	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	3104.62	0.94	0.87	0.38	2.56	2.47	0.09	0.08	31.61	0.0029	0.0027	32.40
Ford F450 Flatbed Truck	Off-Highway Trucks	1	5	43	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	*0.02*	651.85	0.94	0.87	0.12	0.80	0.77	0.03	0.03	6.64	0.0006	0.0006	6.80
CAT 277/279 Skid Steer	Skid Steer Loaders	1	6	14	74	0.37	0.41	2.90	1.52	0.29	0.27	192.43	0.02	43.30	0.94	0.87	0.15	1.05	0.55	0.10	0.10	0.44	0.0000	0.0000	0.45
Telehandler CAT TL 1255	Aerial Lifts	1	6	3	142	0.31	0.03	0.18	0.88	0.01	0.01	162.23	0.02	12.55	0.94	0.87	0.02	0.10	0.51	0.00	0.00	0.13	0.0000	0.0000	0.13
Mechanics Truck Ford F550	Off-Highway Trucks	1	6	52	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	945.94	0.99	0.92	0.14	0.96	0.93	0.03	0.03	9.63	0.0009	0.0009	9.89
Water Truck 4000G	Off-Highway Trucks	2	9	71	402	0.38	0.07	0.47	0.46	0.02	0.02	201.04	0.02	3874.71	0.99	0.92	0.43	2.88	2.78	0.10	0.09	39.44	0.0038	0.0036	40.50
Hyd Drill Sandvick DX6006	Bore/Drill Rigs	2	8	30	225	0.50	0.06	0.56	0.53	0.02	0.02	263.10	0.03	1402.60	0.94	0.87	0.23	2.24	2.12	0.07	0.07	14.28	0.0013	0.0012	14.64
Total Off-Road Emissions																	**4.30**	**34.23**	**32.49**	**1.39**	**1.28**	**260.66**	**0.02**	**0.02**	**267.31**
Maximum Daily Off-Road Emissions																	**2.74**	**21.07**	**20.12**	**0.82**	**0.75**				

Highlighted yellow tabs assumed to operate on a worst-case day; Ford F250/F450 modeled as off-highway trucks conservatively.

On-Road Construction Emissions

					Emissions Factors (g/mi)								Emissions (lbs/day)					Total Metric Tons			
On-Road Emissions	One-Way Trips/Day	Trip Distance (one-way)	Daily VMT	Total Trips	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
Construction Workers[1]	50	16.8	840	180	0.015904	0.091634	1.014928	0.017483	0.006138	305.5531	0.003734	0.00743	0.029452	0.169695	1.87953	0.03237741	0.011367	0.923992	1.12903E-05	2.24677E-05	0.930263
10-wheelers (Material Delivery Trips)[2]	4	60.2	240.8	80	0.014647	1.605601	0.081725	0.1375	0.058554	1554.686	0.00068	0.244941	0.007776	0.852371	0.0433857	0.07299527	0.031085	7.487368	3.27638E-06	0.001179638	7.800064
												Maximum Daily On-Road Emissions Totals	0.037227	1.022066	1.9229157	0.10537268	0.042452	8.411361	1.45667E-05	0.001202106	8.730327

Notes:

[1] Assumes maximum daily emissions with 25 workers. Trip distance assumed to be 16.8 miles consistent with CalEEMod Appendix D Data Tables.

[2] Maximum daily emissions estimated based on assumed 2 material delivery trips per day.

Conversion Factors

Ratio of N_2O to CH_4: 0.45

1 lb = 453.592 g

2204.62 lbs = 1 metric ton

GWP CH_4 = 28

GWP N_2O = 265

1 MT = 1000000 g

Paved Roads Fugitive Dust Emissions
Paved Roads 100%

Option 3

Maximum Daily Emissions - Haul Trucks	Vehicle Type	No. of Trips	Miles Per Day	Paved Road Dust Emissions (lbs/day)	
				PM10 (lbs/day)	PM2.5 (lbs/day)
End Dumps (Teichert Cool Cave)	Dump Truck	16	963	0.18	0.04
10-Wheelers (Material Delivery Trips)	Haul Truck/Material Truck	4	241	0.04	0.01
Maximum Daily Paved Road Dust from Haul Trucks	**-**	**-**	**-**	**0.22**	**0.05**

Maximum Daily Emissions – Worker Trips	Vehicle Type	No. of Trips	Miles Per Day	Paved Road Dust Emissions (lbs/day)	
				PM10 (lbs/day)	PM2.5 (lbs/day)
Construction Workers	Worker/Pick Up	50	840	0.15	0.04

Maximum Daily Paved Road Dust from Worker + Haul Trucks
0.3754 lbs/day PM_{10}
0.0921 lbs/day $PM_{2.5}$

Option 2

Maximum Daily Emissions - Haul Trucks	Vehicle Type	No. of Trips	Miles Per Day	Paved Road Dust Emissions (lbs/day)	
				PM10 (lbs/day)	PM2.5 (lbs/day)
10-Wheelers (Material Delivery Trips)	Haul Truck/Material Truck	4	241	0.04	0.01
Maximum Daily Paved Road Dust from Haul Trucks	**-**	**-**	**-**	**0.04**	**0.01**

Maximum Daily Emissions – Worker Trips	Vehicle Type	No. of Trips	Miles Per Day	Paved Road Dust Emissions (lbs/day)	
				PM10 (lbs/day)	PM2.5 (lbs/day)
Construction Workers	Worker/Pick Up	50	840	0.15	0.04

Maximum Daily Paved Road Dust from Worker + Haul Trucks
0.1985 lbs/day PM_{10}
0.0487 lbs/day $PM_{2.5}$

Option 1

Maximum Daily Emissions - Haul Trucks	Vehicle Type	No. of Trips	Miles Per Day	Paved Road Dust Emissions (lbs/day)	
				PM10 (lbs/day)	PM2.5 (lbs/day)
10-Wheelers (Material Delivery Trips)	Haul Truck/Material Truck	4	241	0.04	0.01
Maximum Daily Paved Road Dust from Haul Trucks	**-**	**-**	**-**	**0.04**	**0.01**

Maximum Daily Emissions – Worker Trips	Vehicle Type	No. of Trips	Miles Per Day	Paved Road Dust Emissions (lbs/day)	
				PM10 (lbs/day)	PM2.5 (lbs/day)
Construction Workers	Worker/Pick Up	50	840	0.15	0.04

Maximum Daily Paved Road Dust from Worker + Haul Trucks
0.1985 lbs/day PM_{10}
0.0487 lbs/day $PM_{2.5}$

Offsite Trips

Trip Types	Distance (miles)
Worker Vehicles	16.8
General Delivery Trips	52
10-Wheelers (Aggregate Material Delivery Trips)	52
Concrete Truck Trips	23

Notes/Assumptions:
PM emissions include offsite travel. Onsite travel assumed to be unpaved roads.
Paved Road Dust: $EF_{DUST} = [(k(sL)^{0.91} \times (W)^{1.02}](1 - P/4N))$

Variable	Value	Description
k (PM10)	0.0022	particle size multiplier for particle size range and units of interest (lb/VMT)
k (PM2.5)	0.00054	particle size multiplier for particle size range and units of interest (lb/VMT)
sL	0.015	road surface silt loading (g/m^2) based on EPA 2011 default for freeways (https://ww3.arb.ca.gov/ei/areasrc/fullpdf/full7-9_2016.pdf)
W	3.93	average weight of all vehicles based on weighted average of trip types
P	80	number of "wet" days with at least 0.254 mm of precipitation during the averaging period
N	365	number of days in averaging period

Source: AP-42 Section 13.2.1 (Paved Roads) - http://www.epa.gov/ttnchie1/ap42/ch13/final/c13s0201.pdf

Trip Type	lb/VMT
All Vehicles – EF (PM_{10})	0.000183663
All Vehicles – EF ($PM_{2.5}$)	4.50809E-05
Haul Truck – EF (PM_{10})	0.000183663
Haul Truck – EF ($PM_{2.5}$)	4.50809E-05

Conversion Units
2000 lbs = 1 ton

Vehicle Type	Total Trips	Percent	Weight (tons)
Worker	30,500	87.6%	2.4
Trucks	4,300	12.4%	14.75
Total	**34,800**	**Average Weight**	**3.93**

Fugitive Dust - Unpaved Roads

Option 3

Maximum Daily Fugitive Dust Emissions	Miles/Trip	Max Trips Per Day	Surface Type	Surface Silt Content (%)	Vehicle Weight (tons)	Uncontrolled Emission Factors (lb/mi)[b]		Uncontrolled Emission Factors (lbs/day)[c]		Control Efficiency[d]	Controlled Emissions (lbs/day)[e]	
						PM10	PM2.5	PM10	PM2.5		PM10	PM2.5
Worker	4.46	50	Unpaved	3.9	2.4	0.49	0.05	110.03	11.0028	83%	18.452	1.845
Truck	6.33	16	Unpaved	3.9	14.75	1.12	0.11	113.13	11.3128	83%	18.972	1.897
Truck	6.33	4	Unpaved	3.9	14.75	1.12	0.11	28.28	2.8282	83%	4.743	0.474
Total Maximum Daily Emissions	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**251.44**	**25.14**	**-**	**42.17**	**4.22**

Option 2

Maximum Daily Fugitive Dust Emissions	Miles/Trip	Max Trips Per Day	Surface Type	Surface Silt Content (%)	Vehicle Weight (tons)	Uncontrolled Emission Factors (lb/mi)[b]		Uncontrolled Emission Factors (lbs/day)[c]		Control Efficiency[d]	Controlled Emissions (lbs/day)[e]	
						PM10	PM2.5	PM10	PM2.5		PM10	PM2.5
Worker	4.46	50	Unpaved	3.9	2.4	0.49	0.05	110.03	11.0028	83%	18.452	1.845
Truck	6.33	4	Unpaved	3.9	14.75	1.12	0.11	28.28	2.8282	83%	4.743	0.474
Total Maximum Daily Emissions	-	-	-	-	-	-	-	**138.31**	**13.83**	-	**23.19**	**2.32**

Option 1

Maximum Daily Fugitive Dust Emissions	Miles/Trip	Max Trips Per Day	Surface Type	Surface Silt Content (%)	Vehicle Weight (tons)	Uncontrolled Emission Factors (lb/mi)[b]		Uncontrolled Emission Factors (lbs/day)[c]		Control Efficiency[d]	Controlled Emissions (lbs/day)[e]	
						PM10	PM2.5	PM10	PM2.5		PM10	PM2.5
Worker	4.46	50	Unpaved	3.9	2.4	0.49	0.05	110.03	11.0028	83%	18.452	1.845
Truck	6.33	4	Unpaved	3.9	14.75	1.12	0.11	28.28	2.8282	83%	4.743	0.474
Total Maximum Daily Emissions	-	-	-	-	-	-	-	**138.31**	**13.83**	-	**23.19**	**2.32**

Notes:

Totals may not match sum of individual values because of rounding.

[a] Unpaved surface silt content from USEPA, AP-42, Section 13.2.2 Unpaved Roads - Related Information Surface Material Silt Content by State.

[b] Equations: EF (unpaved) = $k_u(s/12)^a(W/3)^b$ (Ref: AP-42, Section 13.2.2, "Unpaved Roads," November 2006).

[c] Uncontrolled emissions [lb/day] = Emission factor [lb/mi] x Number x Daily miles traveled [mi/vehicle-day].

[d] Control efficiency from watering unpaved road three times per day (61%) and limiting maximum speed to 15 mph (57%), from Table XI-A, Mitigation Measure Examples, Fugitive Dust from Construction & Demolition, http://www.aqmd.gov/ceqa/handbook/mitigation/fugitive/MM_fugitive.html.

[e] Controlled emissions [lb/day] = Uncontrolled emissions [lb/day] x (1 - Control efficiency [%]).

Assumptions:
Due to the limited space at the Fordyce Dam work site, travel on unpaved roads for construction workers is assumed to be approximately 23,550 feet (distance between entrance of access road and intersection of Lake Fordyce and Magonigal Rd).
Truck trip lengths on unpaved roads assumed to be average of the distances between the entrance of the access road to the intersection of Lake Fordyce and Magonigal Rd (23550 feet) and entire access road length. For example, it is likely that highway trucks would only deliver materials to a staging area to transfer materials to vehicles more suitable for negotiating tighter turns.

Constant for Industrial Roads	Particle Size Multiplier for PM_{10}	Particle Size Multiplier for $PM_{2.5}$
k_u	1.5	0.15
a	0.9	0.9
b	0.45	0.45

Conversion Factors
Ration of N_2O to CH_4: 0.45
1 lb = 453.592 g
2204.62 lbs = 1 metric ton
2000 lbs = 1 ton
1 ton = 0.907185 metric ton

Crew Boat Emissions
Blend of CARB 2021 Update to CHC Methodology and SMAQMD Tool

Type of Boat and Engine Type (Main Engine or Auxiliary Engine)	Year[1]	Horsepower[2]	Load Factor[3]	EF_0[4] (g/hp-hr)					DF[5]					Age/UL	EF (g/hp-hr)				
				ROG	NOx	CO	PM10	PM2.5	ROG	NOx	CO	PM10	PM2.5		ROG	NOx	CO	PM10	PM2.5
Crew Boat - Main Engine	2019	100	0.26	1.198	5.32	3.73	0.22	0.202	0.28	0.14	0.16	0.44	0.4	0.18	1.2579	5.453	3.836571429	0.237285714	0.216428571
Crew Boat - Auxiliary Engine	1996	83	0.40	2.073	13	4.944	0.706	0.649	0.28	0.14	0.16	0.44	0.4	1.00	2.65344	14.82	5.73504	1.01664	0.9086

Notes:
[1] Crew boat main engine assumed to be maximum 5 years old based on information provided by engineer. Engine model years based on SMAQMD_HC _Calculator_30June2017.
[2] Main engine HP based on data provided project engineer; auxiliary engine HP based on SMAQMD_HC _Calculator_30June2017.
[3] Load factor based on CARB Appendix H, 2021 Update to the Emission Inventory for Commercial Harbor Craft: Methodology and Results (https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/chc2021/apph.pdf).

[4] Zero-hour EF based on SMAQMD_HC _Calculator_30June2017 (CARB Methodology does not have EF_0 by vessel type, only by Tier, and Tier is unknown).
[5] Engine DF based on SMAQMD_HC _Calculator_30June2017, CARB Methodology only provides DF for NOx and PM.
[6] Age/UL based on model year as noted in Note 1, construction start year of 2024, and useful life based on SMAQMD_HC_Calculator_30June2017.

Type of Boat and Engine Type (Main Engine or Auxiliary Engine)	Number of Engines	Daily Hours of Use	Emissions (lbs/day)				
			ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Crew Boat - Main Engine	3	4	0.865236719	3.750803585	2.63895578	0.163215131	0.148868707
Crew Boat - Auxiliary Engine	1	4	0.776857884	4.338908677	1.679069826	0.297645622	0.266014334
Total Emissions	**-**	**-**	**1.642094603**	**8.089712261**	**4.318025606**	**0.460860753**	**0.414883041**

Notes: Total emissions calculated using EF above, load factor, horsepower, and total hours of use.
Number of engines based on SMAQMD_HC_Calculator_30June2017.

Type of Boat and Engine Type (Main Engine or Auxiliary Engine)	g/hr[1]				Daily Hours of Use	Days of Use	MT CO_2e
	CO_2	CH_4	N_2O	CO_2e			
Crew Boat - Main Engine	56149.23239	2.277658457	0.455531691	56333.72272	4	5	1.126674454
Crew Boat - Auxiliary Engine	17314.61073	0.702356344	0.140471269	17371.5016	4	5	0.347430032
Total Emissions	**-**	**-**	**-**	**-**	**-**	**-**	**1.474104486**

[1] Gram/hour rates based on SMAQMD_HC _Calculator_30June2017.

In this inventory, emission factors of diesel particulate matter (DPM), NOx, CO, and HC are determined using the following equation:

$$EF = EF_0(1 + DF \times Age/UL)$$

Variables:
EF_0 specific zero hour emission factor
DF deterioration factor
A age of engine when emissions are estimated
UL engine useful life
HP horsepower

LF load factor
Hr operating hours

Constants:
1 year = 365 days
1 lb = 453.5924 grams
1 ton = 2000 lbs
1 metric ton = 1000000 grams
GWP CH_4 = 28
GWP N_2O = 265

Barge Tug Boat Emissions
Blend of CARB 2021 Update to CHC Methodology and SMAQMD Tool

Type of Boat and Engine Type (Main Engine or Auxiliary Engine)	Year[1]	Horsepower[2]	Load Factor[3]	EF_0[4] (g/hp-hr)					DF[5]					Age/UL	EF (g/hp-hr)				
				ROG	NOx	CO	PM10	PM2.5	ROG	NOx	CO	PM10	PM2.5		ROG	NOx	CO	PM10	PM2.5
Tug Boat - Main Engine	2019	250	0.33	0.68	3.99	3.73	0.08	0.074	0.28	0.14	0.16	0.44	0.4	0.2	0.725333333	4.123	3.872095238	0.088381	0.081047619
Tug Boat - Auxiliary Engine	2001	86	0.37	1.178	7.31	3.595	0.58	0.533	0.28	0.14	0.16	0.44	0.4	1	1.50784	8.3334	4.1702	0.8352	0.7462

Notes:
[1] Tug boat main engine assumed to be maximum 5 years old based on information provided by engineer. Engine model year for aux engine based on SMAQMD_HC _Calculator_30June2017.
[2] Main engine HP based on 2023May23 email re: tug details, and aux engine HP based on SMAQMD_HC _Calculator_30June2017.
[3] Load factor based on CARB Appendix H, 2021 Update to the Emission Inventory for Commercial Harbor Craft: Methodology and Results (https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/chc2021/apph.pdf).
[4] Zero-hour EF based on SMAQMD_HC _Calculator_30June2017 (CARB Methodology does not have EF0 by vessel type, only by Tier, and Tier is unknown).
[5] Engine DF based on SMAQMD_HC _Calculator_30June2017, CARB Methodology only provides DF for NOx and PM.
[6] Age/UL based on model year as noted in Note 1, construction start year of 2024, and useful life based on SMAQMD_HC_Calculator_30June2017.

Type of Boat and Engine Type (Main Engine or Auxiliary Engine)	Number of Engines	Daily Hours of Use	Emissions (lbs/day)				
			ROG	NOx	CO	PM_{10}	$PM_{2.5}$
Tug Boat - Main Engine	2	6	1.583095308	8.999	8.451	0.1929	0.17689
Tug Boat - Auxiliary Engine	2	6	1.269319384	7.015	3.511	0.70308	0.62816
Total Emissions	**-**	**-**	**2.852414691**	**16.01**	**11.96**	**0.89598**	**0.80505**

Notes: Total emissions calculated using EF above, load factor, horsepower, and total hours of use.
Number of engines based on SMAQMD_HC_Calculator_30June2017.

Type of Boat and Engine Type (Main Engine or Auxiliary Engine)	g/hr[1]				Daily Hours of Use	Days of Use	MT CO_2e
	CO_2	CH_4	N_2O	CO_2e			
Tug Boat - Main Engine	140373.081	5.694146142	1.138829228	140834.3068	6	5	4.225029204
Tug Boat - Auxiliary Engine	25242.78342	1.023957705	0.204791541	25325.72399	6	5	0.75977172
Total Emissions	**-**	**-**	**-**	**-**	**-**	**-**	**4.984800924**

[1] Gram/hour rates based on SMAQMD_HC _Calculator_30June2017.

In this inventory, emission factors of diesel particulate matter (DPM), NOx, CO, and HC are determined using the following equation:

$$EF = EF_0(1 + DF \times Age/UL)$$

Variables:

EF_0 specific zero hour emission factor
DF deterioration factor
A age of engine when emissions are estimated
UL engine useful life
HP horsepower
LF load factor
Hr operating hours

Constants:
1 year = 365 days
1 lb = 453.5924 grams
1 ton = 2000 lbs
1 metric ton = 1000000 grams
GWP CH_4 = 28
GWP N_2O = 265

Blasting Emissions
Approximate number of blasts per day: 1
Number of Days Blasting to Occur: 15
Explosive (lbs) per blast: 3300

Rock material:
Assumed pounds/cubic yard*: 999
Pounds per ton: 2000
*Source: EPA 2016. Volume to Weight Conversion Factors. https://www.epa.gov/sites/production/files/2016-04/documents/volume_to_weight_conversion_factors_memorandum_04192016_508fnl.pdf.

Daily Emissions from Blasting (lbs)

NOx (from explosives)	CO (from explosives)	PM_{10} (from rock)	$PM_{2.5}$ (from rock)	SOx (from explosives)
28.05	110.55	0.007	0.007	3.3

Total Emissions from Blasting (tons)

NOx (from explosives)	CO (from explosives)	PM_{10} (from rock)	$PM_{2.5}$ (from rock)	SOx (from explosives)
0.210375	0.829125	0.0000525	0.0000525	0.02475

Total GHG Emissions from Blasting: 4.15 MT CO_2e

Emissions Per Blast (lbs)

NOx (from explosives)	CO (from explosives)	PM_{10} (from rock)	$PM_{2.5}$ (from rock)	SOx (from explosives)
28.05	110.55	0.007	0.007	3.3

AP-42, Section 13.3, Table 13.3-1 for ANFO.

Pollutant	Emission Factor	Units
ROG	-	-
NOX	17	lb/ton explosives
CO	67	lb/ton explosives
SOX	2	lb/ton explosives
PM_{10}	-	-

Table 13.3-1 (cont.).

Explosive	Composition	Uses	Carbon Monoxide[a]		Nitrogen Oxides[a]		Methane[b]		Other		
			kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	Pollutant	kg/Mg	lb/ton
ANFO[4,5]	Ammonium nitrate with 5.8-8% fuel oil	Construction work, blasting in mines	34	67	8	17	ND	ND	SO_2	1 (0-2)	2 (1-3)
TNT[2]	Trinitrotoluene	Main charge in artillery projectiles, mortar rounds, etc.	398 (324-472)	796 (647-944)	ND	ND	7.2 (6.6-7.7)	14.3 (13.2-15.4)	NH_3	14 (14-15)	29 (27-30)
									HCN	13 (11-16)	27 (22-32)
									C_2H_2	61	121
									C_2H_6	0.5	1.1
RDX[3]	$(CH_2)_3N_3(NO_2)_3$ Cyclotri-methylene-trinitroamine	Booster	98[d] (2.8-277)	196[d] (5.6-554)	ND	ND	ND	ND	NH_3	22[d] (12-61)	44[d] (24-122)
PETN[2]	$C(CH_2ONO_2)_4$ Pentaerythritol tetranitrate	Booster	149 (138-160)	297 (276-319)	ND	ND	ND	ND	NH_3	1.3 (0-25)	2.5 (0-5)

[a] Based on experiments carried out prior to 1930 except in the case of ANFO, TNT, and PETN. ND = no data.
[b] The factors apply to the chemical species, methane. They do not represent total volatile organic compounds (VOC) expressed as methane. Studies were carried out more than 40 years ago.
[c] Greater than 6 mg per 158 grain projectile (0.6 kg/Mg, 1.2 lb/ton).
[d] These factors are derived from theoretical calculations, not from experimental data.

San Diego County Drilling and Blasting Operations Blast Area PM Emissions:

Blast Area	Typical Dimensions	Blasted Material	lbs TSP/Blast	lbs PM10/Blast
100 ft2	20' x 5' x 50'd	370 tons	0.014 lbs	0.007 lbs
1,000 ft2	50' x 20' x 50'd	3,700 tons	0.44 lbs	0.23 lbs
10,000 ft2	200' x 50' x 50'd	37,000 tons	14 lbs	7.3 lbs
100,000 ft2	1,000' x 100' x 50'd	370,000 tons	442.7 lbs	230.2 lbs

GHG Emissions Calculation Comparison:

Pollutant	Source	Emission Factor	Units
CO_2	1	10.35	kg/gallon

Source/Reference:
The Climate Registry. 2018 Emission Factors. Table 12.1 U.S. Default Factors for Calculating CO2 Emissions from Combustion of Fossil Fuel and Biomass.

Conversion Values:
7.41 lbs/gallon fuel oil
6.00% composition of fuel oil #2 in ANFO
10.35 kg CO_2/gallon fuel oil #2
2000 lbs/ton
1000 kg/MT
1.102 tons/MT

Notes:
MT = metric tons
kg = kilograms
lb = pounds

Fugitive Dust Emissions

Truck Loading and Stockpiling

Material Import Quantities	Excavation (cubic yards)	Fill Volume (cubic yards)
Cofferdam: permanent (large rock)	-	16,500
Cofferdam: surficial mud, sand, and gravel	1,100	-

Source: Section 1.1.4 of PD.

Assumptions for Season 2

Material	Excavation (CY)	Excavation (tons)	Import (CY)	Import (tons)	Percentage of Total based on Truck Trips
Rock (cofferdam)	0	0	16,500	36,754	100
Saturated soil	1,100	1,391	0	0	100

Emissions from Stockpiling and Truck Loading Soils Per Season (Season 2)

Material	PM_{10} (lbs)	$PM_{2.5}$ (lbs)
Rock (cofferdam)	5.89	0.89
Saturated soil	0.12	0.018798
Total	**6.01**	**0.91**

Days per season: 87
Assumption: Worst-case daily emissions would occur during construction of the cofferdam, which will occur in Season 2.

Maximum daily emissions:
PM_{10}: 0.06902 lbs/day
$PM_{2.5}$: 0.01045 lbs/day

Storage Pile and Truck Loading Fugitive Dust Emission Factors
$EF_D = k \times (0.0032) \times ((U/5)^{1.3})/((M/2)^{1.4})$

Variable	Amount	Units	Notes
EF (PM_{10}) for aggregate/rock	0.00016	lb/ton	-
EF ($PM_{2.5}$) for aggregate/rock	0.000024	lb/ton	-
EF (PM_{10}) for saturated soil	0.000089	lb/ton	-
EF ($PM_{2.5}$) for saturated soil	0.000014	lb/ton	-
k (PM_{10})	0.35	factor	-
k ($PM_{2.5}$)	0.053	factor	-
U (mean wind speed)	4.92	miles/hr	Based on CalEEMod Default for Nevada County of 2.2 m/s.
M (moisture content) of saturated soil	12.00	percent	Based on default moisture content in CalEEMod (Appendix D).
M (moisture content) of aggregate	7.90	percent	USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations.
Soil density (CalEEMod default)	1.26	tons/cy	-
Aggregate density	1.34	tons/cy	Based on 1750 kg/m^3, https://civiltoday.com/civil-engineering-materials/aggregate/198-density-of-aggregate.
Rip rap density	2.23	tons/cy	-
Derrick/Grouted stone density	1.96	tons/cy	-

Maximum Daily Earthwork Emissions

Equipment	Quantity	Hours	Total Activity Level	Unmitigated Daily Emissions (lbs/day)		Mitigated Daily Emissions (lbs/day)	
				PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
Rubber Tired Dozer	2	9	18.00	13.55	7.47	6.10	3.36
Grader	1	5	5.00	3.76	2.07	1.69	0.93
Total Earthwork Emissions	**-**	**-**	**-**	**17.31**	**9.54**	**7.79**	**4.29**

Bulldozing, Scraping, and Grading

PM_{10} Emission Factor [lb/hr] = 0.75 x (silt content [%])$^{1.5}$ / (moisture)$^{1.4}$
$PM_{2.5}$ Emission Factor [lb/hr] = 0.60 x (silt content [%])$^{1.2}$ / (moisture)$^{1.3}$
Reference: AP-42, Table 11.9-1, July 1998

Parameter	Value	Basis
Silt Content	6.9	USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations
Moisture	7.9	USEPA, AP-42, July 1998, Table 11.9-3 Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations

PM_{10} Emission Factor: 0.75 lb/hr
$PM_{2.5}$ Emission Factor: 0.41 lb/hr

Emissions [pounds per day] = Controlled emission factor [pounds per hour] x Bulldozing, scraping or grading time [hours/day].

Conversion Factors
1 ton = 2000 pounds
27 cubic feet = 1 cubic yard

Model Output: OFFROAD2021 (v1.0.4) Emissions Inventory
Region Type: County
Region: Nevada
Calendar Year: 2024
Model Year: Aggregate
Scenario: All Adopted Rules - Exhaust
Vehicle Classification: OFFROAD2021 Equipment Types
Units: tons/day for Emissions, gallons/year for Fuel, hours/year for Activity, Horsepower-hours/year for Horsepower-hours

Constants:
1 year = 365 days
1 lb = 453.5924 grams
1 ton = 2000 lbs

	CH_4 (g/gal)	N_2O (g/gal)
Diesel Equipment	0.94	0.87
Diesel Off-Road Trucks	0.99	0.92

Source: The Climate Registry 2022 Default Emission Factors
https://theclimateregistry.org/wp-content/uploads/2022/11/2022-Default-Emission-Factors-Final.pdf.

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Bore/Drill Rigs	100	Diesel	0.083055084	0.980743648	1.64661347	0.036360414	0.033451581	261.3529126	0.025673
Construction and Mining - Bore/Drill Rigs	175	Diesel	0.063273998	0.522909591	1.48748961	0.02391315	0.022000098	266.6782088	0.026196
Construction and Mining - Bore/Drill Rigs	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Bore/Drill Rigs	300	Diesel	0.058163994	0.561823292	0.53160783	0.018231757	0.016773217	263.101165	0.025845
Construction and Mining - Bore/Drill Rigs	50	Diesel	0.309000451	2.110932026	2.19821084	0.111209273	0.102312532	300.0561729	0.029475

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Bore/Drill Rigs	600	Diesel	0.049783244	0.386310363	0.49349379	0.013911727	0.012798789	261.7966593	0.025717
Construction and Mining - Bore/Drill Rigs	75	Diesel	0.111765177	1.660433779	1.65618155	0.080367925	0.073938491	259.8742962	0.025528
Construction and Mining - Bore/Drill Rigs	750	Diesel	0.039446161	0.281632684	0.48570759	0.010845394	0.009977763	266.9299206	0.026221
Construction and Mining - Bore/Drill Rigs	9999	Diesel	0.08504889	1.936604572	0.49773917	0.044729617	0.041151248	264.1122255	0.025944
Construction and Mining - Cranes	100	Diesel	0.137644412	1.233870217	1.10935304	0.077439721	0.071244543	151.2304106	0.014856
Construction and Mining - Cranes	175	Diesel	0.113428999	1.091910189	0.97914424	0.059022125	0.054300355	151.8444221	0.014916
Construction and Mining - Cranes	25	Diesel	0.355859791	1.401287202	1.64858955	0.110054942	0.101250547	168.5709225	0.016559
Construction and Mining - Cranes	300	Diesel	0.084676452	0.907614825	0.48527307	0.037853637	0.034825346	151.6046346	0.014892
Construction and Mining - Cranes	50	Diesel	0.583768909	1.723602625	2.17143055	0.17371841	0.159820937	170.2746579	0.016726
Construction and Mining - Cranes	600	Diesel	0.060574126	0.613818411	0.48407542	0.024699627	0.022723657	151.5946409	0.014891
Construction and Mining - Cranes	75	Diesel	0.383356535	2.871421504	1.32000556	0.270379424	0.24874907	152.631805	0.014993
Construction and Mining - Cranes	750	Diesel	0.111446494	1.128353889	0.83121756	0.055868122	0.051398672	151.5340728	0.014885
Construction and Mining - Cranes	9999	Diesel	0.165291823	1.970559138	1.41010789	0.087374663	0.08038469	151.6045845	0.014892
Construction and Mining - Crawler Tractors	100	Diesel	0.214478697	1.845923696	1.63237014	0.140518302	0.129276838	226.1345654	0.022214
Construction and Mining - Crawler Tractors	175	Diesel	0.140138417	1.307596402	1.38431416	0.073262853	0.067401824	225.6581929	0.022167

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Crawler Tractors	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Crawler Tractors	300	Diesel	0.131883932	1.453883428	0.78049048	0.060230353	0.055411925	225.60506	0.022162
Construction and Mining - Crawler Tractors	50	Diesel	0.76204823	2.1590447	2.90100516	0.202202132	0.186025961	249.5754924	0.024516
Construction and Mining - Crawler Tractors	600	Diesel	0.085147976	0.829700772	0.62723741	0.032579253	0.029972913	225.8017439	0.022181
Construction and Mining - Crawler Tractors	75	Diesel	0.835148973	6.613906793	2.70735409	0.484919483	0.446125924	225.474915	0.022149
Construction and Mining - Crawler Tractors	750	Diesel	0.192358454	2.387957109	1.17340654	0.086725466	0.079787429	224.3686034	0.02204
Construction and Mining - Crawler Tractors	9999	Diesel	0.123161402	2.198224947	0.6439927	0.054856071	0.050467585	227.3283616	0.022331
Construction and Mining - Excavators	100	Diesel	0.079243587	0.828869618	1.31946946	0.035891723	0.033020385	200.1207781	0.019658
Construction and Mining - Excavators	175	Diesel	0.065632364	0.510914958	1.17778922	0.025307374	0.023282784	201.1288664	0.019757
Construction and Mining - Excavators	25	Diesel	1.517855264	2.895220336	4.26241918	0.403506978	0.37122642	223.7107136	0.021976
Construction and Mining - Excavators	300	Diesel	0.053962879	0.434621393	0.42383703	0.014202765	0.013066544	201.301131	0.019774
Construction and Mining - Excavators	50	Diesel	0.158513731	1.337134864	1.60269761	0.04550584	0.041865372	223.7247903	0.021977
Construction and Mining - Excavators	600	Diesel	0.046205764	0.31502174	0.39964275	0.010828832	0.009962525	200.7495466	0.01972
Construction and Mining - Excavators	75	Diesel	0.269500973	2.440011035	1.56638558	0.213448283	0.19637242	201.0085213	0.019745
Construction and Mining - Excavators	750	Diesel	0.074642834	0.781781768	0.59852458	0.031030162	0.028547749	202.205428	0.019863

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Excavators	9999	Diesel	0.030784571	0.900724669	0.37889457	0.008134323	0.007483577	203.2868147	0.019969
Construction and Mining - Graders	100	Diesel	0.283252085	2.239074991	1.71634644	0.169819031	0.156233508	213.4522223	0.020968
Construction and Mining - Graders	175	Diesel	0.147443411	1.298171849	1.39141911	0.071682065	0.065947499	216.1285398	0.021231
Construction and Mining - Graders	25	Diesel	0.812527696	2.48849861	3.16333821	0.299887732	0.275896713	239.3006057	0.023507
Construction and Mining - Graders	300	Diesel	0.108885523	1.188972379	0.51598023	0.039716253	0.036538953	215.2027508	0.02114
Construction and Mining - Graders	50	Diesel	0.802976096	2.173613925	3.05784935	0.223699131	0.2058032	239.1743753	0.023495
Construction and Mining - Graders	600	Diesel	0.120435978	1.269051514	0.4486226	0.04724882	0.043468915	213.8451019	0.021006
Construction and Mining - Graders	75	Diesel	0.625946497	4.880780753	2.11179597	0.413707573	0.380610967	223.5044169	0.021955
Construction and Mining - Graders	9999	Diesel	0.165249069	2.416539955	0.80936579	0.069190548	0.063655304	215.1689752	0.021136
Construction and Mining - Misc - Asphalt Pavers	100	Gasoline	0.375873288	1.087552614	20.3793299	0.031973144	0.024157487	458.5777721	0.056747
Construction and Mining - Misc - Asphalt Pavers	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Asphalt Pavers	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Asphalt Pavers	50	Gasoline	1.222922243	1.917514763	106.670216	0.047293605	0.035732946	686.0200794	0.105469
Construction and Mining - Misc - Bore/Drill Rigs	100	Gasoline	0.407438849	1.448940359	15.870138	0.043961885	0.033215646	630.5274457	0.073864
Construction and Mining - Misc - Bore/Drill Rigs	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Misc - Bore/Drill Rigs	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Bore/Drill Rigs	175	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Bore/Drill Rigs	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Bore/Drill Rigs	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Bore/Drill Rigs	50	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Cement And Mortar Mixers	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Cement And Mortar Mixers	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Cement And Mortar Mixers	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Cement And Mortar Mixers	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Cement And Mortar Mixers	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Concrete/Industrial Saws	100	Gasoline	0.260948076	0.72508426	14.1743702	0.043866907	0.033143885	629.1651957	0.074315
Construction and Mining - Misc - Concrete/Industrial Saws	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Misc - Concrete/Industrial Saws	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Concrete/Industrial Saws	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Concrete/Industrial Saws	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Concrete/Industrial Saws	50	Gasoline	0.661704464	1.180459338	54.1946177	0.042294969	0.031956199	613.5121097	0.079699
Construction and Mining - Misc - Concrete/Industrial Saws	50	Diesel	0.38862087	3.089035748	3.61611046	0.096833672	0.089086978	447.3029317	0.043939
Construction and Mining - Misc - Cranes	100	Gasoline	0.456433561	1.316410954	21.6412697	0.030903427	0.023349256	443.2352605	0.053015
Construction and Mining - Misc - Cranes	175	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Cranes	50	Gasoline	0.757470657	1.17896728	60.1817408	0.025109034	0.01897127	364.2204963	0.047297
Construction and Mining - Misc - Crushing/Proc. Equipment	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Crushing/Proc. Equipment	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Dumpers/Tenders	100	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Dumpers/Tenders	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Misc - Dumpers/Tenders	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Dumpers/Tenders	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Dumpers/Tenders	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Excavators	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Other	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Other	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Other	175	Gasoline	0.140945708	0.514474054	13.2335303	0.027026738	0.020420202	376.99799	0.045948
Construction and Mining - Misc - Other	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Other	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Other	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Other	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Pavers	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Paving Equipment	100	Gasoline	0.219282676	0.621444703	12.1689586	0.035444007	0.026779916	508.3590174	0.060606
Construction and Mining - Misc - Paving Equipment	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Paving Equipment	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Misc - Paving Equipment	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Paving Equipment	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Paving Equipment	50	Gasoline	0.532325868	0.946162822	44.4764108	0.033005462	0.02493746	478.7625589	0.061622
Construction and Mining - Misc - Plate Compactors	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Plate Compactors	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Plate Compactors	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rollers	100	Gasoline	0.611692814	1.625643613	30.7516751	0.033130858	0.025032203	475.1824138	0.059852
Construction and Mining - Misc - Rollers	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rollers	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rollers	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rollers	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rollers	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rollers	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rollers	50	Gasoline	1.22614333	1.749600783	103.524772	0.033042743	0.024965628	479.3033865	0.070946
Construction and Mining - Misc - Rough Terrain Forklifts	100	Gasoline	0.498327638	1.43861161	23.610307	0.033822093	0.025554471	485.0965287	0.059869

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Misc - Rough Terrain Forklifts	175	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rough Terrain Forklifts	50	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rubber Tired Loaders	100	Gasoline	0.442085598	1.226061164	23.0042402	0.029086574	0.021976522	417.1768297	0.051282
Construction and Mining - Misc - Rubber Tired Loaders	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rubber Tired Loaders	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rubber Tired Loaders	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rubber Tired Loaders	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rubber Tired Loaders	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Rubber Tired Loaders	50	Gasoline	0.751236047	1.114665398	64.5385686	0.023727749	0.017927632	344.1842134	0.047917
Construction and Mining - Misc - Signal Boards	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Signal Boards	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Misc - Signal Boards	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Signal Boards	50	Diesel	0.38159609	3.012695433	3.49513358	0.094214137	0.086677006	515.8782646	0.050676
Construction and Mining - Misc - Skid Steer Loaders	100	Gasoline	0.197752439	0.551338337	11.4413339	0.030835984	0.023298299	442.2679877	0.052423
Construction and Mining - Misc - Skid Steer Loaders	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Skid Steer Loaders	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Skid Steer Loaders	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Skid Steer Loaders	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Skid Steer Loaders	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Skid Steer Loaders	50	Gasoline	0.520278095	0.898656244	44.9633324	0.031181219	0.023559143	452.300888	0.059992
Construction and Mining - Misc - Surfacing Equipment	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Surfacing Equipment	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Surfacing Equipment	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Tampers/Rammers	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Misc - Tractors/Loaders/Backhoes	100	Gasoline	0.298800153	0.847542499	23.1082451	0.026100522	0.019720395	374.3491051	0.047345
Construction and Mining - Misc - Tractors/Loaders/Backhoes	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Tractors/Loaders/Backhoes	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Tractors/Loaders/Backhoes	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Tractors/Loaders/Backhoes	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Tractors/Loaders/Backhoes	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Trenchers	100	Gasoline	0.499801205	1.450559639	23.5830313	0.034382683	0.025978027	493.1368413	0.060922
Construction and Mining - Misc - Trenchers	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Trenchers	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Trenchers	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Trenchers	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Trenchers	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Misc - Trenchers	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Misc - Trenchers	50	Gasoline	1.071308148	1.67836858	84.6963987	0.036035981	0.027227186	522.7219668	0.074638
Construction and Mining - Off-Highway Tractors	100	Diesel	0.120889517	1.236335018	1.56958031	0.07540122	0.069369122	229.8866907	0.022582
Construction and Mining - Off-Highway Tractors	175	Diesel	0.077908182	0.63435525	1.35671946	0.030209177	0.027792443	229.1153519	0.022506
Construction and Mining - Off-Highway Tractors	25	Diesel	1.766574711	3.342652436	4.8544131	0.459548786	0.422784883	254.7811873	0.025028
Construction and Mining - Off-Highway Tractors	300	Diesel	0.078178744	0.648369114	0.50382194	0.02406935	0.022143802	229.2563397	0.02252
Construction and Mining - Off-Highway Tractors	50	Diesel	0.258738316	1.678020954	2.06797847	0.075909874	0.069837084	254.3632344	0.024987
Construction and Mining - Off-Highway Tractors	600	Diesel	0.057250735	0.380133769	0.46212519	0.012984529	0.011945767	228.5972852	0.022456
Construction and Mining - Off-Highway Tractors	75	Diesel	0.144630652	1.330835071	1.63207274	0.071076321	0.065390215	229.2359535	0.022518
Construction and Mining - Off-Highway Tractors	750	Diesel	0.107919846	0.746136642	0.47304058	0.038388548	0.035317465	227.7169824	0.022369
Construction and Mining - Off-Highway Tractors	9999	Diesel	0.119060008	1.580055587	0.56446065	0.042828561	0.039402276	229.1996053	0.022515
Construction and Mining - Off-Highway Trucks	100	Diesel	0.138709979	1.187249528	1.52220298	0.077838449	0.071611373	201.6052829	0.019804
Construction and Mining - Off-Highway Trucks	175	Diesel	0.087626335	0.588779776	1.27570584	0.027972746	0.025734926	200.6585581	0.019711
Construction and Mining - Off-Highway Trucks	25	Diesel	0.939410581	2.174388182	3.29340563	0.243939948	0.224424752	223.4534768	0.02195
Construction and Mining - Off-Highway Trucks	300	Diesel	0.077844617	0.525287524	0.48901209	0.021090199	0.019402983	200.3640121	0.019682

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Off-Highway Trucks	50	Diesel	0.225609258	1.509688715	2.00354523	0.067219835	0.061842248	221.6855547	0.021777
Construction and Mining - Off-Highway Trucks	600	Diesel	0.070048882	0.471931538	0.4563022	0.016918679	0.015565184	201.0390731	0.019748
Construction and Mining - Off-Highway Trucks	75	Diesel	0.089278115	0.623890553	1.50816884	0.009724134	0.008946203	201.9469968	0.019838
Construction and Mining - Off-Highway Trucks	750	Diesel	0.098844969	0.790033261	0.63214058	0.030215336	0.02779811	200.9214436	0.019737
Construction and Mining - Off-Highway Trucks	9999	Diesel	0.072936082	1.231614317	0.45915192	0.023058806	0.021214102	201.3490878	0.019779
Construction and Mining - Other	100	Diesel	0.142673158	1.346244141	1.48000573	0.086621332	0.079691625	218.9603438	0.021509
Construction and Mining - Other	175	Diesel	0.109518755	1.05693918	1.31184914	0.05483907	0.050451945	217.8876353	0.021404
Construction and Mining - Other	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Other	300	Diesel	0.087276403	0.93119182	0.55524016	0.036084732	0.033197954	219.0713989	0.02152
Construction and Mining - Other	50	Diesel	0.342725465	1.867625539	2.08363155	0.126234865	0.116136076	244.4989492	0.024018
Construction and Mining - Other	600	Diesel	0.067807122	0.649299718	0.54207193	0.024345751	0.022398091	218.8649115	0.0215
Construction and Mining - Other	75	Diesel	0.34849681	3.191846227	1.77547912	0.2402578	0.221037176	215.2527453	0.021145
Construction and Mining - Other	750	Diesel	0.071611473	0.743632636	0.45710389	0.025860603	0.023791754	219.0272709	0.021515
Construction and Mining - Other	9999	Diesel	0.057097278	1.205212524	0.41622771	0.022169924	0.02039633	218.5846685	0.021472
Construction and Mining - Pavers	100	Diesel	0.102873116	1.124812998	1.42177326	0.059969156	0.055171623	218.0811024	0.021423

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Pavers	175	Diesel	0.081618887	0.770061212	1.2522447	0.036636708	0.033705771	219.1136628	0.021524
Construction and Mining - Pavers	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Pavers	300	Diesel	0.054102849	0.61495272	0.41934342	0.01990965	0.018316878	218.971402	0.02151
Construction and Mining - Pavers	50	Diesel	0.393657968	1.741044857	2.05303171	0.11561105	0.106362166	243.4934602	0.023919
Construction and Mining - Pavers	600	Diesel	0.04260472	0.406259698	0.40516384	0.011417561	0.010504156	218.631089	0.021477
Construction and Mining - Pavers	75	Diesel	0.387290026	2.906666439	1.68176663	0.280283935	0.25786122	217.1659094	0.021333
Construction and Mining - Pavers	750	Diesel	0.024333313	0.108466017	0.39318267	0.003733697	0.003435001	218.7042056	0.021484
Construction and Mining - Paving Equipment	100	Diesel	0.080364892	0.855697946	1.22411712	0.038768534	0.035667052	187.0556847	0.018375
Construction and Mining - Paving Equipment	175	Diesel	0.079779802	0.712074133	1.10922414	0.037445069	0.034449463	186.674235	0.018337
Construction and Mining - Paving Equipment	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Paving Equipment	300	Diesel	0.05495541	0.530696952	0.38850929	0.020777167	0.019114994	187.2332454	0.018392
Construction and Mining - Paving Equipment	50	Diesel	0.186038473	1.331645217	1.52068594	0.05835811	0.053689461	206.811161	0.020315
Construction and Mining - Paving Equipment	600	Diesel	0.049019332	0.467036565	0.36255145	0.015569293	0.01432375	186.7368515	0.018344
Construction and Mining - Paving Equipment	75	Diesel	0.197027594	1.750327476	1.35933326	0.143051207	0.13160711	186.1523173	0.018286
Construction and Mining - Paving Equipment	750	Diesel	0.052051484	0.46808827	0.35529114	0.01278108	0.011758594	187.2990886	0.018399

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Paving Equipment	9999	Diesel	0.039703892	0.840022252	0.35582592	0.014124706	0.012994729	187.0485683	0.018374
Construction and Mining - Rollers	100	Diesel	0.097515933	1.031549008	1.28266223	0.053897525	0.049585723	197.6410226	0.019415
Construction and Mining - Rollers	175	Diesel	0.052987201	0.496375065	1.09234478	0.022679456	0.020865099	197.3952885	0.019391
Construction and Mining - Rollers	25	Diesel	1.521858471	2.879608711	4.18195147	0.395889406	0.364218254	219.4874102	0.021561
Construction and Mining - Rollers	300	Diesel	0.080458356	0.884289694	0.57112218	0.033971577	0.031253851	197.6430008	0.019415
Construction and Mining - Rollers	50	Diesel	0.232004805	1.43101837	1.57386251	0.071981563	0.066223038	219.6055819	0.021572
Construction and Mining - Rollers	600	Diesel	0.053077901	0.54288188	0.5317159	0.018457872	0.016981243	198.551836	0.019504
Construction and Mining - Rollers	75	Diesel	0.701511196	5.648745915	2.30583195	0.401978699	0.369820403	197.5232531	0.019403
Construction and Mining - Rough Terrain Forklifts	100	Diesel	0.050250756	0.721142626	1.29614371	0.017336996	0.015950036	211.9198798	0.020817
Construction and Mining - Rough Terrain Forklifts	175	Diesel	0.080455361	0.673183002	1.18650186	0.044757804	0.04117718	211.6982407	0.020796
Construction and Mining - Rough Terrain Forklifts	25	Diesel	0.163604718	2.018817049	1.65168956	0.114649628	0.105477658	235.4672142	0.02313
Construction and Mining - Rough Terrain Forklifts	300	Diesel	0.045826154	0.561851212	0.39770107	0.013293771	0.01223027	211.7773504	0.020803
Construction and Mining - Rough Terrain Forklifts	50	Diesel	0.200731662	1.423309809	1.52731864	0.056539754	0.052016573	235.3508141	0.023119
Construction and Mining - Rough Terrain Forklifts	600	Diesel	0.028572013	0.211360585	0.38280937	0.00365568	0.003363226	211.5199184	0.020778
Construction and Mining - Rough Terrain Forklifts	75	Diesel	0.811868936	3.824970854	2.5243991	0.331719333	0.305181786	225.4315706	0.022145

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Rough Terrain Forklifts	750	Diesel	0.046534264	0.540624035	0.39457432	0.003862853	0.003553825	211.4757835	0.020774
Construction and Mining - Rubber Tired Dozers	100	Diesel	0.251801975	2.101078164	1.65221711	0.15542967	0.142995296	209.7104077	0.0206
Construction and Mining - Rubber Tired Dozers	175	Diesel	0.231372048	2.041855354	1.4875054	0.131633232	0.121102573	208.2033422	0.020452
Construction and Mining - Rubber Tired Dozers	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Rubber Tired Dozers	300	Diesel	0.207686804	2.283395468	1.49589984	0.101744561	0.093604996	208.485773	0.02048
Construction and Mining - Rubber Tired Dozers	50	Diesel	0.175977603	1.414161032	1.92426356	0.044855968	0.041267491	231.4091171	0.022732
Construction and Mining - Rubber Tired Dozers	600	Diesel	0.161535738	1.585239518	1.28571598	0.070568784	0.064923281	209.8437949	0.020613
Construction and Mining - Rubber Tired Dozers	75	Diesel	0.295998085	2.277565317	1.72554339	0.164674866	0.151500877	208.5000443	0.020481
Construction and Mining - Rubber Tired Dozers	750	Diesel	0.089273037	1.133897494	0.430746	0.032106894	0.029538343	208.1377273	0.020446
Construction and Mining - Rubber Tired Loaders	100	Diesel	0.141618866	1.191801599	1.38622962	0.078381109	0.07211062	188.8527105	0.018551
Construction and Mining - Rubber Tired Loaders	175	Diesel	0.089837019	0.688188302	1.19158072	0.036853024	0.033904782	189.9416891	0.018658
Construction and Mining - Rubber Tired Loaders	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Rubber Tired Loaders	300	Diesel	0.069789639	0.645353923	0.42272978	0.021399723	0.019687745	190.0674483	0.018671
Construction and Mining - Rubber Tired Loaders	50	Diesel	0.367098091	1.625764843	2.17871398	0.104154249	0.095821909	212.8468378	0.020908
Construction and Mining - Rubber Tired Loaders	600	Diesel	0.079338873	0.649636311	0.48749406	0.024585932	0.022619057	189.8160544	0.018646

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Rubber Tired Loaders	75	Diesel	0.479123562	3.712046218	1.6423017	0.332392492	0.305801092	188.1337845	0.018481
Construction and Mining - Rubber Tired Loaders	750	Diesel	0.071295726	0.472057969	0.55661856	0.01709422	0.015726683	189.8742477	0.018652
Construction and Mining - Rubber Tired Loaders	9999	Diesel	0.07711439	1.35112514	0.42283772	0.028008447	0.025767771	190.7574467	0.018738
Construction and Mining - Scrapers	100	Diesel	0.249751044	2.6111015	1.92736233	0.186288597	0.171385509	255.2038499	0.025069
Construction and Mining - Scrapers	175	Diesel	0.151229514	1.405994915	1.61235914	0.073643577	0.067752091	255.8961982	0.025137
Construction and Mining - Scrapers	25	Diesel	0.084403504	1.395277421	1.64767496	0.005353094	0.004924846	282.4294767	0.027744
Construction and Mining - Scrapers	300	Diesel	0.154751077	1.54958168	0.82031582	0.070146754	0.064535014	253.7342231	0.024925
Construction and Mining - Scrapers	50	Diesel	1.648458383	3.256527356	4.63904248	0.457875821	0.421245756	277.7078999	0.02728
Construction and Mining - Scrapers	600	Diesel	0.11025206	1.105528681	0.82531077	0.042711494	0.039294575	254.5239521	0.025002
Construction and Mining - Scrapers	75	Diesel	0.364154074	2.810204087	1.96927396	0.238833387	0.219726716	255.9552535	0.025143
Construction and Mining - Scrapers	750	Diesel	0.342710059	4.644406597	3.28760631	0.191939263	0.176584122	254.9125035	0.025041
Construction and Mining - Scrapers	9999	Diesel	0.200558686	2.876949612	1.95306514	0.098759195	0.090858459	253.9244091	0.024943
Construction and Mining - Skid Steer Loaders	100	Diesel	0.414679643	2.897213649	1.51518834	0.288866571	0.265757245	192.4268397	0.018902
Construction and Mining - Skid Steer Loaders	175	Diesel	0.048255849	0.458275832	1.06093863	0.019397539	0.017845736	193.464306	0.019004
Construction and Mining - Skid Steer Loaders	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Skid Steer Loaders	300	Diesel	0.038767397	0.436488529	0.36459435	0.013428375	0.012354105	194.1641935	0.019073
Construction and Mining - Skid Steer Loaders	50	Diesel	0.128466813	1.229881934	1.34944421	0.032604216	0.029995879	216.4821548	0.021265
Construction and Mining - Skid Steer Loaders	600	Diesel	0.061084178	0.768427806	0.36784063	0.033556429	0.030871915	194.2696112	0.019083
Construction and Mining - Skid Steer Loaders	75	Diesel	0.052395546	0.706890895	1.19961405	0.021819662	0.020074089	194.1347473	0.01907
Construction and Mining - Skid Steer Loaders	9999	Diesel	0.027095723	0.843472657	0.35101784	0.011338042	0.010430999	194.2696112	0.019083
Construction and Mining - Surfacing Equipment	100	Diesel	0.047025938	0.660628291	0.98804596	0.024330743	0.022384283	159.7341018	0.015691
Construction and Mining - Surfacing Equipment	175	Diesel	0.093871924	0.927375106	0.94063348	0.052716437	0.048499122	158.8778621	0.015607
Construction and Mining - Surfacing Equipment	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Surfacing Equipment	300	Diesel	0.058145766	0.763549844	0.3979727	0.025414403	0.023381251	159.1289429	0.015632
Construction and Mining - Surfacing Equipment	50	Diesel	0.099158039	1.107482498	1.0899902	0.034544754	0.031781174	178.0144363	0.017487
Construction and Mining - Surfacing Equipment	600	Diesel	0.035386182	0.37257054	0.3228912	0.013939517	0.012824356	158.7013244	0.01559
Construction and Mining - Surfacing Equipment	75	Diesel	0.199578805	1.921738441	1.16656247	0.126096774	0.116009032	159.2475945	0.015643
Construction and Mining - Surfacing Equipment	750	Diesel	0.027389683	0.267776875	0.30029665	0.009827723	0.009041506	158.5855816	0.015578
Construction and Mining - Surfacing Equipment	9999	Diesel	0.035747646	0.84396749	0.33871942	0.014287801	0.013144777	158.7656107	0.015596
Construction and Mining - Tractors/Loaders/Backhoes	100	Diesel	0.079229244	0.807601757	1.28785033	0.035804504	0.032940144	194.7827785	0.019134

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Tractors/Loaders/Backhoes	175	Diesel	0.064997416	0.508402078	1.14100642	0.02528723	0.023264252	193.4421214	0.019002
Construction and Mining - Tractors/Loaders/Backhoes	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Tractors/Loaders/Backhoes	300	Diesel	0.064710169	0.606984786	0.45181084	0.02210839	0.020339719	193.3901645	0.018997
Construction and Mining - Tractors/Loaders/Backhoes	50	Diesel	0.219579419	1.403451351	1.7166401	0.061785894	0.056843023	213.5324727	0.020976
Construction and Mining - Tractors/Loaders/Backhoes	600	Diesel	0.05575932	0.425552299	0.44623586	0.016392209	0.015080832	193.2899466	0.018987
Construction and Mining - Tractors/Loaders/Backhoes	75	Diesel	0.600717316	4.715062068	1.99620245	0.377874172	0.347644238	194.1511451	0.019072
Construction and Mining - Tractors/Loaders/Backhoes	750	Diesel	0.097422745	0.846067728	0.98655917	0.035061994	0.032257034	190.4494575	0.018708
Construction and Mining - Tractors/Loaders/Backhoes	9999	Diesel	0.062738877	1.157447125	0.38139516	0.021612005	0.019883044	194.0259557	0.01906
Construction and Mining - Trenchers	100	Diesel	0.218736487	2.07361542	1.84033731	0.139917997	0.128724557	265.1111973	0.026042
Construction and Mining - Trenchers	175	Diesel	0.183925694	1.855452727	1.67511234	0.094457792	0.086901168	264.0409274	0.025937
Construction and Mining - Trenchers	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Construction and Mining - Trenchers	300	Diesel	0.148722241	1.654273702	0.77613241	0.069632813	0.064062188	265.3630649	0.026067
Construction and Mining - Trenchers	50	Diesel	0.30098848	1.921417646	2.12142761	0.098493276	0.090613814	294.6688172	0.028946
Construction and Mining - Trenchers	600	Diesel	0.090150908	0.84694867	0.82527229	0.035665869	0.0328126	265.7506905	0.026105
Construction and Mining - Trenchers	75	Diesel	0.405201614	3.533604131	2.11602713	0.264423701	0.243269805	264.3754754	0.02597

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Construction and Mining - Trenchers	750	Diesel	0.029725514	0.13142425	0.47654157	0.004529054	0.004166729	264.811344	0.026013
Construction and Mining - Trenchers	9999	Diesel	0.589774561	6.729480445	7.12746047	0.313752981	0.288652742	264.6556241	0.025998
Industrial - Aerial Lifts	100	Diesel	0.028647343	0.44316298	0.97869542	0.005746844	0.005287097	162.3113907	0.015944
Industrial - Aerial Lifts	175	Diesel	0.026597376	0.176253078	0.88050378	0.007464117	0.006866987	162.2284387	0.015936
Industrial - Aerial Lifts	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Aerial Lifts	300	Diesel	0.024961964	0.210920654	0.29827702	0.002851062	0.002622977	162.2268002	0.015936
Industrial - Aerial Lifts	50	Diesel	0.048842461	0.889501021	0.95868405	0.006672017	0.006138256	180.4224992	0.017723
Industrial - Aerial Lifts	600	Diesel	0.020094563	0.081169363	0.29529997	0.00283362	0.002606931	162.2268002	0.015936
Industrial - Aerial Lifts	75	Diesel	0.033910415	0.506041449	0.97592289	0.01125119	0.010351094	162.268572	0.01594
Industrial - Forklifts	100	Diesel	0.058632095	0.552917588	0.72652998	0.031620984	0.029091305	105.6650668	0.01038
Industrial - Forklifts	175	Diesel	0.045258515	0.375780278	0.63774373	0.019338869	0.017791759	105.759797	0.010389
Industrial - Forklifts	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Forklifts	300	Diesel	0.038431607	0.317561912	0.24282358	0.011989275	0.011030133	105.906408	0.010403
Industrial - Forklifts	50	Diesel	0.138992931	0.811050127	1.02167355	0.0407548	0.037494416	117.7156958	0.011563
Industrial - Forklifts	600	Diesel	0.047436639	0.383003382	0.25172903	0.014520367	0.013358738	106.4789816	0.01046
Industrial - Forklifts	75	Diesel	0.344468687	2.710966207	1.13511351	0.211220917	0.194323244	105.1575907	0.01033
Industrial - Forklifts	9999	Diesel	0.021456119	0.484821207	0.20747449	0.004484681	0.004125907	105.7854719	0.010392
Industrial - Misc - Aerial Lifts	100	Gasoline	0.173181841	0.484086029	10.6018191	0.024961202	0.018859575	358.0083505	0.04285
Industrial - Misc - Aerial Lifts	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Aerial Lifts	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Aerial Lifts	15	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Aerial Lifts	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Industrial - Misc - Aerial Lifts	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Aerial Lifts	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Aerial Lifts	25	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Aerial Lifts	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Aerial Lifts	50	Gasoline	0.446004827	0.745660187	40.5040652	0.024961201	0.018859574	362.0761057	0.04868
Industrial - Misc - Forklifts	100	Gasoline	0.190558067	1.056545767	19.9472509	0.016197922	0.01223843	232.3202357	0.030215
Industrial - Misc - Forklifts	100	Nat Gas	0	0.916332339	9.13720471	0.017999055	0	202.3873778	0.034007
Industrial - Misc - Forklifts	175	Gasoline	0.130564313	0.859472688	10.0994095	0.016210386	0.012247847	226.1198852	0.027727
Industrial - Misc - Forklifts	175	Nat Gas	0	0.598396476	7.02588824	0.018031906	0	202.7567772	0.033493
Industrial - Misc - Forklifts	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Forklifts	25	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Forklifts	50	Gasoline	0.540703613	1.398165908	70.2911459	0.016195052	0.012236261	234.9182035	0.039734
Industrial - Misc - Forklifts	50	Nat Gas	0	0.84965085	3.24871929	0.018003906	0	202.441914	0.032572
Industrial - Misc - Other General Industrial Equipment	100	Gasoline	0.21864995	1.445793108	17.5415441	0.029424883	0.022232134	422.0291215	0.051424
Industrial - Misc - Other General Industrial Equipment	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Other General Industrial Equipment	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Other General Industrial Equipment	175	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Industrial - Misc - Other General Industrial Equipment	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Other General Industrial Equipment	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Other General Industrial Equipment	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Other General Industrial Equipment	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Other General Industrial Equipment	50	Gasoline	0.601525562	1.488903717	63.6670199	0.028942293	0.02186751	419.8241062	0.059596
Industrial - Misc - Other Material Handling Equipment	100	Gasoline	0.355118885	1.869317579	20.8666183	0.031740491	0.023981704	455.2409163	0.05679
Industrial - Misc - Other Material Handling Equipment	50	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Sweepers/Scrubbers	100	Gasoline	0.247937685	1.750525938	17.3461128	0.038535987	0.029116079	552.7058523	0.066347
Industrial - Misc - Sweepers/Scrubbers	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Sweepers/Scrubbers	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Sweepers/Scrubbers	175	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Sweepers/Scrubbers	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Industrial - Misc - Sweepers/Scrubbers	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Sweepers/Scrubbers	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Sweepers/Scrubbers	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Industrial - Misc - Sweepers/Scrubbers	50	Gasoline	0.692490733	1.677718619	66.1538036	0.038723965	0.029258107	561.7126372	0.076516
Industrial - Other General Industrial Equipment	100	Diesel	0.148466831	1.251075428	1.27872491	0.087263945	0.08028283	180.3030378	0.017712
Industrial - Other General Industrial Equipment	175	Diesel	0.071036611	0.541752882	1.10006486	0.028404163	0.02613183	180.0881848	0.01769
Industrial - Other General Industrial Equipment	25	Diesel	1.387231018	2.624871234	3.81200545	0.360868027	0.331998585	200.0709982	0.019653
Industrial - Other General Industrial Equipment	300	Diesel	0.065081445	0.584716429	0.40192256	0.019428421	0.017874147	180.2198111	0.017703
Industrial - Other General Industrial Equipment	50	Diesel	0.186298196	1.317534062	1.63203118	0.056441673	0.051926339	200.4592653	0.019691
Industrial - Other General Industrial Equipment	600	Diesel	0.049930456	0.323686362	0.37203114	0.011216217	0.01031892	180.0219977	0.017684
Industrial - Other General Industrial Equipment	75	Diesel	0.082424815	0.821442518	1.2362747	0.038540969	0.035457692	179.9061682	0.017673
Industrial - Other General Industrial Equipment	750	Diesel	0.032424676	0.176160262	0.40454402	0.008004582	0.007364215	180.021575	0.017684
Industrial - Other General Industrial Equipment	9999	Diesel	0.051846271	1.121907797	0.35361369	0.018711418	0.017214505	180.0224979	0.017684
Industrial - Other Material Handling Equipment	100	Diesel	0.071660852	0.78405889	1.35389124	0.029134638	0.026803867	208.4604122	0.020477
Industrial - Other Material Handling Equipment	175	Diesel	0.096903261	0.776525524	1.31221019	0.042302001	0.038917841	208.0779772	0.02044

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Industrial - Other Material Handling Equipment	25	Diesel	0.309809015	1.461889915	2.16439173	0.057063402	0.05249833	231.3705472	0.022728
Industrial - Other Material Handling Equipment	300	Diesel	0.096455842	0.837140487	0.4683257	0.034266967	0.03152561	208.1879083	0.020451
Industrial - Other Material Handling Equipment	50	Diesel	0.377137297	1.83314167	2.26081622	0.126738441	0.116599366	232.8048716	0.022869
Industrial - Other Material Handling Equipment	600	Diesel	0.069435793	0.579203376	0.50188368	0.021408671	0.019695978	208.4243707	0.020474
Industrial - Other Material Handling Equipment	75	Diesel	0.18531249	1.639410828	1.60625543	0.128896538	0.118584815	207.4185078	0.020375
Industrial - Other Material Handling Equipment	750	Diesel	0.131795259	1.052517363	0.44489121	0.05462171	0.050251973	208.109401	0.020443
Industrial - Other Material Handling Equipment	9999	Diesel	0.022049423	0.897526737	0.37216232	0.007137451	0.006566455	208.109401	0.020443
Light Commercial - Misc - Air Compressors	100	Gasoline	0.441152826	1.231749906	22.9067839	0.030192505	0.022812115	433.038775	0.053783
Light Commercial - Misc - Air Compressors	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Air Compressors	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Air Compressors	15	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Air Compressors	175	Gasoline	0.315871137	1.274891622	15.819983	0.02909758	0.021984838	405.8842962	0.049319
Light Commercial - Misc - Air Compressors	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Air Compressors	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Air Compressors	25	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Light Commercial - Misc - Air Compressors	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Air Compressors	5	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Air Compressors	50	Gasoline	0.92078768	1.378025089	78.7961214	0.030078399	0.022725901	436.3038432	0.064006
Light Commercial - Misc - Air Compressors	50	Diesel	0.27198554	1.842091274	2.31062766	0.064417174	0.0592638	280.4878969	0.027553
Light Commercial - Misc - Gas Compressors	100	Nat Gas	0	2.086275686	27.5084542	0	0	658.4040331	0.11003
Light Commercial - Misc - Gas Compressors	175	Nat Gas	0	2.072509783	20.774921	0	0	636.114303	0.104919
Light Commercial - Misc - Gas Compressors	300	Nat Gas	0	1.752879935	20.893636	0	0	573.0012473	0.094898
Light Commercial - Misc - Gas Compressors	50	Nat Gas	0	1.998214976	9.7488034	0	0	664.006412	0.106464
Light Commercial - Misc - Gas Compressors	600	Nat Gas	0	1.760063823	20.9792592	0	0	575.3497737	0.095354
Light Commercial - Misc - Generator Sets	100	Gasoline	0.281921257	1.849769154	13.0723736	0.036649005	0.027690359	525.6418021	0.062517
Light Commercial - Misc - Generator Sets	100	Nat Gas	0	1.826294651	18.2179995	0	0	581.2648427	0.095047
Light Commercial - Misc - Generator Sets	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Generator Sets	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Generator Sets	175	Gasoline	0.183546057	2.081254926	18.9468508	0.039373172	0.029748619	549.2193178	0.066464
Light Commercial - Misc - Generator Sets	175	Nat Gas	0	1.507204394	13.1490699	0	0	510.2233565	0.082998

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Light Commercial - Misc - Generator Sets	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Generator Sets	2	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Generator Sets	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Generator Sets	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Generator Sets	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Generator Sets	50	Gasoline	0.663235226	1.545790327	48.6895152	0.03677812	0.027787913	533.487086	0.070017
Light Commercial - Misc - Generator Sets	50	Diesel	0.284654038	2.638894617	2.78129127	0.078849183	0.072541248	430.6057703	0.042299
Light Commercial - Misc - Pressure Washers	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pressure Washers	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pressure Washers	15	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pressure Washers	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pressure Washers	2	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pressure Washers	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pressure Washers	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pressure Washers	25	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Light Commercial - Misc - Pressure Washers	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pressure Washers	5	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pressure Washers	50	Gasoline	0.806058736	1.495661767	61.1841475	0.050066355	0.037827912	726.2403054	0.098143
Light Commercial - Misc - Pressure Washers	50	Diesel	0.080939861	1.025956379	0.96341269	0.025886439	0.023815523	150.6907563	0.014803
Light Commercial - Misc - Pumps	100	Gasoline	0.281288899	0.836446604	15.2628891	0.037120164	0.028046346	532.3994461	0.063684
Light Commercial - Misc - Pumps	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pumps	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pumps	175	Gasoline	0.225493669	0.926632457	19.0061474	0.038545531	0.02912329	537.6744919	0.065586
Light Commercial - Misc - Pumps	2	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pumps	2	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pumps	25	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pumps	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pumps	5	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Pumps	50	Gasoline	0.687455607	1.196636426	57.7371059	0.037208533	0.028113114	539.7304705	0.072713
Light Commercial - Misc - Pumps	50	Diesel	0.314845964	2.688796635	2.93245852	0.084318053	0.077572609	433.0386824	0.042538

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Light Commercial - Misc - Welders	100	Gasoline	0.278748225	0.888566024	12.6070546	0.027544237	0.020811201	395.0558029	0.047496
Light Commercial - Misc - Welders	15	Gasoline	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Welders	15	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Welders	15	Electric	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Welders	175	Gasoline	0.213832738	1.065014781	15.1230205	0.030445146	0.023002999	424.6815676	0.050663
Light Commercial - Misc - Welders	25	Diesel	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Light Commercial - Misc - Welders	50	Gasoline	0.608112914	1.06269041	45.4045499	0.02770217	0.020930529	401.8353743	0.054403
Light Commercial - Misc - Welders	50	Diesel	0.235429028	1.694033409	2.03113693	0.058408306	0.053735641	262.8398441	0.025819
Portable Equipment - Non-Rental Compressor	100	Diesel	0.03468462	0.499329473	1.03562206	0.035883346	0.033012678	161.0253851	0.015818
Portable Equipment - Non-Rental Compressor	75	Diesel	0.04147445	0.75413469	0.9876854	0.004115183	0.003785969	161.0253851	0.015818
Portable Equipment - Non-Rental Generator	100	Diesel	0.050714731	0.430643608	1.22967793	0.036572615	0.033646806	161.0253851	0.015818
Portable Equipment - Non-Rental Generator	175	Diesel	0.060660223	0.37002358	1.07753428	0.020051079	0.018446993	161.0253851	0.015818
Portable Equipment - Non-Rental Generator	300	Diesel	0.050714731	0.216658316	0.37043207	0.011367948	0.010458512	161.0253851	0.015818
Portable Equipment - Non-Rental Generator	600	Diesel	0.050714731	0.326438252	0.34805205	0.013716408	0.012619095	161.0253851	0.015818
Portable Equipment - Non-Rental Generator	75	Diesel	0.106543552	0.859328809	1.22967793	0.010231669	0.009413135	161.0253851	0.015818

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Portable Equipment - Non-Rental Generator	750	Diesel	0.050714731	0.051942936	0.34805205	0.006018331	0.005536865	161.0253851	0.015818
Portable Equipment - Non-Rental Generator	9999	Diesel	0.113033278	1.296487016	0.60066036	0.039389356	0.036238208	161.0253851	0.015818
Portable Equipment - Non-Rental Other	100	Diesel	0.026721182	0.288757115	1.03901083	0.02342525	0.02155123	161.0253851	0.015818
Portable Equipment - Non-Rental Other	175	Diesel	0.020017431	0.141902271	0.87242083	0.002893418	0.002661944	161.0253851	0.015818
Portable Equipment - Non-Rental Other	300	Diesel	0.028219262	0.170190894	0.30846546	0.007097083	0.006529317	161.0253851	0.015818
Portable Equipment - Non-Rental Other	50	Diesel	0.126980119	1.57208283	1.62634452	0.06990536	0.064312932	179.014597	0.017585
Portable Equipment - Non-Rental Other	600	Diesel	0.031134662	0.251675894	0.3026792	0.00992804	0.009133797	161.0253851	0.015818
Portable Equipment - Non-Rental Other	75	Diesel	0.035286253	0.745192319	0.96467145	0.003819855	0.003514266	161.0253851	0.015818
Portable Equipment - Non-Rental Other	750	Diesel	0.031842047	0.358233784	0.29786845	0.013500439	0.012420404	161.0253851	0.015818
Portable Equipment - Non-Rental Pump	100	Diesel	0.036397477	0.749798304	1.01759312	0.047561928	0.043756974	161.0253851	0.015818
Portable Equipment - Non-Rental Pump	600	Diesel	0.022446251	0.039932009	0.29757778	0.002683082	0.002468435	161.0253851	0.015818
Portable Equipment - Non-Rental Pump	75	Diesel	0.061311318	0.919148039	1.06145888	0.057905388	0.053272957	161.0253851	0.015818
Portable Equipment - Rental Compressor	100	Diesel	0.050714731	0.430643608	1.22967793	0.036572615	0.033646806	161.0253851	0.015818
Portable Equipment - Rental Compressor	50	Diesel	0.102305046	1.211209422	1.43091523	0.046786638	0.043043707	179.014597	0.017585
Portable Equipment - Rental Generator	75	Diesel	0.106543552	0.848164024	1.22967793	0.007220575	0.006642929	161.0253851	0.015818

Vehicle Category	Horsepower Bin	Fuel	ROG (g/hp-hr)	NOx (g/hp-hr)	CO (g/hp-hr)	PM_{10} (g/hp-hr)	$PM_{2.5}$ (g/hp-hr)	CO_2 (g/hp-hr)	gal/hp-hr
Portable Equipment - Rental Other	100	Diesel	0.046069968	0.506016859	1.19276787	0.040396721	0.037164984	161.0253851	0.015818
Portable Equipment - Rental Pump	75	Diesel	0.106543552	0.848164024	1.22967793	0.007220575	0.006642929	161.0253851	0.015818

Lake Fordyce Dam Seepage Mitigation Project: 2021 Revised Project
Air Quality and Greenhouse Gas Emission Estimates Summary for the 2021 Revised Lake Fordyce Dam Seepage Mitigation Project

Maximum Daily Emissions (lbs/day)

Project Component/Source	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Construction Equipment	5.79	57.67	178.73	2.24	2.24	14.75
On-Road Construction Equipment	0.60	40.30	12.48	1.18	0.58	7.65
Boats	5.56	28.13	29.32	0.66	0.66	1.94
Fugitive Dust	-	-	-	120.94	12.25	-
Total Maximum Daily Emissions	11.95	126.10	220.53	125.02	15.74	24.33
NSAQMD Level B Threshold	136	136	N/A	136	136	N/A

Notes/Assumptions:
Maximum daily emissions based on equipment list provided by contractor for worst-case scenario.
Fugitive dust emissions include project design features of watering unpaved surfaces twice per day and limiting vehicle speeds to 15 mph.
Blasting would only occur at the beginning of Season 1 during roadway improvements and clearing. Assumed to not overlap with worst-case maximum daily scenario which is anticipated to occur during cofferdam construction.
Helicopter usage would only occur 6 days per season; it was assumed helicopter material deliveries would be used during site mobilization/demobilization and would not overlap with worst-case maximum daily scenario.

Season 1 Total Emissions (tons/season)

Project Component/Source	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Construction Equipment	0.22	2.01	7.46	0.08	0.08	1,260.06
On-Road Construction Equipment	0.01	0.27	0.75	0.02	0.01	293.84
Boats	0.11	0.54	0.56	0.01	0.01	74.32
Blasting	-	0.01	0.04	0.00	0.00	0.21
Helicopter	0.03	0.14	0.04	0.00	0.00	39.35
Fugitive Dust	-	-	-	2.99	0.30	-
Total Season 1 Emissions	0.37	2.97	8.85	3.12	0.41	1,668
NEPA Thresholds	100	100	100	100	100	25,000

Notes/Assumptions:
Assumes blasting activities would occur during Season 1.
Fugitive dust emissions include project design features of watering unpaved surfaces twice per day and limiting vehicle speeds to 15 mph.

Season 2 Total Emissions (tons/season)

Project Component/Source	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Construction Equipment	0.17	1.65	5.91	0.07	0.07	961.32
On-Road Construction Equipment	0.01	0.33	0.34	0.02	0.01	173.95
Boats	0.05	0.27	0.28	0.01	0.01	37.16
Blasting	-	-	-	-	-	-
Helicopter	0.03	0.14	0.04	0.00	0.00	39.35
Fugitive Dust	-	-	-	0.58	0.06	-
Total Season 2 Emissions	0.26	2.40	6.57	0.68	0.15	1,212
NEPA Thresholds	100	100	100	100	100	25,000

Notes/Assumptions:
Assumes blasting activities would occur during Season 1.
Fugitive dust emissions include project design features of watering unpaved surfaces twice per day and limiting vehicle speeds to 15 mph.

Season 3 Total Emissions (tons/season)

Project Component/Source	ROG	NOx	CO	PM_{10}	$PM_{2.5}$	CO_2e
Off-Road Construction Equipment	0.16	1.45	5.46	0.06	0.06	870.80
On-Road Construction Equipment	0.01	0.12	0.33	0.01	0.01	102.35
Boats	0.11	0.54	0.56	0.01	0.01	74.32
Blasting	-	-	-	-	-	-
Helicopter	0.03	0.14	0.04	0.00	0.00	39.35
Fugitive Dust	-	-	-	3.15	0.32	-
Total Season 3 Emissions	0.30	2.26	6.38	3.25	0.40	1,087
NEPA Thresholds	100	100	100	100	100	25,000

Notes/Assumptions:
Assumes blasting activities would occur during Season 1.
Fugitive dust emissions include project design features of watering unpaved surfaces twice per day and limiting vehicle speeds to 15 mph.

Total Construction Related Emissions	MT CO_2e
Season 1	1,668
Season 2	1,212
Season 3	1,087
Season 4	1,668
Total GHG Emissions	**5,634**
Amortized GHG Emissions	**188**

Appendix B Construction Noise/Vibration Technical Memorandum

Table of Contents

Appendices

Acronyms and Abbreviations

dB	decibel
dBA	A-weighted decibels
Caltrans	California Department of Transportatiaon
FTA	Federal Transit Administration
Hz	Hertz
in/sec	inch per second
LDL	Larson-Davis Laboratories
L_{eq}	equivalent noise level, an average of the sound energy occurring over a specified time period
L_{dn}	day-night sound level
L_{max}	maximum noise level, the highest instantaneous sound level measured during a specified period
µPa	micro-Pascals
PPV	peak particle velocity
RMS	root mean square
SPL	Sound Pressure Level
VdB	vibration decibel levels

1. Introduction

The purpose of the Proposed Project is to improve the safety of Lake Fordyce Dam by providing a permanent dam repair to reduce seepage in accordance with DSOD requirements. For more information about the Proposed Project, please refer to Section 1, Introduction, of the 2024 Addendum to the Initial Study and Mitigated Negative Declaration for the Lake Fordyce Dam Seepage Mitigation Project.

2. Regulatory Setting

2.1 Nevada County General Plan

The Nevada County General Plan, Noise Element (adopted in 2014) and Nevada County Code outline acceptable exterior noise standards for varying land uses and zoning districts. The Nevada County Exterior Noise Limits establish the exterior noise standards for “Rural” land uses of 55 dBA Leq and 75 dBA Lmax for project activities between 7 a.m. and 7 p.m.; 50 dBA Leq and 65 dBA Lmax for project activities between 7 p.m. and 10 p.m.; and 40 dBA Leq and 55 dBA Lmax for project activities between 10 p.m. and 7 a.m. As noted in the Nevada County Land Use

Development Code, Chapter II, Zoning Regulations (Section L II 4.1.7, Noise), construction activities are exempt from the County's noise standards (Nevada County 2019).

No Proposed Project construction activities would occur in Placer County. Additionally, as noted in the Placer County Code, Chapter 9, Article 9.36 (Section 9.36.030, Exemptions) sound emanating from construction activities between the hours of 6 a.m. and 8 p.m. Monday through Friday, and between the hours of 8 a.m. and 8 p.m. Saturday and Sunday are exempt, provided that all construction equipment is fitted with factory installed muffling devices and that all construction equipment is maintained in good working order (Placer County 2020).

2.2 Applicable Vibration Regulations

Nevada County does not have any standards regarding construction vibration and no construction activities resulting in vibration would occur in Placer County.

Acoustical Terms are shown in Appendix A.

3. Ambient Noise

3.1 Existing Noise Sources

No substantial noise sources are in the project area. The project area is undeveloped and generally uninhabited. What noise is generated in the area would be from intermittent vehicle and OHVs using local roads, and potentially from timber harvest operations. Occasionally, PG&E requires helicopter operations to bring personnel or materials to the dam site. Noise-sensitive land uses generally consist of those uses where exposure to noise would result in adverse effects and uses for which quiet is an essential element of the intended purpose.

3.2 Noise-Sensitive Land Uses

Noise-sensitive land uses are those uses for which quiet is an essential element of the purpose and function of the subject land use. Residential uses are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Schools, places of worship, hotels, libraries, health facilities, and other places where low interior noise levels are essential are also considered noise-sensitive land uses. Parks, historic sites, cemeteries, and recreation areas are also considered sensitive to increases in exterior noise levels.

Residential areas, hospitals, schools, and parks are examples of noise-sensitive receptor locations that could be more acutely affected by changes in existing environmental noise levels. Visitors to Lake Fordyce would be considered noise-sensitive receptors; however, informal recreational opportunities at Lake Fordyce would be restricted during construction.

4. Methodology

The following formulas were used to calculate the over-air pressure levels and ground vibration levels based on the Caltrans Transportation and Construction Vibration Guidance Manual (Caltrans 2020).

4.1 Blast Noise

Peak Air Overpressure (psi) = K(Ds)^-1.2

Where: Ds = cube-root scaled distance (distance to the receiver in ft, divided by the cube root of charge weight in lbs.

The curves representing the normal upper and lower bounds for confined charges use combined K factors (intercepts at a Ds of 1) of 2.5 and 0.78, respectively. The curve for unconfined charges uses a combined K factor of 82.

The attenuation slope of –1.2 is typical for static conditions and represents a reduction of approximately 7.2 dB for each doubling of distance. Some researchers have used attenuation slopes as flat as –1.0 (corresponding to 6 dB per doubling of distance), but the difference does not become a major factor until a considerable distance has been reached. Atmospheric variables such as wind and temperature inversions have a greater effect on attenuation.

To convert psi to decibels, the following formula was used:

dB = 20 log (psi / 2.9 x 10^-9)

4.2 Blasting Vibration

PPV (in/sec) = K(Ds)^-1.6

Where: PPV = peak particle velocity in /sec

Ds = square-root scaled distance (distance to the receiver in ft. divided by the square root of charge weights in lbs.

K = a variable subject to many factors

K = 24 to 242 for most conventional blasts

K = 605 for blast under extremely high confinement

5. Short-Term Blasting Noise

Construction noise levels would fluctuate depending on the type, number, and duration of use for the various pieces of construction equipment. The effects of construction noise largely depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise-sensitive receptors, and the existing ambient noise environment in the receptor's vicinity. Blasting could be required during project construction if needed to excavate hard-rock areas. Blasting could generate substantial noise levels. The highest noise levels associated with construction activities typically occur during blasting.

Accounting for the intervening ridges[1] between the project site and the nearest camping sites, project-related blasting activities would generate a noise level of up to 53 to 63 dB L_{max} at the nearest noise-sensitive uses, which are located about 2 miles from the project site.

Calculations of blasting noise are shown in Appendix B.

[1] An earthen berm, such as a levee, can provide noise attenuation of up to 15 dBA if it is several feet higher than the "line of sight" between the noise source and the receiver (FHWA 2017).

6. Short-term Blasting Vibration

Construction activities have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used, the location of construction activities relative to sensitive receptors, and the operations/activities involved. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. The type and density of soil can also affect the transmission of energy. Blasting could be required during project construction if needed to excavate hard-rock areas. Blasting could generate substantial vibration or ground-borne noise levels. The highest vibration levels associated with construction activities typically occur during blasting.

The California Department of Transportation (Caltrans) has developed criteria that are commonly applied as an industry standard to determine the impacts of project vibration relative to human annoyance and structural damage. Caltrans determines that the vibration level of 80 vibration decibel levels (VdB; 0.04 inch per second [in/sec] peak particle velocity [PPV]) would be distinctly perceptible. Therefore, remaining less than 80 VdB at residential uses would avoid human annoyance. Also, Caltrans recommends staying below 0.3 in/sec PPV at older residential structures, and below 0.5 for new residential structures, to avoid structural damage (Caltrans 2020).

The vibration-sensitive use (Lake Fordyce Dam) nearest to the construction site is located at approximately 300 feet from the dam. The resulting vibration level from the blasting would be 85 VdB and 0.0048 in/sec PPV to 0.0488 in/sec PPV at a distance of 1,000 feet, which would be below the 0.5 in/sec PPV recommended by Caltrans for structural damage. Therefore, short-term construction of the project would not exceed the threshold for structural damage, but would expose persons to or generate excessive groundborne noise or vibration.

Calculations of blasting vibration are shown in Appendix B.

7. Statement of Limitations

This technical report is for the sole use and benefit of AECOM, the State Water Resources Control Board, and their authorized representatives. The scope of services performed in execution of this effort may not be appropriate to satisfy the needs of other users, and any use or reuse of this document or the findings, conclusions, or recommendations presented herein is at the sole risk of said user. No expressed or implied representation or warranty is included or intended in this document, except that the work was performed with the customary thoroughness and competence of professionals working in the same area on similar projects.

8. References

California Department of Transportation. 2013. Technical Noise Supplement. Sacramento, CA. Prepared by IFC Jones & Stokes, Sacramento, CA.

California Department of Transportation. 2020. Transportation and Construction Vibration Guidance Manual, April 2020.

Caltrans. *See* California Department of Transportation.

Nevada County. 2014.The Nevada County General Plan, Noise Element (adopted in 2014).

Nevada County Code.

U.S. Federal Highway Administration (FHWA). 2017. Physical Techniques to Reduce Noise Impacts.

Federal Transit Administration. 2018 (September). *Transit Noise and Vibration Impact Assessment Manual*. FTA Report No. 0123.

FHWA. *See* Federal Highway Administration.

FTA. *See* Federal Transit Administration.

Appendix A – Fundamentals of Acoustics and Environmental Noise

Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air). Noise is generally defined as unwanted sound (i.e., loud, unexpected, or annoying sound). Acoustics is defined as the physics of sound. In acoustics, the fundamental scientific model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. Acoustics addresses primarily the propagation and control of sound.

Frequency

The number of sound pressure peaks traveling past a given point in a single second is referred to as the frequency, expressed in cycles per second or Hertz (Hz). A given sound may consist of energy at a single frequency (pure tone) or in many frequencies over a broad frequency range (or band). Human hearing is generally affected by sound frequencies between 20 Hz and 20,000 Hz (20 kilohertz).

Sound having a high concentration of energy in a relatively narrow frequency band may be considered “tonal” in character. Sources of noise that may be tonal noise include fans, motors, transformers, and compressors. These sources generally have moving parts that rotate, oscillate, or vibrate at a given speed, producing a distinct tonal noise output directly related to that speed.

Amplitude

The amplitude of pressure waves generated by a sound source determines the perceived loudness of that source. Sound pressure amplitude is measured in micro-Pascals (µPa). One µPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 µPa to 100,000,000 µPa. Because of this huge range of values, sound is rarely expressed in terms of pressure. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of human hearing (near total silence) is approximately 0 dB, which corresponds to 20 µPa.

Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic means. Under the decibel scale, a doubling of sound energy corresponds to a 3 dB increase. In other words, when two sources are each producing sound of the same loudness, the resulting sound level at a given distance would be approximately 3 dB higher than one of the sources under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB – rather they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level of approximately 5 dB louder than one source, and ten sources of equal loudness together produce a sound level of approximately 10 dB louder than the single source.

A-Weighted Decibels

Exhibit A-1 illustrates sound levels associated with common sound sources. The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental sound levels, perception of loudness is relatively predictable, and can be approximated by frequency filtering using the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard descriptor for environmental noise assessment. All noise levels reported in this report are A-weighted.

Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3 dB increase in sound level. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured.

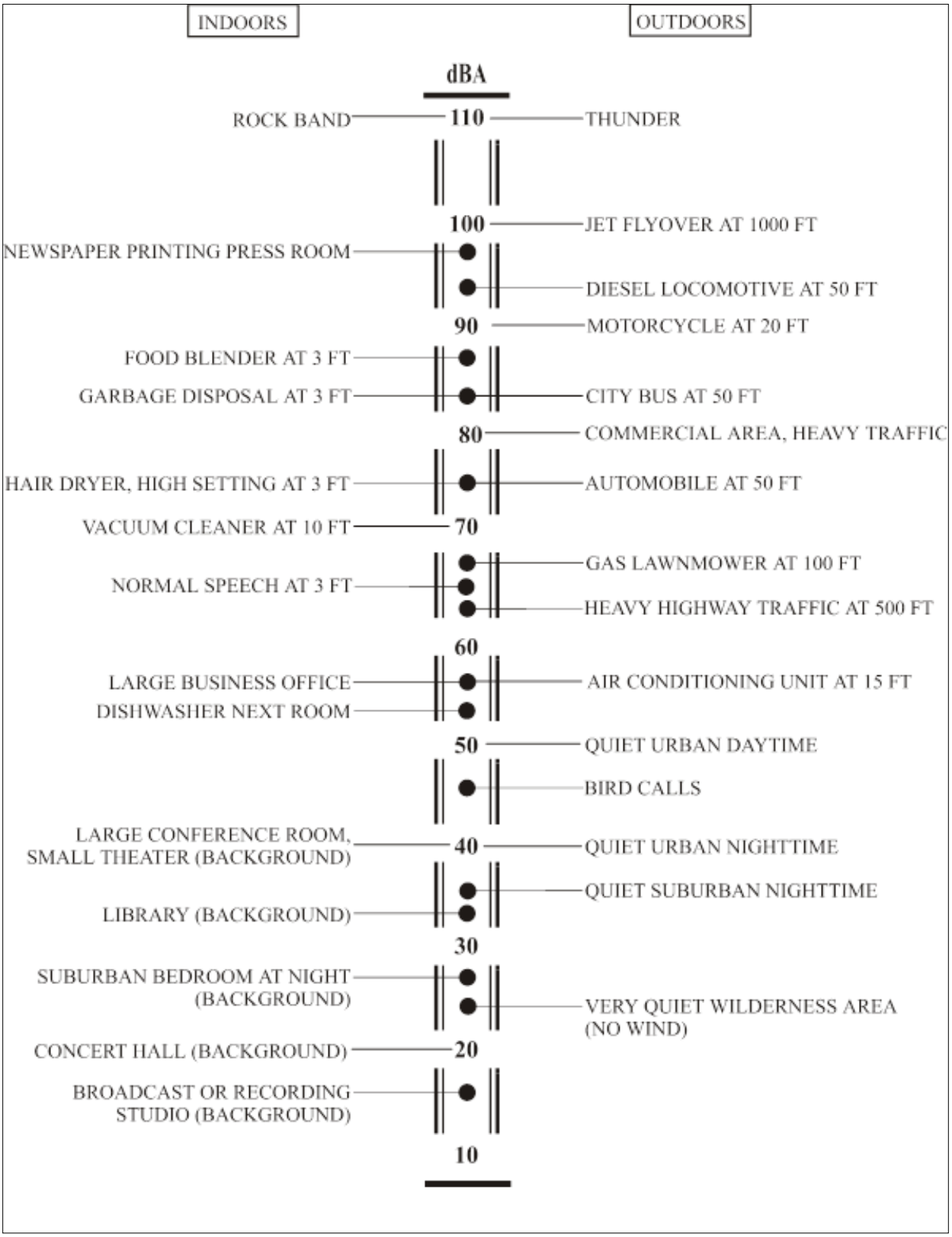
Under controlled conditions in a laboratory setting, the trained, healthy human ear is able to discern 1 dB changes in sound levels when exposed to steady, single-frequency (“pure-tone”) signals in the mid-frequency range (1,000 Hz to 8,000 Hz). In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5 dB increase is generally perceived as a distinctly noticeable increase, and a 10 dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy that would result in a 3 dB increase in sound pressure level would generally be perceived as barely detectable. Please refer to Table A-1.

Noise-Sensitive Land Uses

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Noise-sensitive land uses typically include residences, hospitals, schools, transient lodging, libraries, and certain types of recreational uses. Noise-sensitive residential receivers are found throughout the study area.

Noise Descriptors

Noise in our daily environments fluctuates over time. Some fluctuations are minor, but some are substantial. Some noise levels occur in regular patterns, but others are random. Some noise levels fluctuate rapidly, but others slowly. Some noise levels vary widely, but others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors most commonly used in environmental noise analysis, and may be applicable to this study.



Source: Caltrans 2013

Exhibit A-1 **Decibel Scale and Common Noise Sources**

Table A-1 Approximate Relationship Between Increases in Environmental Noise Level and Human Perception

Noise Level Increase, (decibels)	Human Perception (Typical)
up to about 3	not perceptible
about 3	barely perceptible
about 5	distinctly noticeable
about 10	twice as loud
about 20	four times as loud

Source: Caltrans 2013.

- **Equivalent Sound Level (L_{eq}):** The L_{eq} represents an average of the sound energy occurring over a specified time period. In effect, the L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour, A-weighted equivalent sound level ($L_{eq}[h]$) is the energy average of A-weighted sound levels occurring during a 1-hour period, and is the basis for noise abatement criteria (NAC) used by Caltrans and the FHWA.

- **Percentile-Exceeded Sound Level (L_n):** The L_n represents the sound level exceeded "n" percentage of a specified period (e.g., L_{10} is the sound level exceeded 10 percent of the time, and L_{90} is the sound level exceeded 90 percent of the time).

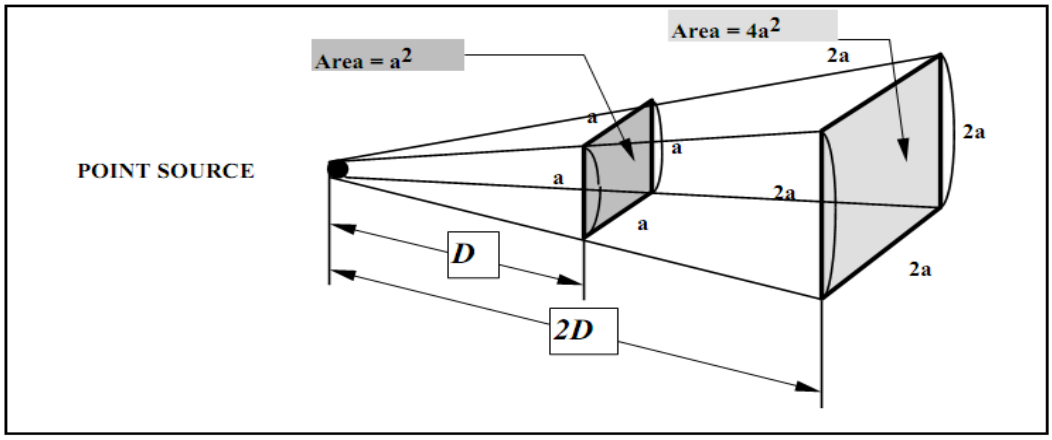
- **Maximum Sound Level (L_{max}):** The L_{max} is the highest instantaneous sound level measured during a specified period.

- **Day-Night Average Sound Level (L_{dn}):** The L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during nighttime hours (10 p.m. to 7 a.m.). The L_{dn} is often noted as the DNL.

- **Community Noise Equivalent Level (CNEL):** Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during the nighttime hours (10 p.m. to 7 a.m.), and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours (7 p.m. to 10 p.m.). The CNEL is usually within 1 dB of the L_{dn}, and for all intents and purposes, the two are interchangeable. Because it is easier to compute and of more common use, the L_{dn} is used as the long-term noise measure in this study.

Sound Propagation/Geometric Spreading

Sound from a localized source (i.e., point source), such as a construction area, propagates uniformly outward in a spherical pattern; therefore, this type of propagation is called *spherical spreading*. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point/stationary source as its energy is continuously spread out over a spherical surface (see Exhibit A-2).



Source: Caltrans 2013

Exhibit A-2 **Point Source Spreading with Distance**

Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides) and human activity (explosions; traffic; and operation of machinery, trains, or construction equipment). Vibration sources may be continuous (e.g., operating factory machinery) or transient (e.g., explosions).

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. RMS is a measurement of the effective energy content in a vibration signal, expressed mathematically as the average of the squared amplitude of the signal. PPV is typically used in the monitoring of transient and impact vibration, and has been found to correlate well to the stresses experienced by buildings (FTA 2018; Caltrans 2020). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response to vibration. The response of the human body to vibration relates well to average vibration amplitude. Therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity, and like airborne sound impacts on humans, vibration velocity can be expressed in dB notation, as vibration decibels (VdB).[2]
Table A-2 summarizes the general human response to different levels of groundborne vibration.

Table A-2 Human Response to Different Levels of Groundborne Vibration

Vibration-Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there is an infrequent number of events per day.

Source: FTA 2018

Note:

VdB = vibration decibels, referenced to 1 micro-inch per second and based on the root-mean-square vibration velocity

[2] Vibration levels described in VdB are referenced to 1 micro-inch per second.

The effects of groundborne vibration include movement of building floors, rattling of windows, shaking of items that sit on shelves or hang on walls, and rumbling sounds. In extreme cases, vibration can damage buildings, although this is not a factor for most projects. Human annoyance from groundborne vibration often occurs when vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance can be well below the damage threshold for normal buildings. Table A-3 shows the general thresholds for structural responses to vibration levels.

Table A-3 Structural Responses to Vibration Levels

Structure and Condition	Peak Vibration Threshold (in/sec PPV)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Table 19, Caltrans 2020.

Notes:

Transient sources, such as blasting or drop balls, create a single isolated vibration event. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

in/sec = inches per second
PPV = peak particle velocity

Appendix B – Blasting Noise and Vibration Calculations

Project-Generated Blasting Source Noise Prediction Model

Location	Distance to Nearest Receiver in feet		Threshold (dBA)	Predicted Noise Level (dBA)	
	Lower Bound	Upper Bound		Lower Bound	Upper Bound
Threshold	96,565	255,616	60		
Receptor	10560			83	93
	2000			100	111
	1900			101	111
	4850			91	101
	3400			95	105
	1650			102	113
	1125			106	117
	100000			60	70
	180000			54	64

Input	Lower Bound	Upper Bound
K	0.78	2.5
Distance	10560	10560
Charge Weight	24	24
Ds	**3660.9475**	**3660.9475**
psi	**0.0000**	**0.0001**

Ground Type	Soft
Ground Factor	-1.20

Combined Predicted Noise Level (Linear Peak dBA)	Lower Bound	Upper Bound
	83.0	**93.2**

Sources:
Obtained from the Caltrans Transportation and Construction Vibration Guidance Manual, April 2020.
Peak Air Overpressure (psi) = K(Ds)^-1.2
Where: Ds = cube-root scaled distance (distance to receiver in ft, divided by cube root of charge weight in lbs.)
If it is desirable to convert psi to decibels, the following formula can be used:
dB = 20 log (psi / 2.9 x 10 -9)

Project-Generated Blasting Source Vibration Prediction Model

Distance to Threshold in feet		Threshold
Lower Bound	Upper Bound	PPV
55	233	0.5000

Input	Lower Bound	Upper Bound
K	24	242
Distance	1000	1000
Charge Weight	24	24
Ds	**204.1241**	**204.1241**
PPV	**0.0048**	**0.0488**
K	24	242
Distance	300	300
Charge Weight	24	24
Ds	**61.2372**	**61.2372**
PPV	**0.0332**	**0.3346**

Receptor	Distance	PPV		VdB	
		Lower Bound	Upper Bound	Lower Bound	Upper Bound
	1000	0.0048	0.0488	61.6	81.7
	100	0.1925	1.9408	93.6	113.7
	200	0.0635	0.6402	84.0	104.1
	300	0.0332	0.3346	78.4	98.5
	400	0.0209	0.2112	74.4	94.5
	800	0.0069	0.0697	64.7	84.8
	1600	0.0023	0.0230	55.1	75.2
	3200	0.0008	0.0076	45.5	65.6
	10560	0.0001	0.0011	28.9	49.0

Sources:

Obtained from the Caltrans Transportation and Construction Vibration Guidance Manual, April 2020.