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Bottle Rock Power, LLC

Petition to Amend

Bottle Rock Geothermal Power Project (79-AFC-4)

April 2023

Bottle Rock Power, LLC

Petition to Amend
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April 2023

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Acronyms

AC	alternating current
ACC	air-cooled condenser
ADA	anthraquinone disulfonic acid
AFC	Application for Certification
AST	aboveground storage tanks
ASTM	American Society for Testing Materials
BAAQMD	Bay Area Air Quality Management District
BRP	Bottle Rock Power, LLC
BRPP	Bottle Rock Power Plant
CAAQS	California Ambient Air Quality Standard
CalEEMod	California Emissions Estimator Model
CalFIRE	California Department of Forestry and Fire Protection
CalGEM	California Geologic Energy Management Division
Cal/OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CBC	California Building Code
CBO	Chief Building Official
CBSC	California Building Standards Code
CCR	California Code of Regulations
CEC	California Energy Commission
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent

COC	conditions of certification
CPSs	condensate processing systems
CPM	Compliance Project Manager
CUPA	Certified Unified Program Agency Database
CVC	California Vehicle Code
dB	decibels
DTSC	Department of Toxic Substances Controls
DWR	Department of Water Resources
EIR	Environmental Impact Report
ELF	equivalent lateral force
ESA	Environmental Site Assessment
FTA	Federal Transit Administration
GAMP	Geysers Air Monitoring Program
GHGs	greenhouse gases
gpd	gallons per day
GSU	generator step-up
HMBP	Hazardous Materials Business Plan
H_2S	hydrogen sulfide
HFCs	hydrofluorocarbons
IBC	intermediate bulk containers
kV	kilovolt
lbs	pounds
LCAB	Lake County Air Basin
LCAQMD	Lake County Air Quality Management District
L_{eq}	equivalent continuous sound level
LORS	laws, ordinances, regulations, or standards

LOTO	lockout/tagout
LT	long ton
MCC	motor control centers
mg/L	milligrams per liter
mph	miles per hour
MW	megawatt
MWh	megawatt hour
NAAQS	National Ambient Air Quality Standard
NCG	non-condensable gas
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NOA	naturally occurring asbestos
NOP	Notice of Preparation
NOx	nitrogen oxide
OITC	Outdoor/Indoor Transmission Class
OSHA	Occupational Safety and Health Administration
ORC	Organic Rankine cycle
PB	lead
pCi/kg	picocurie/kilogram
PDC	Power Distribution Center
PFCs	perfluorocarbons
PG&E	Pacific Gas & Electric
$PM_{2.5}$	particulate matter fewer than 2.5 microns in diameter
PM_{10}	particulate matter fewer than 10 microns in diameter
PLC	programmable logic controller
ppb	parts per billion

ppm	parts per million
ppv	peak particle velocity
Project	Mayacma Geothermal Project
PTA	Petition to Amend
REC	recognized environmental conditions
ROG	reactive organic gases
SF_6	sulfur hexafluoride
SFBAAB	San Francisco Bay Area Air Basin
SMBRP	Site Mitigation Brownfields Reuse Program
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control and Countermeasures
SR	State Route
TAC	toxic air contaminant
U.S. EPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UV	ultraviolet
VHFHSZ	very high fire hazard severity zone
VFD	variable frequency drives
W	effective seismic weight

1 Introduction

1.1 Overview of Petition to Amend

Bottle Rock Power, LLC, (BRP) is filing this Petition to Amend (PTA) on behalf of Mayacma Geothermal LLC. Mayacma Geothermal LLC, proposes to construct and operate a 7.5-megawatt (MW) binary geothermal power plant within the approximately 6 -acre Bottle Rock Power Plant (BRPP) site, located at 7385 High Valley Road, Cobb, California. This PTA includes the information required pursuant to California Code of Regulations (CCR) Title 20, section 1769(a)(1).

1.2 Background

The California Energy Commission (CEC) certified the Department of Water Resources (DWR) BRPP Application for Certification (AFC) in 1980 (Order 79-AFC-4). DWR constructed the BRPP and commenced geothermal power production in 1985. DWR ceased operation of the BRPP in 1990 due to reduced steam capacity. In 1993, the CEC approved an amendment to reduce the monitoring and reporting requirements during plant shutdown. In 2001, the CEC approved the transfer of ownership to Bottle Rock Power Corporation. In 2005, the CEC approved an amendment to its decision that extended the environmental monitoring program during suspended operation. In 2006, the CEC approved an amendment to transfer ownership to BRP, restart operations of the BRPP, and complete design changes to the facility. In 2013, the CEC approved an amendment to the decision to change the financial assurance and closure bond requirements. BRPP went into shutdown and non-operational status on April 1, 2015, and has remained non-operational since that time. The history of CEC decisions for the BRPP is summarized in Table 1.2-1.

BRP filed a petition to change operational control of the BRPP to Mayacma Geothermal LLC, on February 14, 2023, to reflect Mayacma Geothermal's operational control over the geothermal resource and BRPP under the terms of the lease agreement and asset purchase agreement between BRP and Mayacma Geothermal LLC. Mayacma Geothermal LLC, would have operational control over the proposed modifications to the BRPP included in this PTA.

The BRPP steam field, including the existing geothermal wells, steam pipelines, and access roads, are operated and maintained under the jurisdiction of Lake County (UP 85-27, UPX 12-02, and MMU 10-01). Lake County published an Environmental Impact Report (EIR) for the Bottle Rock Steam Project in 1980 and a Supplemental EIR in 1985.

Table 1.2-1 Prior CEC Decisions/Orders for the BRPP

Decision/Order	Description
79-AFC-4	CEC decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project (October 1980); approved development of the 55 MW Bottle Rock Geothermal Power Plant
Order No. 93-0426-02	Authorized reduced environmental monitoring during a 5-year suspension of operations at Bottle Rock Geothermal Power Plant (1993)
Order No. 97-1203-1(a)	Approved an extension to reduced environmental monitoring during suspended operations (1997)
Order No. 01-0539-07	Approved transfer of ownership from Department of Water Resources to the Bottle Rock Power Corporation (May 2001)
Order No. 06-1213-12	Approved change of ownership to Bottler Rock Power LLC, restart of operation, after suspension, and 11 facility design changes (2006)
Order No. 13-1211-3	Updated compliance conditions of certification; the bond amount for the project was adjusted as a result of the order (2013)

1.3 Summary of Proposed Modifications

The Mayacma Geothermal Project, or amended BRPP, would include the construction and operation, and decommissioning of a 7.5-MW binary geothermal power plant within the existing BRPP site in Lake County, California. BRP proposes the following modifications to the BRP license:

- Installation of two *organic Rankine cycle* (ORC) binary power generation units with a net power generation capacity of 7.5 MW
- Installation of two *power distribution center* (PDC) structures
- Removal of the existing water-cooling tower and replacement
- Installation of two *air-cooled condensers* (ACCs) consisting of sixteen cells and thirty-two fans
- Installation of new pipelines to connect the steam supply to the new ORC units[1]
- Installation of new pipelines to connect the *non-condensable gas* (NCG) streams from the ORC units to the Stretford hydrogen sulfide (H_2S) abatement and catalyst reactor H_2S abatement tanks
- Installation of a new steam-vent stack with associated H_2S treatment tank and pumps to be located near the ORCs

[1] The portion of the new steam pipeline located outside of the BRPP fence line would be subject to Lake County jurisdiction and would require Lake County approval to construct.

- New electrical line and switchgear to tie in to the new power generation to the existing *generator step-up* (GSU) transformer
- Removal of the circulating water pumps and associated piping below the existing water-cooling tower
- Installation of a new condensate pipeline from the ORC units to the injection well on the Coleman Well Pad[2]
- Removal of the existing steam supply pipeline to the turbine generator, steam-stacking pipelines, and vent stack

Demolition and removal of the existing BRPP facilities was previously evaluated in CEC Order 79-AFC-4 and would be conducted in the absence of this amendment to the CEC Decision. As such, demolition of existing BRPP facilities is not considered part of this PTA and demolition activities are instead considered a cumulative project within the context of this PTA. Demolition and removal of the water-cooling tower is anticipated to occur in advance of construction of the amended BRPP facilities, and removal and demolition of the existing steam supply to the turbine generator building, steam-stacking system, and rock muffler would occur concurrent with other PTA construction activities at the site. Demolition activities are described and the environmental impacts of demolition activities are analyzed in this PTA to provide a complete scope of activities that would occur at the site.

1.4 Necessity of Proposed Modification

Sections 1769 (a)(1)(A), (B), and (C) of the CEC Power Plant Site Certification regulations require a discussion of the necessity for the proposed modification and whether the modification is based on information known by the petitioner during the certification proceeding.

The BRPP ceased operation in 2015, and has been in standby mode since. The amendment includes installation of new technology that has been designed at a capacity that is compatible with the existing steam supply. The new infrastructure would use binary technology to conserve the geothermal reservoir and reinject all condensate to the BRPP steam field. The amendment also includes replacement of the water-cooling tower with air-cooled condensers so that the power generation process would not require consumptive use of water.

The proposed modification to the BRPP facilities is needed to support future geothermal generation at the BRPP in an efficient manner. The reduced steam supply at the BRPP could not have been known by DWR at the time of the BRPP design and licensing in 1980. The facility was designed and licensed based on the expected geothermal capacity at the time of licensing. The change in technology was not known during prior amendments to the BRPP and has become an

[2] The portion of the new condensate pipeline outside of the BRPP fence line co-located with the new steam pipeline would be subject to Lake County jurisdiction and would require Lake County approval to construct.

option due to the recent change in operational control of the facility to Mayacma Geothermal LLC. Mayacma Geothermal LLC has experience constructing and operating binary geothermal facilities with similar capacity and design to those proposed at the BRPP.

1.5 Summary of Environmental Effects

Section 1769 (a)(1)(E) of the CEC Power Plant Site Certification regulations requires that an analysis be conducted to address impacts a proposed modification may have on the environment and proposed measures to mitigate any significant adverse impacts. Section 1769 (a)(1)(F) requires a discussion on whether the proposed modification affects the facility's ability to comply with applicable laws, ordinances, regulations, and standards (LORS).

As evaluated in Section 3 of this PTA, the modification described in this PTA would not result in any new or increased significant effects not addressed in the original AFC proceeding or Lake County EIRs. A summary of the conclusions for each of the environmental technical areas evaluated in the decision and CEC Staff Assessment are presented in Table 1.5-1 below. The amendment would not modify the transmission line system and does not involve any grading. Transmission line safety and nuisance and civil engineering is therefore not discussed further.

Table 1.5-1 Summary of Environmental Effects and Changes to Conditions of Certification (COCs)

Technical area	Summary of environmental effects and changes to COCs
Air quality	Air quality emissions from the amended BRPP would be less than previously evaluated in Order 79-AFC-4. The modifications to the operating equipment and upgrades to emission abatement technology require modifications to the following COCs applicable to air quality: DOC-2, DOC-3, DOC-6, DOC-7, DOC-10, DOC-14, DOC-15, DOC-19, DOC-20, AC20-5, AC25-2, 1-3, 2-2, and 2-3 The following COCs no longer apply to BRPP due to changes in the project and removal of equipment that the COC specifically applies to: DOC-5, DOC-11, DOC-23, AC20, AC20-2, AC20-3, AC24-1, AC24-2, AC24-3, AC24-4, AC24-5, AC24-6, AC26-1, AC26-2, AC26-3, AC26-4, AC26-5, and AC26-6
Biological resources	The proposed power generating facilities would be located within the BRPP site and would not affect plant or wildlife habitat. The impact on nesting birds during construction would be temporary, and no biological resource impacts would exceed those of the approved BRPP. The proposed steam and condensate pipelines would be co-located on new steam pipeline supports in disturbed areas and would avoid impacts on habitat including streams and riparian areas. COCs 5-2, 5-3.b, 5-3.c, 5-3.i, and 5.3-j require modification to update the name of California Department of Fish and Wildlife (from California Department of Fish and Game), align the sampling location names and timing with the water board permit, and remove groundwater monitoring at locations that are no longer accessible. COC 5-3.d is deleted because years of monitoring data have demonstrated that birds prefer the native habitat to the nest boxes.
Cultural resources	The amended BRPP facilities avoid any known cultural resources. The amended BRPP would not result in any new cultural resources impacts or modify any COCs pertaining to cultural resources.

Technical area	Summary of environmental effects and changes to COCs
Geologic hazards/structural engineering	The amended BRPP facilities would be located within and immediately adjacent to the previously graded and developed BRPP site. The facilities would be designed to comply with current California Building Standards Code (CBSC). The amended BRPP would not result in any new geologic hazards impacts. COCs 10-1, 10-5, and 10-6 require modification to reflect current building standards.
Hazards and hazardous materials	The amended BRPP would not introduce any new hazards or hazardous materials to the BRPP site. The volume of hazardous material required for the amended BRPP would be less than previously evaluated for the BRPP site. The amended BRPP would also install a metal air-cooled condenser in place of the wooden water-cooling tower, which would reduce the fire hazard at the site. The impact of the amended BRPP would be less than the licensed BRPP. The amended BRPP would not modify any COCs pertaining to hazards or hazardous materials.
Land use	The amended BRPP is consistent with the existing geothermal use of the site. The amended BRPP would not affect land use. No COCs apply to land use.
Noise and vibration	The amended BRPP would install new ORC units and air-cooled condensers. The amended BRPP equipment is being designed to comply with the noise standards specified in the COCs. The amended BRPP includes minor technical clarifications to COCs 16-1 and 16-2.
Paleontological resources	The amended BRPP would not disturb any known paleontological resources. The amended BRPP would not result in any new or increased paleontological resource impacts. No COCs pertain to paleontological resources.
Public health	The amended BRPP would result in reduced emissions of pollutants that are a concern to public health. The amended BRPP would also replace the existing water-cooling tower with an air-cooling tower and thereby removes the risk of Legionella. The amended BRPP would therefore result in less impact on public health than the existing BRPP. The modifications to the BRPP equipment require modifications to COCs 2-2 and 2-3. COC 2-10 no longer applies to the BRPP due to removal of the water-cooling tower.
Socioeconomics and aesthetics	The amended BRPP would not adversely affect socioeconomics or aesthetics. The proposed equipment would be shorter in height than the removed equipment and existing equipment at the site. No COCs for socioeconomics or aesthetics apply to the amended BRPP.
Soil and water resources	The proposed power generating facilities would be located within and immediately adjacent to the BRPP site and would not affect soil and water resources. The amended BRPP would use air cooling instead of water cooling, which would significantly reduce the water demand of the BRPP compared to the licensed BRPP. The amended BRPP would not modify any COCs pertaining to soil or water resources.
Traffic and transportation	The amended BRPP would not modify the road network for the BRPP and would not result in any new or increased traffic or transportation impact. No COCs pertain to traffic and transportation.

Technical area	Summary of environmental effects and changes to COCs
Waste management	The amended BRPP would result in reduced waste generation due to the reduced operating capacity of the amended BRPP relative to the licensed BRPP. COC 11-2 would be modified to address the change in technology, and COC 11-8 no longer applies to the BRPP due to removal of the water-cooling tower and associated sludge.
Worker health and safety	The amended BRPP would result in reduced risk to worker health and safety compared to the licensed BRPP due to removal of equipment that presented a risk to worker safety. COCs 2-10, 12-3, 12-5, and 12-6 no longer apply to the BRPP due to change in equipment and operations that remove potential safety hazards.

1.6 Compliance with Laws, Regulations, Ordinances, and Standards

Section 1769 (a)(1)(F) of the CEC Siting Regulations requires a discussion on whether the proposed modification affects the facility's ability to comply with applicable LORS. The amended BRPP would comply with all LORS applicable to construction, operation, and maintenance of the proposed facilities. The amended BRPP would not affect compliance with applicable LORS.

1.7 Summary of Effects on Public and Nearby Property Owners

Sections 1769(a)(1)(F) and 1769(a)(1)(H) of CEC Power Plant Site Certification regulations require a discussion of the potential effects of the modification on the public and nearby property owners. The potential effects of the amended BRPP on the public and nearby property owners are discussed in subsections 3.1 Air Quality, 3.5 Hazards and Hazardous Materials, 3.9 Public Health, 3.7 Noise and Vibration, and 3.10 Socioeconomics/Aesthetics. The amended BRPP would result in reduced air quality emissions relative to the licensed BRPP and would not result in any new or increased impacts on the public or nearby property owners.

1.8 Property Owners

Section 1769(a)(1)(G) of CEC Power Plant Site Certification regulations requires a list of current assessor's parcel numbers and owners' names and addresses for all parcels within 500 linear feet of any affected project linears and 1,000 feet of the project site. A list of current assessor's parcel numbers and addresses for parcels within 1,000 feet of the project are enclosed in Appendix A.

1.9 Consistency of Modification with License

Section 1769 (a)(1)(D) of the CEC Siting Regulations requires that, should the modification be based on new information that changes or undermines the assumptions, rationale, findings, or

other bases of the final decision, an explanation of why the change shall be permitted. As presented in this PTA, the amended BRPP does not change or undermine the assumptions, rationale, findings, or other bases of the final decision. The amended BRPP would produce geothermal power consistent with the overall goal of the licensed BRPP and would help meet state goals for mid-term reliability. The amended BRPP would result in impacts that are less than or the same as those of the licensed BRPP. The amended BRPP is also consistent with applicable LORS and COCs with minor modifications to some COCs to reflect changes in operating equipment.

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2 Project Description

2.1 Overview of Proposed Modification

The BRPP was licensed by the CEC as a 55-MW geothermal turbine-generator power plant in Lake County, California. The BRPP ceased operation in 2015 due to inadequate equipment and geothermal capacity. The geothermal resource at the site is no longer capable of efficiently supporting production of power using the existing 55-MW steam turbine generator. The proposed modification to the BRPP, referred to as the Mayacma Geothermal Project (project or amended BRPP) would be operated by Mayacma Geothermal LLC, under a lease from BRP. The proposed modification includes:

- Installation of two ORC binary power generation units with a net power generation capacity of 7.5 MW
- Installation of two PDC buildings
- Installation of two ACCs
- Installation of new pipelines to connect the steam supply to the new ORC units[3]
- Installation of new pipelines to connect the NCG streams from the ORC units to the Stretford H_2S abatement system (Stretford system) and catalyst reactor H_2S abatement tanks
- Installation of a new steam vent stack with associated H_2S treatment tank and pumps to be located near the ORCs
- New electrical line and switchgear to tie in to the new power generation to the existing GSU transformer
- Removal of the circulating water pumps and associated piping below the existing water-cooling tower
- Installation of a new condensate pipeline from the ORC units to the injection well on the Coleman Well Pad[4]

[3] The portion of the new steam pipeline located outside of the BRPP fence line would be subject to Lake County jurisdiction and would require Lake County approval to construct.

[4] The portion of the new condensate pipeline outside of the BRPP fence line co-located with the new steam pipeline would be subject to Lake County jurisdiction and would require Lake County approval to construct.

- Removal of the existing steam supply pipeline to the turbine generator building, steam-stacking system, and rock muffler

Various existing BRPP facilities would also be used, maintained, and tested as part of the project, including the following:

- Stretford system
- Fire protection system
- Domestic water system
- Compressed air system
- Stormwater drainage
- Sanitary system
- Production and injection pipelines
- Geothermal production and injection wells
- Groundwater wells and water supply pipelines
- Storage tanks
- Control room—relocated from the Turbine building to the Stretford building
- Emergency generator
- Other ancillary facilities

Although the use of water, stormwater, sanitary sewer, process wastewater, and electrical transmission facilities for the project would be similar to those required for the permitted BRPP, water use would be at a substantially reduced volume compared to the permitted capacity. This is due to the reduced 7.5-MW capacity of the proposed facilities and the associated reduction in steam flow and number of workers required to operate the facility, as well as process changes from water cooling to air cooling. The new facilities would use the existing interconnection capacity at the Bottle Rock Substation and would not require any modifications to offsite electrical transmission facilities. The project facilities referred to herein as the amended BRPP or project would be operated by Mayacma Geothermal LLC.

2.2 Proposed Facility Description, Design, and Operation

2.2.1 Process Overview

The ORC units are binary-type power production units that use nonflammable refrigerant as the motive or working fluid. Steam from the production wells would be collected in a common steam header and transferred to the ORCs. The project would construct a new steam pipeline to connect the ORCs to the existing steam header. The existing vent stack would be demolished, and a new vent stack would be sized according to the revised steam flow rate and located near the ORCs in order to facilitate startup and shutdown as well as to provide a venting location during short-term upset conditions. The steam being processed through the ORCs would flow through a series of heat exchangers to be cooled and condensed. As the steam is cooled, the heat would be transferred to the motive fluid, which would flash from liquid to vapor. The vapor phase of the motive fluid would flow through an expander, which would convert the thermal

energy into electrical energy via a synchronous *alternating current* (AC) generator. At the discharge of the expander, the vapor motive fluid would flow to an ACC to be cooled and condensed back into the liquid phase and recycled through the ORC process again via the receiver tank at the ACC and refrigerant feed pumps. The motive fluid cycle of the ORC would be a closed-loop cycle. On the process side of the heat exchangers, the two discharges are condensed steam (condensate) and NCGs. As a result of cooling the steam and condensing to liquid, there would be an off-gas effect of the naturally occurring NCGs in the steam phase. The NCGs would be transferred to the existing Stretford abatement system. As a backup to the Stretford abatement system, a new catalyst reactor H_2S abatement system would be installed at the site. Post-NCG removal, the condensate would be transferred to an existing injection well for reinjection via a new 4-inch condensate pipeline that would be co-located with the new steam pipeline on new pipeline supports. During upset conditions of the injection system, the condensate may be temporarily held in a condensate collection system; in this case, the condensate may off-gas NCGs that are trapped in the condensate. During this upset condition, the condensate would be treated with iron chelate, hydrogen peroxide, or other H_2S treatment process, if needed, to meet Lake County Air Quality Management District (LCAQMD) standards. Under normal conditions, the condensate would be directly injected rather than introduced to the atmosphere and, therefore, an abatement system would not be required.

2.2.2 Site Arrangement and Layout

Existing Site Conditions and Facilities

The project site contains the existing BRPP, geothermal well pads, geothermal wells, steam pipelines, injection pipeline, and access roads (as shown in Figure 2.2-1). The BRPP, including all production wells and pipelines, is not currently in operation. The existing BRPP facilities are shown in Figure 2.2-2. A Pacific Gas & Electric (PG&E) switching station within the Bottle Rock Power Substation is located on the western side of the BRPP. An office and laydown area are located adjacent the Francisco Well Pad. Three existing geothermal wells are present at the Coleman Well Pad, one at the Francisco Well Pad, and three at the West Coleman Well Pad that are connected to the steam-stacking facility via approximately 1.6 miles of cross-country steam pipelines. An additional injection well is located at the Coleman Well Pad. The injection well is connected to the existing injection pit at the power plant via approximately 0.5 mile of cross-country injection pipeline and to the condensate collection system from the gathering system. The power plant facility was licensed by the CEC under Order 79-AFC-4. The geothermal wells, steam pipelines, and access roads are permitted by Lake County use permits and the California Geologic Energy Management Division (CalGEM).

General Arrangement

Access to the amended BRPP facilities would be provided via the existing access road and entrance gate. The proposed modifications would be constructed on paved and graveled areas within the existing BRPP fence line and the steam pipeline and condensate pipeline would be located immediately adjacent to the fence in areas that have been cleared of vegetation for defensible space. The surrounding uses are predominately undeveloped open space, existing

geothermal facilities, and rural residential. The nearest residential structure is approximately 1,500 feet northeast of the fence line at the BRPP site, and the nearest property line is approximately 200 feet east of the BRPP site fence line. The general arrangement of the proposed and demolished facilities is shown in Figure 2.2-3 and Figure 2.2-4, respectively.

The project would connect to the same geothermal wells and steam pipelines at the permitted BRPP. The water supply, septic system, and emergency generator would be tested, and maintenance would be performed to ensure proper operation, but no modifications to these systems are proposed. The existing transmission line would not be modified.

2.2.3 Proposed Mayacma Project Facilities

Organic Rankine Cycle Binary Power Generation Units

Two new ORC units capable of producing a total of 8.836 MW gross and 7.5 MW net of geothermal power would be installed within an graveled portion of the site that is currently used for equipment storage. Each ORC unit would be approximately 40 feet long by 60 feet wide and up to 24.6 feet in height. The ORC units are located in the southeast area of the existing facility footprint and would not be visible from any public vantage point.

Major equipment within the ORC includes the expander, generator, heat exchangers (i.e., evaporator, preheater, condensate subcooler, and condensate tank), refrigerant receiver, expander lube oil system, and refrigerant-feed pump. The ORC units would be housed within a structure with walls to the east, north, and south. The walls would use noise blankets or functional equivalent to control noise emissions from the ORC units and comply with Lake County and CEC conditions for noise control at the property line.

Because the binary process does not use the steam resource to directly generate electricity but, rather, uses a secondary fluid to run the turbo-expanders, the binary process would conserve mass within the geothermal reservoir, which would support long-term sustainability of the geothermal resource.

Power Distribution Center

A PDC metal container would be located adjacent to each ORC unit to enclose and protect the electrical equipment related to the ORC. Each PDC would be 10 feet wide by 45 feet long and at a height of 15 feet at the highest point. Each PDC would be located on a concrete pier foundation and would house the following equipment:

- 480 V Switchgear
- 480 V *motor control centers* (MCCs) with *variable frequency drives* (VFDs)
- ORC generator control and exciter cabinets
- *Programmable logic controller* (PLC) panel(s)
- 480 V power distribution boards
- 480 V/120 V distribution transformers
- 120 V panelboards

Figure 2.2-1 Project Location and Existing Facilities

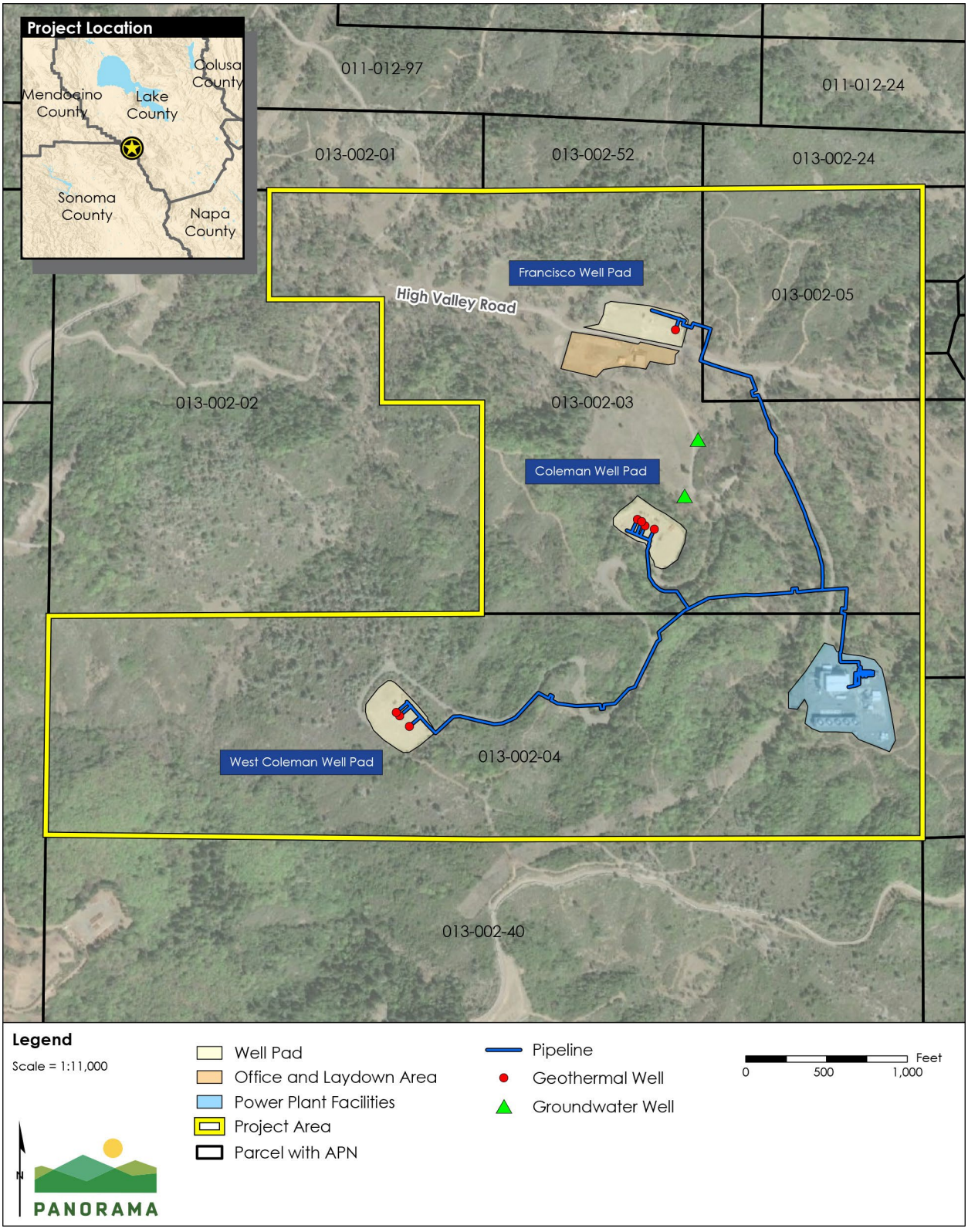
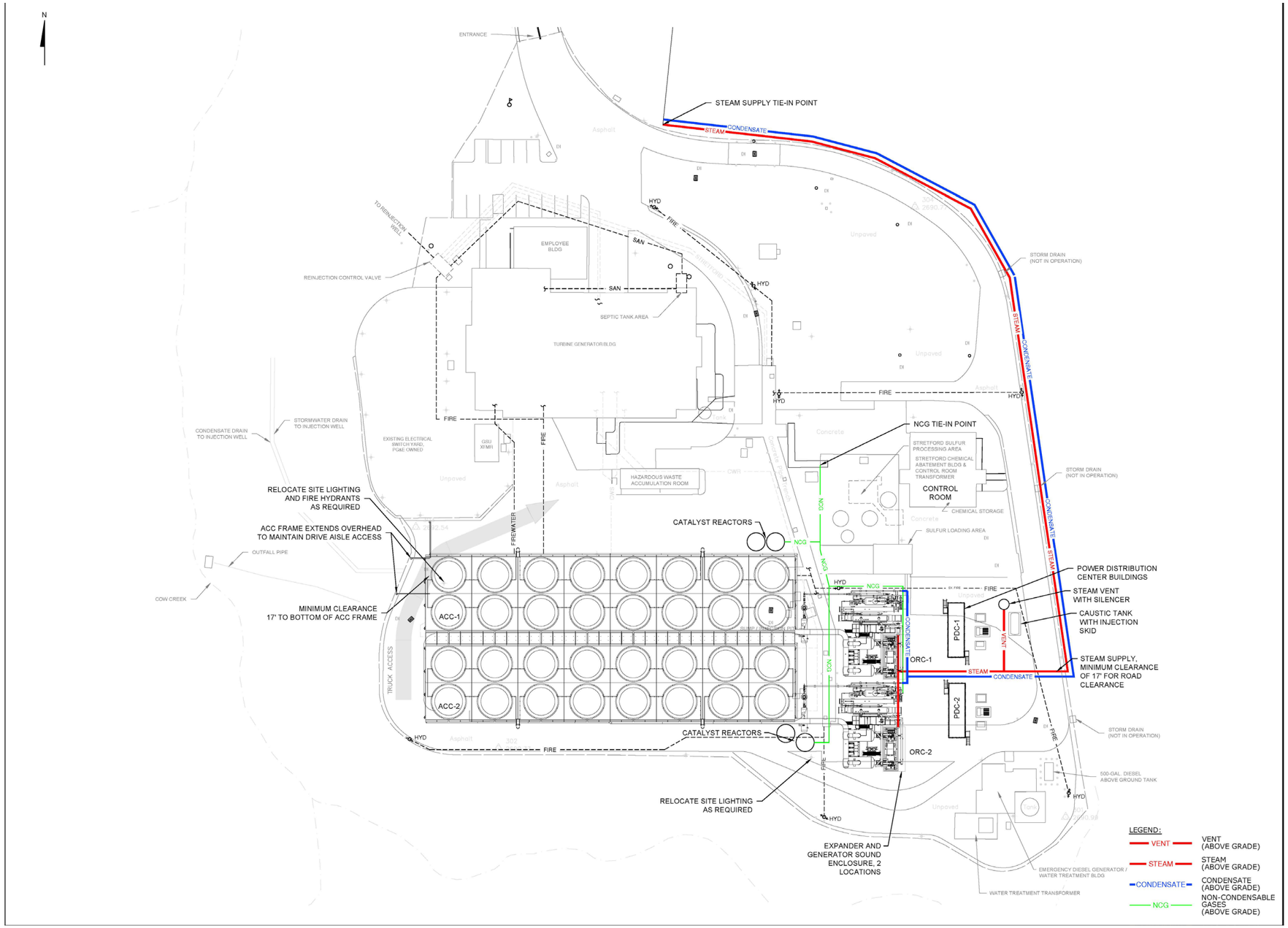


Figure 2.2-2 Existing Bottle Rock Power Plant Facilities

Figure 2.2-3 Amended BRPP Facilities



OPEN MOUNTAIN ENERGY
3451 N Triumph Blvd Ste 201, Lehi, UT 84043,
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TETRA TECH
TETRA TECH, INC.
4101 COX ROAD,
SUITE 120
GLEN ALLEN, VA 23060
TEL: (804) 290-4321
FAX: (804) 270-2739

PE STAMP:

PRELIMINARY
NOT FOR CONSTRUCTION

KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
A	03/03/2023	FOR CEC PERMITTING

PROJECT TITLE:
MAYACMA GEOTHERMAL LLC REPOWER PROJECT

PROJECT LOCATION:
7385 HIGH VALLEY ROAD
COBB, CA 95426

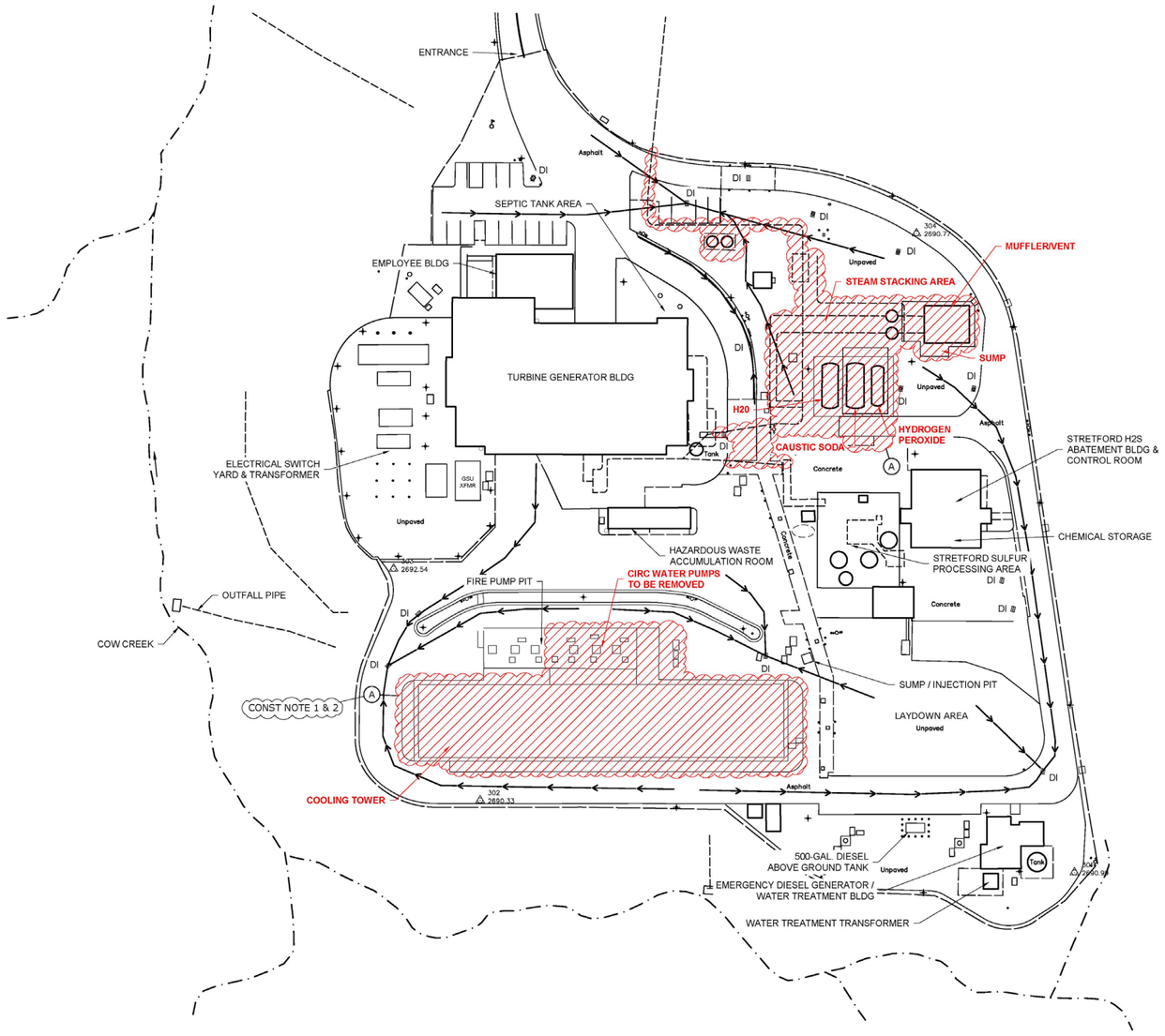
SHEET TITLE & DESCRIPTION:
SITE PLAN
GENERAL ARRANGEMENT

PROJ NUM:	194-G0437
DES:	S. RASMUSSEN
DWN:	A. COLISTA
CHK:	J. ABBATE
APV:	C. LUNDQUIST
DATE:	03/03/2023

SCALE AT 24" x 36":
1/32"=1'-0"

SHEET NO: C-1001
REV: A

Figure 2.2-4 Facilities Proposed for Demolition



A

LEGEND:

MATERIAL FOR DEMOLITION

CONSTRUCTION NOTES:

1. CONTRACTOR TO REMOVE HAZARDOUS MATERIALS IN ACCORDANCE WITH LOCAL & STATE REGULATIONS.
2. CONTRACTOR TO REMOVE COOLING TOWER WHILE MAINTAINING THE INTEGRITY OF THE FOUNDATION FOR THE PUMP PIT AND WATER BASIN.

OPEN MOUNTAIN ENERGY
3451 N Triumph Blvd Ste 201, Lehi, UT 84043,
(385) 352-8858

TETRA TECH
TETRA TECH, INC.
4101 COX ROAD,
SUITE 120
GLEN ALLEN, VA 23060
TEL: (804) 290-4321
FAX: (804) 270-2739

PE STAMP:

PRELIMINARY
NOT FOR CONSTRUCTION

KEY PLAN:

REVISIONS:

NO.	DATE	DESCRIPTION
A	02/17/2023	PRELIMINARY
B	02/21/2023	PRELIMINARY

PROJECT TITLE:

MAYACMA GEOTHERMAL LLC
REPOWER PROJECT

PROJECT LOCATION:

7385 HIGH VALLEY ROAD
COBB, CA 95426

SHEET TITLE & DESCRIPTION:

DEMOLITION
SITE PLAN

PROJ NUM:	194-G0437
DES:	S. RASMUSSEN
DWN:	A. COLISTA
CHK:	A. MCGREAL
APV:	C. LUNDQUIST
DATE:	11/08/2022

SCALE AT 24" x 36":
1"=40'

SHEET NO: C-1001-D
REV: B

Air-Cooled Condensers

New fan-driven ACCs would be installed at the current location of the existing water-cooling tower, which would be demolished and removed prior to the project. The ACCs would extend slightly north of the footprint of the existing water-cooling tower but would still be located within the unused portion of the site. The ACCs would have a larger footprint than the existing water-cooling tower due to reduced cooling efficiency of air cooling compared to water cooling at the ambient temperatures at the site. The ACCs have been sized to produce 7.5 MW net of energy. The ACCs would be approximately 33,330 square feet and up to 36 feet in height. The foundations for the ACCs would be designed to accommodate the existing drainage and water storage system on the site, which is located adjacent to the existing cooling tower basin. The ACCs would not alter the site drainage.

Tie-In to Existing Steam Pipelines

The project includes construction of a new pipeline and vent stack to extend the steam line directly to the ORC unit from the steam line at the entrance to the facility. As shown in Figure 2.2-3, the majority of the new steam pipeline would be located directly adjacent to and just outside the BRPP fence.[5] The vent stack would be constructed and operated to meet LCAQMD requirements and would use modern noise abatement design. A new H_2S treatment tank would be installed adjacent to the vent stack to treat any vented steam and corresponding NCG. The H_2S treatment tank would be used during plant shutdowns, startups and upset conditions. The bypassed existing steam-stacking system and vent would be decommissioned and removed from the site.

Hydrogen Sulfide Abatement

The project would require modification and refurbishing of the Stretford H_2S abatement system for the proposed process changes for the ORC binary-power generation rather than existing turbine generators. As part of the project, BRP also proposes to install, operate, and maintain a catalyst reactor as a backup H_2S abatement process. The catalyst reactor would improve facility reliability and allow for the facility to continue to operate when the refurbished Stretford H_2S abatement system is down for maintenance.

Refurbished Stretford

The following actions would be required to refurbish the Stretford system for use with the proposed ORC units:

- Recoating of all Stretford tanks and vessels
- Removing the feed gas blowers from service
- Replacing the activated carbon mercury vessels

[5] The portion of the proposed steam pipeline outside of the BRPP fence line would be subject to Lake County permit requirements.

- Replacing piping and related piping components as necessary (i.e., where damaged)
- Restoring or replacing all instrumentation and electrical wiring
- Restoring the laboratory in the Stretford building
- Replacing damaged vacuum skids including vacuum pump, separator, cooler and receiver
- Reinstalling scavenged piping and related equipment
- Installation of a spare air compressor
- Refurbishment of the evaporator
- Installation of new pressure protection system upstream of the Stretford on the incoming NCG stream from the ORCs
- Installation of a spare pre-scrubber
- Replacement of existing perforated plate trays in the polishing tower to a system type less susceptible to fouling
- Installation of a wash-water collection pan to rotary drum filter to allow better segregation of wash water from Stretford liquor

Catalyst Reactor

The catalyst reactor would consist of large pressure vessels that are 10 feet in diameter by 30 feet tall. Each ORC would be connected to two vessels in a lead-lag arrangement to provide 100-percent redundancy during operation. Once the catalyst in the first vessel becomes saturated with sulfur, the NCG stream would be automatically routed to the second vessel. The spent catalyst would then be removed and hauled to a non-hazardous waste disposal facility/landfill. The new catalyst would be loaded into the vessel and put into lag mode. An activated carbon mercury removal vessel would be installed upstream of the catalyst reactor to provide capture for mercury. The mercury removal vessel would be serviced routinely. The spent activated carbon containing mercury would be removed and replaced by an authorized waste hauler and sent to a landfill authorized to accept hazardous waste.

Condensate Collection

Along the steam line there would be a condensate collection system that collects condensate from the steam header as a result of pressure drop and pipe-wall cooling. The existing condensate collection system would be reused. A new pipeline segment would connect the new portion of the condensate collection on the extended steam line to the existing condensate collection system at the power plant site. The existing condensate collection system discharges to the injection pit at the power plant site and would remain in service. The injection pit gravity flows to the injection well located on the Coleman Well Pad. A new 4-inch pipeline co-located

on the new steam pipeline would carry the condensate from the ORC condensate tanks to the injection well for reinjection.[6]

Electrical Modifications

Power produced from the project would interconnect at the existing Bottle Rock Power Substation. A storage room on the south side of the existing turbine generator building would be used to house the new switchgear for the project modification. The new switchgear would consist of five 13.8-kilovolt (kV) breakers, one for each ORC unit, one for each PDC, and one main circuit breaker/bus. Each breaker would be approximately 36 inches wide, and breakers would be located within a rack with a height of approximately 95 inches.

2.3 Demolition and Construction

Demolition

Demolition and removal of the existing BRPP facilities was previously evaluated in CEC Order 79-AFC-4 and would be conducted in the absence of this amendment to the CEC Decision. As such, demolition of BRPP facilities is not considered part of this PTA and demolition activities are instead considered a cumulative project within the context of this PTA. Demolition and removal of the water-cooling tower would occur in advance of construction of the amended BRPP facilities, and removal and demolition of the existing steam supply to the turbine generator building, steam-stacking system, and rock muffler would occur concurrent with other PTA construction activities at the site.

The separator, separator tanks, and rupture-relief platform would also be demolished as the equipment would not be necessary for operation of the binary power plant. New pressure protection in the form of rupture disks would be installed on the existing rupture-disk stations at each of the production well pads to protect the cross-country steam line and ORCs. The pipelines connecting the steam-stacking system to the existing turbine generator building and the Stretford system would be removed. The steam stacking-system and existing vent stack would be demolished and replaced by a new steam pipeline and vent stack sized for the reduced ORC required steam flow. Any potentially hazardous materials (e.g., treated wood waste, asbestos, lead-based paint) would be sent to a landfill classified to accept hazardous waste. Prior to demolition, material would be characterized to define materials that could be recycled and materials that would require disposal as hazardous waste. Approximately 630 one-way truck trips are expected during project demolition. All materials would be removed by haulers with an active California Department of Transportation (Caltrans) Transportation Permit.

[6] Similar to the portion of the new steam pipeline located outside the BRPP fence line, this portion of the new condensate pipeline would be subject to Lake County permit requirements.

Waste Management and Removal

Nonhazardous Solid Waste

Solid waste from construction activities may include lumber, excess concrete, metal, glass scrap, empty nonhazardous containers, and waste generated by workers. Management of these wastes would be the responsibility of the construction contractor(s). Typical management practices required for nonhazardous waste management would include recycling when possible, proper storage of waste and debris to prevent wind dispersion, and weekly pickup and disposal of wastes at local Class III landfills.

Hazardous Waste

All hazardous wastes generated during construction would be handled and disposed in accordance with applicable laws, ordinances, regulations, and standards. Hazardous wastes would be recycled or managed and disposed properly in a licensed Class I waste disposal facility that is authorized to accept the waste. The Kettleman Hills Hazardous Waste Facility is the nearest Class I facility that could accept hazardous waste generated from the project.

Construction Phases, Schedule, and Traffic

Construction of the project would occur over approximately 8 months and is planned to begin in January 2024. Construction is anticipated to occur between the hours of 7:00 a.m. and 7:00 p.m., Monday through Saturday. No work would occur on Sundays or holidays. Table 2.3-1 presents the construction schedule by phase.

Excavation and Soil Disturbance

Project construction would require excavation of approximately 500 cubic yards of material and placement of approximately 750 cubic yards of concrete for new foundations. The depth of excavation for the project would be 5 feet if spread footings are used. Micro pile foundations may be used to avoid underground interferences, if necessary, depending on the results of geotechnical investigations.

Table 2.3-1 Construction Schedule

Construction phase	Start	End	Duration (working days)
Well plug removal and cleanout	05/01/2023	05/15/2023	10
Well testing	09/15/2023	09/31/2023	10
Staging and mobilization	01/01/2024	01/05/2024	5
Demolition	01/08/2024	02/26/2024	45
Foundation construction	01/09/2024	02/26/2024	42
Process installation	03/07/2024	07/24/2024	120
Commissioning	07/12/2024	08/21/2024	35
Commercial in-Service	08/22/2024	08/23/2024	1

Table 2.3-2 provides the average daily worker, vendor, and haul-truck trips for project construction. A total of approximately 1,748 one-way haul truck trips and approximately 324 vendor truck trips are expected to occur throughout project construction.

Table 2.3-2 Average Daily Construction Vehicle Trips by Phase (One-Way Trips)

Construction phase	Worker trips	Vendor trips	Haul-truck trips
Well pad cleanout	30	10	3
Well testing	10	10	1
Staging and mobilization	8	0	4
Demolition	10	0	14
Foundation construction	20	2	4
Process installation	50	2	13

Access and Staging

Work crews would access the project site via Bottle Rock Road and High Valley Road. Staging and storage of equipment and materials for demolition and construction would occur within existing paved or graveled areas at the BRPP site. The primary staging area would be located at the existing storage yard adjacent the Francisco Well Pad, with a smaller staging area located at the southeast corner of the BRPP.

Equipment and Personnel

Anticipated equipment for the demolition and construction of the project is provided in Table 2.3-3. An average of 15 workers would be on site daily during construction, with a maximum of up to 30 workers per day during peak construction.

Table 2.3-3 Equipment Table

Construction phase	Equipment	Quantity	Daily usage (hours)
Well Plug Removal and Clean Out	Drill rig diesel engine	2	24
	Forklift	1	12
	Generator	1	24
	Light tower	2	12
	Water truck	1	4
Demolition	Crane	1	4
	Trackhoe	2	4
	Manlift	1	8
Foundation construction	Pier Drilling Rig	1	4
	Concrete Pump Truck	1	8

Construction phase	Equipment	Quantity	Daily usage (hours)
	Skidsteer	1	4
Process installation construction equipment	Manlifts	2	4
	Crane	2	4
	Forklift	1	4
	Telehandler	1	4
	Loader	1	4
	Welders	2	4

Construction Water Use

Water use for the project construction would be limited to water required for dust control, concrete mixing, compaction, and worker drinking water and sanitation. Water for the project site, with the exception of drinking water, would be sourced from the existing groundwater wells at the site shown in Figure 2.2-1 (Well #1 and Well #2) that have current production capacities of 20 to 30 gallons per minute and 40 to 60 gallons per minute, respectively. Approximately 200 gallons per day (gpd) of water would be required for earthwork and foundation construction. Approximately 40 gpd of water would be required during other construction phases. A total of 67,000 gallons of water would be required to fill the Stretford system prior to operation. The total water use during construction would be approximately 80,000 gallons.

Traffic Control

The project access roads and vehicle traffic would be maintained in compliance with the Traffic Control and Road Maintenance Plan (MMU 10-01). Appropriate traffic control devices would be installed along access roads to control vehicle speed and traffic during construction. Traffic controls would also follow the recommendations in the California Temporary Traffic Control Handbook regarding basic standards for the safe movement of traffic on highways and streets in accordance with section 21400 of the California Vehicle Code. In addition,

2.4 Operations and Maintenance

Startup

Prior to starting the ORCs, the auxiliary systems of the facility including the electrical, fire water and compressed air system would be in service and fully functional. The two ORCs located at this facility would be started up one at a time.

For startup of the first ORC, the well field production system would be operating at half the steam flow rate (sufficient for one ORC unit) with steam venting through the vent system and abated at the vent station. The production system would be at a steady operating state. The startup of the ORC would largely be automatic through the control system of the ORC. Once the operator has determined that the production system and all auxiliary systems are operating in steady state, the start command would be given to the first ORC. The ORC startup sequence

would commence by starting the expander lubricating oil system, then stopping the generator space heater and starting the generator cooling system. Once the control system confirms that the oil system and cooling system is within pressure and temperature range, the system would allow for preheating.

At this point, the Stretford or catalyst abatement system would be started based on the equipment's startup procedures and would be ready to accept NCGs. During the preheating phase, the motive fluid circulating pump would start to fill the preheaters, condensate tank and evaporator with motive fluid until the operational set point is reached, then the steam inlet control valve would start to modulate open to introduce steam or heat to the ORC system. The expander bypass valve would remain open and the expander inlet valve would remain closed bypassing the motive fluid to the receiver tank. The system would begin heating up at a minimum flow level until the pressure set points in the gas-liquid separator portion of the evaporate is reached. As the system heats up the fans on the air-cooled condenser would begin to turn on and operate according to the predetermined startup sequence. Once the system is in stable operation with pressure and level set points reached in the evaporator, condensate tank and receiver, the expander startup phase would commence. The inlet valve to the expander would begin to modulate open and the bypass valve would throttle closed and then the system would begin to take more steam (heat) by modulating open the steam inlet valve. As the steam inlet valve is opened the motive fluid pump controls would react by motive fluid level to increase the speed of the pump and the flow of motive fluid. With the increased motive fluid the expander bypass valve would modulate to control pressure in the gas-liquid separator section of the evaporator. The expander would start to accelerate and reach synchronization speed.

In cooperation with PG&E, once synchronization speed is reached, the synchronization system would be energized along with the generator exciter. The auto synchronization system would be enabled and the generator breaker would close, connecting the generator to the grid. The ORC system would ramp up to increase generation to normal operation by steadily admitting steam (heat) to the ORC system. The motive fluid circulating pump and expander bypass valve would work concurrently with the expander inlet control valve to transfer the motive fluid vapor from the bypass system to the expander. As the system ramps up it would take more steam transferring the steam to the ORC from the venting system until venting has stopped. Once rated output is reached the bypass valve would be in the closed position and all motive fluid would be processed through the expander. When the first ORC is in normal, stable operation, the second ORC can be started.

In order to start the second ORC, the well field production system would be increased to the full steam flow rate. This increased steam flow would be processed through the vent system and abated at the vent station. Once the steam system is in stable operation the second ORC would be started in the same manner as the first ORC.

Shutdown Procedure

The general procedure for shutdown of the project has been sequenced to reduce the well field production flow rate during the shutdown process in order to comply with the Lake County Air Quality Management District Rule 421.2 for the allowable rate of H_2S emissions during scheduled and unscheduled outages.

The first step in shutting down the facility would be to reduce the production well flow rates to match the steam flow required for minimum output of both ORCs. Once the system is stable at minimum flow, one ORC would be shut down. Shut down would be conducted by closing the steam inlet control valve to the first ORC; the pressure in the evaporator would decrease along with the power output until the generator output reaches the minimum level. The evaporator inlet valve would close as the evaporator bypass valve opens to maintain system pressure; then the generator breaker would disconnect from the grid and the expander speed would decrease to a full stop. The motive fluid circulating pumps would stop and the ORC and the fans on the ACC would stop based on a preprogrammed schedule. The well field production would decrease to minimize venting from the vent system.

Once the first ORC is shut in and no steam is venting from the vent system, the second ORC would be stopped in the same manner as the first ORC. Once the second ORC is shut down, the production well field would be shut in and the Stretford, catalyst abatement and all other auxiliary systems would be shutdown per the equipment's normal shutdown sequence.

Workforce

The proposed facility would have an operational life of 30 years, with an option to extend. Operation of the facility would require two to four employees on site daily. The existing geothermal wells and pipelines would be operated and maintained in compliance with all existing permit conditions. Operation and maintenance of the proposed facility would include routine inspections and maintenance of the facility to ensure proper operating conditions and maintain defensible space around the facility in compliance with California Department of Forestry and Fire Protection requirements. Facility maintenance would also be conducted as needed to repair any damaged or malfunctioning equipment. The facility is expected to operate 95 percent of the time, with 5 percent downtime for facility maintenance.

Water Use

Water requirements for the facility would be primarily for employee use. Fire water or general plant washdown water would be used for plant washdown during normal operation and Stretford system cleanout (once every 2 years). Operational water would be sourced from on-site groundwater wells (Well #1 and Well #2). The amended BRPP would require fresh, soft water for the following uses:

- Refill of Stretford tanks every two years (67,000 gallons)
- Stretford filter wash water (680 gpd)
- Stretford liquid ring vacuum pump (80 gpd)
- Water for pump seal flushes (<1 gpd)

- Mist eliminator cleaning spray lance on top of the polishing tower that operates six times a day for 30 seconds at a time
- Worker use (15 gpd per worker)

Wastewater

Blowdown from the Stretford pumps would produce 80 gpd of wastewater. The 67,000 gallons of Stretford solution would become wastewater when the Stretford solution is refilled every 2 years.

An existing septic system would be utilized at the project site to handle sanitary waste. The septic system would require the installation of two new motors and control panels prior to operation.

Lighting

New lighting on steel posts (up to 30 feet tall) would be located around the perimeter of the new ORC units. Lighting would be on motion sensors, downcast, and dark-sky compliant to avoid impacts on the night sky. Where it is feasible to use shorter light posts due to focused work areas on the ground, lights would be mounted at a height of 10 to 16 feet to reduce light scatter. Lighting would comply with outdoor lighting standards in California Energy Code Title 24 part 6.

Facility Security

The existing security fence and site access controls would be maintained. Site access to the facility is restricted by locked chain-linked fencing, locked gates, and locked buildings. An automated gate located on High Valley Road provides traffic control and minimal security to the site. Locked gates located on the entrance roads to the power plant and well pads are used to provide secondary security. There is no other access to the facility when these gates are closed. Only authorized personnel are allowed access to the facility.

Fire Protection

The existing fire protecting system would be re-used to the extent possible. Changes would include removal of two fire hydrants on the north side of the cooling tower that would interfere with the new ACCs as well as blind flanging the seal and lube oil deluge systems in the turbine building. The two fire hydrants that would be removed would no longer be needed because the fire hydrants were previously designed for the wooden water-cooling tower. The proposed ACCs in the area would be metal and would not require fire hydrants. The new transformers within the turbine building have a capacity of less than 500 gallons of oil and therefore do not require a deluge system. The oil system for the expanders would have a fire sprinkler system if the oil capacity were to exceed 500 gallons.

Emissions Control Equipment

Stretford System

The existing Stretford system would be utilized for the expected one-percent flow of NCGs from the current steam supply. Testing and maintenance of the existing Stretford system would occur prior to operation.

Materials used to operate the Stretford system would include 67,000 gallons of solution in the process vessels and lines. The solution would consist of 1.5 grams per liter of vanadium, *anthraquinone disulfonic acid* (ADA), alkalinity, and sulfur byproduct salts. Table 2.4-1 provides the estimates for makeup chemicals added to the Stretford system process and stored on site. The Stretford process is capable of producing approximately 4,700 pounds (lbs) of sulfur daily, which would be loaded into roll-off bins and transported off site for commercial use or for disposal. The area for the roll-off bins would be realigned if needed to the east to allow for installation of the ORC units and required noise mitigation. Sulfur produced from the Stretford system would be tested to ensure it meets standards for reuse. Sulfur materials containing vanadium in excess of 24 milligrams per liter (mg/L) would be processed as hazardous waste and sent to a facility that is licensed to accept hazardous waste (see discussion in "Hazardous Waste," below).

Table 2.4-1 Stretford System Chemicals

Chemicals	Quantity
Assumed days of storage on site	120 days
Assumed total sulfur throughput during time period	101 long ton (LT)
Assumed vanadium use rate	3.2 lbs/LT
Vanadium stored on site	320 lbs
Vanadium content of liquid Vanadium solution	8 percent weight (wt%)
Liquid vanadium solution stored on site	4,000 lbs
Assumed ADA use rate	12 lbs/LT
ADA stored on site	1,200 lbs
ADA content of liquid ADA solution	20 wt%
Liquid ADA stored on site	6,000 lbs
Assumed caustic use rate	300 lbs/LT
Caustic stored on site	30,000 lbs
Caustic concentration	25 wt%
Liquid caustic stored on site	120,000 lbs

Catalyst Reactor

The absorbent used in the catalyst reactor process is iron-oxide based and non-regenerative. The absorbent is a non-hazardous granular material that absorbs H_2S as the NCG passes through the containment vessel. Over time, as the sulfur concentration builds, the absorbent would eventually need to be replaced (as described in Section 2.2.3 above). The spent absorbent would be non-hazardous and would be transported to an approved disposal facility/landfill. The absorbent would be supplied in ultraviolet-coated polypropylene bulk bags, which require dry storage.

Hazardous Materials and Waste

Hazardous Material Storage

Hazardous materials would be stored in the existing hazardous material storage room between the generator building and the BRPP or in the chemical storage area within the Stretford control building. The hazardous materials storage room has secondary containment and complies with all standards for storage of hazardous materials. Two 500-gallon *aboveground storage tanks* (ASTs) and one 1,000-gallon AST located at the BRPP would also continue to be used for storage of diesel fuel for operation of the emergency generator. Both ASTs would continue to be monitored to ensure that there are no leaks of diesel fuel.

Hazardous Wastes

The Stretford system has historically produced sulfur cake that is primarily commercial grade; however, about 12 percent of the sulfur cake contained vanadium above 24 mg/L, which requires disposal as hazardous waste. Assuming the sulfur cake from the project would have a similar make up as that from the prior Bottle Rock Project, the project would produce approximately 200,000 lbs of sulfur annually that would be classified as hazardous waste. The mercury-laden activated carbon would be classified as hazardous waste.

All hazardous wastes generated during facility operation would be handled and disposed in accordance with applicable laws, ordinances, regulations, and standards. Hazardous wastes would be recycled or managed and disposed properly in a licensed Class I waste disposal facility, such as the Kettleman Hills Hazardous Waste Facility.

Nonhazardous Solid Waste

The primary source of solid waste during operation would be office waste and other waste generated by workers. Non-hazardous waste would be collected in appropriate on-site storage receptacles designated for waste and recycling. Recyclable materials would be brought to a recycling center, and non-recyclable waste would be removed and taken to a Class III landfill.

2.5 Facility Availability and Reliability

2.5.1 Facility Availability and Reliability

The facility has been designed for 95-percent availability after initial startup and commissioning. The facility would need to be taken offline every two years for planned maintenance activities.

2.5.2 Efficiency

The power-generating equipment, ORC and ACC have been designed for three distinct operating cases: Normal, Summer, and Winter. These cases are solely based on ambient air-temperature conditions. Each case rests on a direct correlation between the ambient air temperature and potential net power output. The ACC surface area has been maximized based on the Summer case to provide peak cooling capacity, which would be the limiting factor for

net power production. The Winter case, with the lowest ambient air temperatures, creates the highest net power production.

2.5.3 Safety

The facility design incorporates as many engineering controls as possible. System descriptions, control narratives, and standard operating procedures would be used to train the operators and serve as the daily operating basis. Alarm systems would be incorporated into potentially hazardous areas that may contain H_2S, mercury, vanadium, or other hazardous chemicals. An Occupational Safety and Health Administration (OSHA) compliant lockout/tagout (LOTO) process would be used to conduct planned and unplanned maintenance activities. Operators would be trained on and follow company policies for confined space entry, equipment operation, H_2S, and fall protection. Records would be maintained for all training and instruction.

2.6 Decommissioning and Closure

The project would be decommissioned at the end of the project's useful life. Decommissioning activities would involve removal of all infrastructure within the power plant site, including the ORC units, steam pipelines, ACCs, Stretford system, pipelines, ASTs, generator, water storage tanks, paving, and other infrastructure associated with the power plant operation. All aboveground geothermal steam pipelines and injection pipelines would be removed, and the geothermal wells would be capped and abandoned in accordance with CalGEM requirements. Any materials that could be recycled would be recycled, and all waste would be managed in accordance with state and federal regulations. BRP would submit a final closure plan to the CEC in compliance with COC COM—15 prior to closure of the facility.

2.7 Applicant Proposed Measures

APM BIO-1. Northern Spotted Owl Avoidance. If project construction commences during nesting/breeding season of northern spotted owl (February 1 to July 31), protocol surveys for noise disturbance projects shall be conducted by a qualified biologist, following USFWS's 2011 Northern Spotted Owl survey protocol. This protocol requires six visits between March 15 and May 31, and the goal would be to determine if spotted owls are nesting in the immediate vicinity of the project area. The surveys shall cover all spotted owl habitat within 0.25-mile of the project site. If no nests are documented, the surveys are effective until the beginning of the following nesting season (February 1). If northern spotted owl nests are documented in the immediate project area no construction activities may commence within 0.25 mile of any active nest and the United States Fish and Wildlife Service (USFWS) shall be consulted to define appropriate nest buffers or other mitigation measures.

APM BIO-2. Nesting Bird and Raptor Avoidance. Project construction shall be timed to avoid bird nesting season (February 15 – August 15) to the extent feasible. If construction activities start during the nesting season, a pre-construction survey for nesting birds shall be conducted

by a qualified biologist within one week prior to initiation of construction activities. If construction ceases for a period of 48 hours or more or if construction activities move into areas that have not been subject to routine construction noise disturbance then new avian surveys shall be conducted for nesting birds. If active nests are observed in proximity to the construction, the following standard no-disturbance buffers shall be implemented: 50-foot buffer for passerine (songbird) nests, 200-foot buffer for raptor nests, and 500-foot buffer for purple martin nests. The no disturbance buffer may be adjusted by the biologist based on site specific conditions. The no disturbance buffer shall be maintained until the young have fledged and left the nest, as determined by a qualified biologist.

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3 Environmental Information

The Environmental Information section presents the environmental, public health and safety, and local impact assessment technical areas for which the California Energy Commission's (CEC's) Power Plant Site Certification regulations require information in a Petition to Amend (20 CCR §§ 1769). Each technical area subsection follows a standardized format with discussions under the following headings:

- Affected Environment
- Environmental Analysis
- Cumulative Effects
- Compliance with Laws, Ordinances, Regulations, and Standards
- Conditions of Certification
- References

Each "Affected Environment" discussion describes the existing environmental conditions in the proposed modification area and any relevant changes to those conditions since certification. CEQA requires an evaluation of a project's environmental impacts against conditions existing without the project. Historically this was interpreted to mean the specific, static conditions that existed at the moment in time that the environmental review was commenced[7]; however, court rulings[8] have held that it is appropriate to evaluate a proposed project's operational impacts relative to a substitute baseline rather than against existing conditions at the time of the environmental review. The court cases have found that substituting a baseline consisting of conditions that reflect historic use or occupancy, granted the baseline conditions are supported by substantial evidence available to the Lead Agency and provide a realistic baseline for analyzing impacts. Therefore, this analysis evaluates the operational impacts of the amended BRPP against the conditions assuming operation and occupancy of the BRPP in accordance with the activities that have historically occurred on the BRPP site as allowable under the existing CEC permit. The BRPP site and buildings have been historically occupied and operation of the power plant and associated facilities could occur at any time in accordance with the CEC permit conditions.

[7] The PTA process is a CEQA-equivalent process.

[8] Neighbors for Smart Rail v. Exposition Metro Line Construction Authority, et al (8/5/13) 57 Cal.4th 439,453.; Communities for a Better Environment v. South Coast Air Quality Management Dist. (2010) 48 Cal.4th 310; North County Advocates v. City of Carlsbad (4th Dist. 2015) 241 Cal.App.4th 94.

Each "Environmental Analysis" discussion analyzes the potential environmental consequences of the construction and operation of the modification. The environmental analysis discusses whether the modification will result in any new or increased environmental impacts when compared to the licensed BRPP.

Each "Cumulative Effects" discussion analyzes potential effects of the project modification that are not significant adverse impacts but that could reach significance cumulatively in combination with other projects. The only cumulative projects that are proposed in the vicinity of the proposed modification include testing of the Bottle Rock geothermal wells and fluid pipelines, upgrades to the worker building at the Francisco Well Pad, and demolition of BRPP equipment including the existing water-cooling tower, steam-stacking pipelines, rock muffler, demister, and pipelines associated with the water-cooling tower and connections to the Stretford system and turbine generator building.

Each "Compliance with Laws, Ordinances, Regulations, and Standards" discussion describes changes to laws, ordinances, regulations, or standards (LORS) that pertain to the modification for a given technical area.

Each "Conditions of Certification" discussion briefly describes the conditions of approval for the licensed Bottle Rock Power Plant that are applicable to the proposed modification and any changes to those conditions that are needed for the modification.

3.1 Air Quality

This subsection includes an evaluation of the amended BRPP effects on air quality and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts to air quality that were not previously analyzed in Order 79-AFC-4. The project modification is consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

Supplemental information on the environmental and regulatory setting, methodology, and emissions modeling results for the amended BRPP are provided in Appendix B.

3.1.1 Affected Environment

Lake County Air Basin

The project site is in the southern portion of Lake County, California, which is located within the Lake County Air Basin (LCAB) and the jurisdictional boundaries of the Lake County Air Quality Management District (LCAQMD). The LCAB is a federally and state recognized geographic area that follows the county boundary.

Mountains surround the LCAB, which is why it is rarely influenced by outside meteorology. Summer months in the LCAB are characterized by high temperatures of approximately 90 degrees Fahrenheit (ºF), with little to no rainfall. Winter months are mild, with high temperatures in the mid-50s ºF. During the winter, annual rainfall averages 27 inches. Annual rainfall in Middletown (roughly 10 miles southeast of the project site) averages approximately 44 inches.

Ambient Air Quality

The United States Environmental Protection Agency (U.S. EPA) has established a National Ambient Air Quality Standard (NAAQS) for ozone, nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter fewer than 10 microns in diameter (PM_{10}), particulate matter fewer than 2.5 microns in diameter ($PM_{2.5}$), and lead (PB). The California Air Resources Board (CARB) has established a California Ambient Air Quality Standard (CAAQS) for ozone, NO_2, CO, SO_2, sulfates, PM_{10}, $PM_{2.5}$, lead, hydrogen sulfide (H_2S), sulfates, vinyl chloride, and visibility-reducing particles. The LCAB is designated as in attainment or unclassified for all NAAQS and CAAQS.

Ambient Air Quality Monitoring

The LCAQMD and various geothermal generating stations operate the Geysers Air Monitoring Program (GAMP) in the vicinity of the project site. The GAMP is designed to intensively monitor ambient air concentrations of H_2S but have historically also monitored other pollutants such as PM_{10}. A GAMP monitoring site at the base of High Valley Road (Glenbrook Monitoring Station) has been historically used to assess downdraft impacts from geothermal operations that include the existing BRPP operations. This data is representative of the area. Two other certified monitoring stations were previously located close to the project site to distinguish the air

quality at the BRPP separate from neighboring geothermal facilities; however, the two onsite monitoring stations (West Coleman Pad and High Valley Road) were removed by LCAQMD after BRPP operations ceased in 2015.

Greenhouse Gas Emissions

Unlike criteria pollutants and other air pollutants, which are regional and/or local pollutants of concern, *greenhouse gases* (GHGs) are global pollutants. The most prominent GHGs that have been identified as contributing to climate change are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Emissions of GHGs contributing to global climate change are attributable largely to human activities associated with the industrial/manufacturing, utility, residential, and agricultural sectors. The transportation sector is the largest emitter of GHGs in California, followed by electricity generation. CO_2 is a byproduct of the fossil fuel combustion associated with both the transportation and the utility sectors. CH_4, a highly potent GHG, results from off-gassing associated with agricultural practices and landfills. Processes that absorb and accumulate CO_2, often called CO_2 "sinks," include uptake by vegetation and dissolution into the ocean. GHG emissions are typically reported in terms of pounds (lbs) or metric tons of CO_2 equivalent (CO_2e). CO_2e is calculated as the product of the mass of a given GHG emitted and its specific global warming potential.

3.1.2 Environmental Analysis

Air Quality and GHG Thresholds

For the purposes of this analysis, the thresholds of significance described below were used to determine whether implementation of the amended BRPP would result in significant air quality impacts.

Construction Emissions and Operational Mobile Source Emissions

Lake County is in attainment or unclassified for all criteria air pollutants and, therefore, LCAQMD has not adopted specific thresholds relating to air quality. Because the LCAQMD does not have thresholds of significance for criteria air pollutants and no thresholds for criteria air pollutants are included in the existing BRPP air permits, Bay Area Air Quality Management District (BAAQMD) thresholds were used to evaluate the impacts of the amended BRPP. BAAQMD's thresholds are based on the air quality within the San Francisco Bay Area Air Basin (SFBAAB). Air quality within the SFBAAB is lower than air quality within the LCAQMD as the SFBAAB is nonattainment for several state and federal ambient air quality standards whereas the LCAQMD is in attainment for all state and federal standards. Consequently, using BAAQMD's thresholds to determine significance is an extremely conservative approach. This is a similar approach, however, to the one used by the Northern Sonoma County Air Pollution Control District, which has similarly not adopted its own air quality standards. BAAQMD set the following air quality thresholds for criteria air pollutants (BAAQMD 2017):

- Average daily construction exhaust emissions of 54 lbs per day of reactive organic gases (ROG), NO_x, or $PM_{2.5}$ or 82 lbs per day of PM_{10}

- Average daily operation emissions of 54 lbs per day of ROG, NOx, or $PM_{2.5}$ or 82 lbs per day of PM_{10}
- Daily emissions that result in annual emissions of 10 tons per year of ROG, NOx, or $PM_{2.5}$ or 15 tons per year of PM_{10}

Operation of the amended BRPP would result in approximately eight vehicle round-trips per day, resulting in negligible CO emissions, and the geothermal process would not produce CO. Therefore, the project modifications would have no impact related to CO emissions, and CO emission impacts are not discussed further in this analysis.

The LCAB is in attainment or unclassified for all CAAQS and NAAQS. Consequently, there are no air quality plans for the LCAB. Therefore, the project modifications would have no impact related to conflicts with or obstructions of air quality plans, and conflicts with air quality plans are not discussed further in this analysis.

Stationary Source Air Quality Emissions
Stationary source emissions from operation of the amended BRPP were compared to existing permitted levels for the BRPP as well as any applicable LCAQMD thresholds to determine significance.

GHG Emissions
GHG emissions from operation of the amended BRPP were compared to existing permitted levels included in the prior BRPP amendments. Lake County and LCAQMD have not adopted thresholds or approaches for evaluating a project's GHG emissions.

Emissions Calculations Methodology

Construction Emissions
Construction emissions were estimated for off-road equipment, on-road trucks for material delivery and equipment hauling, and worker commute trips using the California Emissions Estimator Model (CalEEMod) Version 2020.4.0 (California Air Pollution Control Officers Association, CalEEMod). CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions associated with both construction and operations from a variety of land use projects. The model quantifies direct emissions from construction and operational activities (including off-road equipment and on-road vehicle use) as well as indirect emissions such as GHG emissions from energy use, solid waste disposal, and water use/wastewater disposal. A detailed description of the assumptions used to estimate construction emissions and modeling results are included in Appendix B.

Operational Emissions
Operation of the amended BRPP would result in geothermal process emissions from *non-condensable gases* (NCGs) released through the NCG outlet on each ORC. The NCGs would be processed in the Stretford H_2S abatement system prior to being released to the ambient air. The Stretford H_2S abatement system would be refurbished as described in Section 2.0 Project

Description and would provide H_2S and mercury removal (via scrubbers) equivalent to levels during the prior amendment approval in 2006. During periods when the Stretford H_2S abatement system is down for maintenance, a catalyst reactor would be used as backup H_2S abatement. Emissions of NCGs were quantified using historical chemistry data from prior BRPP operation and NCG gas flow rates from project engineers. Calculation of H_2S abatement for the Stretford system and the catalyst reactor assumed a control efficiency of 98.89 percent or more based on historical efficiency rates and published efficiencies (Purification Solutions 2022).

Operational emissions were also estimated for on-road vehicles. The only operational combustion sources would be employee vehicles, vendor trucks, and haul trucks. Motor vehicle combustion and fugitive emissions were calculated using CalEEMod Version 2020.4.0 and a one-way vehicle trip length of 16.8 miles for employee vehicles (equivalent to construction worker vehicles) and 20.0 miles per one-way trip for vendor and haul trucks. A detailed description of the assumptions used to estimate operational emissions and modeling results is included in Appendix B.

Air Quality Impacts

Criteria Air Pollutants

The amended BRPP would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard because the LCAB is in attainment or unclassified for all CAAQS and NAAQS. Nevertheless, construction and operational emissions of criteria pollutants are assessed for significance using the significance thresholds adopted by the BAAQMD.

Construction Impacts

Construction of the amended BRPP would generate emissions from on-site heavy equipment and motor vehicles (i.e., worker vehicles, vendor trucks, and haul trucks). Table 3.1-1 presents the average daily construction emissions and compares them to BAAQMD's significance thresholds. Construction would be located within a paved and graveled area and would not generate significant fugitive dust.

Table 3.1-1 Project Average Daily Construction Emissions

Source	ROG	NOx	PM_{10} [a]	$PM_{2.5}$ [a]
Average daily construction emissions (lbs.)	1.65	25.82	0.56	0.53
Significance threshold	54	54	82	54
Threshold exceeded?	No	No	No	No

[a] BAAQMD construction significance thresholds for PM_{10} and $PM_{2.5}$ apply to exhaust emissions only.

Source: CalEEMod Version 2020.4.0 (California Air Pollution Control Officers Association)

Construction emissions would be below the BAAQMD's significance thresholds. Therefore, criteria pollutant emissions during construction of the amended BRPP site would be in accordance with COCs and all applicable LORS. No impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

Operational Impacts

Operation of the amended BRPP would only generate criteria air pollutants from on-road vehicles (i.e., employees, vendors, and haul trucks). Geothermal process emissions would not result in the release of criteria air pollutants. Table 3.1-2 presents the amended BRPP's operational emissions and compares them to BAAQMD's significance thresholds. Emissions from the amended BRPP would not only be below BAAQMD's significance thresholds but would result in decreased operational emissions compared to the approved BRPP due to reduced level of equipment use and vehicle trips for the amended BRPP relative to the approved BRPP. Therefore, criteria pollutants emissions during operation of the amended BRPP would not exceed any air quality thresholds. No impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

Table 3.1-2 Project Average Daily and Annual Operational Emissions

Source	ROG	NOx	PM_{10}	$PM_{2.5}$
Average daily operational emissions (lbs.)	0.05	1.15	0.26	0.08
Significance threshold (lbs/day)	54	54	82	54
Threshold exceeded?	No	No	No	No
Annual operational emissions (tons)	0.01	0.22	0.04	0.01
Significance threshold (tons/year)	10	10	15	10
Threshold exceeded?	No	No	No	No

Source: CalEEMod Version 2020.4.0 (California Air Pollution Control Officers Association)

Substantial Pollutant Concentrations

Asbestos

The amended BRPP would be located within the disturbed graveled and paved BRPP site, and the new segment of steam pipeline and condensate pipeline would be located immediately adjacent the BRPP fence, within previously disturbed areas. No areas containing serpentine soils or naturally occurring asbestos (NOA) occur in the amended BRPP area. The amended BRPP would have no impact from disturbance of NOA.

NCG Emissions

Emissions of NCGs were quantified using historical chemistry data from prior BRPP operation and NCG flow rates from project engineers. Table 3.1-3 presents the average volume of each NCG constituent and the projected NCG outlet flow rate. Based on this historical chemistry data, the NCG is roughly 4.65 percent H_2S and 2.22 percent ammonia (NH_3) (by volume). The remaining NCG constituents are CO_2 and CH_4 (discussed in the GHG emissions analysis) and

nitrogen and hydrogen. There are also other trace NCG constituents (discussed in subsection 3.9 Public Health).

Table 3.1-3 NCG Average Dry Gas Volume and Flow Rate

Pollutant	Average volume of dry gas (%)	NCG outlet flow rate (lbs/hour) [a]
Carbon Dioxide (CO_2)	64.00	796.16
Hydrogen Sulfide (H_2S)	4.65	57.85
Ammonia (NH_3)	2.22	27.62
Nitrogen (N_2)	2.09	26.00
Methane (CH_4)	6.12	76.13
Hydrogen (H_2)	20.86	259.50

[a] Based on a projected NCG outlet flow rate of 1,244 lbs/hour

Source: BRPP Historical Chemistry Database

As shown in Table 3.1-4, assuming a minimum control efficiency of 98.89 percent from the existing Stretford H_2S Abatement and the catalyst reactor H_2S abatement tanks, controlled H_2S emissions from operation of the amended BRPP would be less than 13 percent of the BRPP permitted emissions of 5 lbs per hour. NH_3 emissions would be approximately 27.62 lbs per hour, below the permitted emissions threshold.

Table 3.1-4 Amended BRPP NCG Emissions Compared to Permitted NCG Emissions

Pollutant	Uncontrolled project NCG emissions (lbs/hour)	Controlled project NCG emissions (lbs/hour)	Uncontrolled existing permitted emissions (lbs/hour)	Controlled existing permitted emissions (lbs/hour)
Hydrogen sulfide (H_2S)	57.85	0.64	450	5
Ammonia (NH_3)	27.62	27.62	140	100–140

Source: BRPP Historical Chemistry Database and CEC (California Energy Commission 2006)

Chapter II, article III, section 421.2 of the LCAQMD rules and regulations stipulates that geothermal power plants shall not emit more than 50 grams of H_2S per gross megawatt hour (MWh). That would equate to 0.97 lbs per hour of H_2S (50 grams multiplied by 8.836 megawatt [MW] gross). Therefore, neither H_2S abatement option under the amended BRPP would exceed the LCAQMD standard. Furthermore, the existing BRPP had a permitted emissions limit of 5 lbs per hour of H_2S; therefore, the amended BRPP would result in substantially less H_2S emissions than the level allowed at the existing BRPP under the existing BRPP permits. The amended BRPP would also capture all condensate and transfer the condensate to the geothermal reservoir via the proposed condensate pipeline. Because the condensate would not

be exposed to the air at any point in the process there would be no H_2S emissions from the condensate.

There is no LCAQMD standard or existing permit limit for NH_3 under the existing BRPP. The existing BRPP was estimated to generate approximately 100 to 140 lbs per hour of NH_3. The amended BRPP would also result in a reduction in NH_3 emissions compared to the approved BRPP. Therefore, NCG emissions during operation of the amended BRPP would not exceed the levels allowed for the existing BRPP and would be in accordance with COCs and all applicable LORS. No impacts would exceed those described in Order 79-AFC-4 and subsequent amendments.

Toxic Air Contaminants

NCGs also contain small quantities of *toxic air contaminants* (TACs) such as benzene, arsenic, and mercury. The nearest residential structure is approximately 1,500 feet northeast of the project site. RCH and Panorama staff met with the LCAQMD on November 30, 2022, and LCAQMD confirmed that a health risk assessment and dispersion modeling would not be required for the project modifications. The project modifications would result in a reduction in TAC emissions compared to what is currently permitted at BRPP because the total volume of emissions would be less, and the emissions point would be at the same approximate location and distance from sensitive receptors as the emissions for the permitted BRPP. Therefore, TAC emissions during operation of the amended BRPP would be in accordance with COCs and all applicable LORS. No impacts would exceed those described in Order 79-AFC-4 and subsequent amendments.

Odors

The amended BRPP would not introduce a new odor source to the area. H_2S is known to produce odors and odors from H2S were previously evaluated as part of the BRPP licensing process and subsequent amendments. The amended BRPP would result in a reduction of H_2S emissions compared to what is currently allowed at the BRPP under the existing permits, as discussed above. The project modifications would result in decreased odors compared to currently permitted operations due to the proposed decreased NCG and associated H_2S emissions of the amended BRPP. Therefore, impacts related to odors during operation of the amended BRPP would be in accordance with COCs and all applicable LORS. No impacts would exceed those described in Order 79-AFC-4 and subsequent amendments.

GHG Emissions

GHG emissions would be generated through project construction and operation.

Construction Impacts

Construction emissions were estimated to be approximately 867 metric tons of CO_2e during the construction period. BAAQMD has not adopted significance thresholds for construction GHG emissions because, according to BAAQMD, construction emissions represent a very small portion of a project's lifetime GHG emissions and are not considered significant. Thus,

construction of the amended BRPP would not result in a significant impact related to construction GHG emissions.

Operational Impacts

Operational GHG emissions would be released through the geothermal process and generated by on-road vehicles (i.e., employee vehicles, vendor trucks, and haul trucks). On-road vehicles were estimated to generate approximately 96 metric tons of CO_2e per year. Geothermal process emissions would result from NCGs released through the NCG outlet on each ORC. Emissions of NCGs were quantified using historical chemistry data from prior operation of the BRPP and NCG gas flow rates from project engineers. Based on historical chemistry data (see Table 3.1-3, pg. 38), the NCG gas emission is approximately 64 percent CO_2 and 6 percent CH_4 (by volume). Geothermal process GHG emissions for the amended BRPP were estimated to be approximately 8,137 metric tons of CO_2e per year as shown in Table 3.1-5. The amended BRPP would not exceed the significance threshold of 10,000 metric tons of CO_2e per year and GHG emissions impacts would be less than significant. Impacts related to GHG emissions during the operation of the amended BRPP would be in accordance with COCs and all applicable LORS. No impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

Table 3.1-5 Annual Amended BRPP Operational GHG Emissions

Source	CO_2e (metric tons per year)
Geothermal process released emissions	8,137
Mobile sources	96
Total amended BRPP emissions	8,233
Significance Threshold	10,000
Significant	No

Source: CalEEMod Version 2020.4.0 (California Air Pollution Control Officers Association), BRPP Historical Chemistry Database, and 2009 PTA

Furthermore, the project supports the state's efforts to increase electricity generation from renewable energy sources and reduce GHG emissions from the electricity generation sector. Table 3.1-6 compares the amended BRPP CO_2 emissions to other geothermal and fossil fuel energy sources. The amended BRPP would result in CO_2 emissions below the California and United States average for geothermal facilities and other fossil fuels sources. The amended BRPP would be in support of state's goals for reducing GHG emissions as outlined in CARB's Scoping Plans. Therefore, the operation of the amended BRPP would not conflict with plans, policies, or regulations adopted for the purpose of reducing GHG emissions.

Table 3.1-6 CO_2 Emission Factors of Geothermal and Fossil Fuel Electricity Generation

Source	Average CO_2 Emission Factor (g/kWh)
Amended BRPP	68
Geothermal CA Average	107
Geothermal US Average	122
Natural Gas	480
Oil	660
Coal	900

[a] CO_2 only – does not account for other GHGs such as CH_4 and N_20.

Source: (Energy Sector Management Assistance Program, 2016)

3.1.3 Cumulative Effects

Criteria Air Pollutants and Pollutant Concentrations

The amended BRPP would not result in new impacts to air quality. The project modifications would result in decreased operational emissions compared to the existing BRPP permitted levels. Emissions from cumulative projects at the project site, including well testing, well pad cleanout, and demolition and removal of the existing BRPP facilities, were included in the construction emissions estimates and would not exceed the applicable significance thresholds, as indicated in the discussion of the project impacts above. There would not be a significant cumulative impact during construction of the amended BRPP. Furthermore, because the amended BRPP would result in a reduction of emissions compared to what is currently permitted at the BRPP, the amended BRPP would not result in a cumulatively considerable impact, and the impact would be consistent with the findings of the licensed BRPP. No cumulative impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

Operation of the amended BRPP would result in less H_2S and TACs emissions than the permitted BRPP, as discussed above. The amended BRPP would therefore neither cause not contribute to a significant cumulative impact from H_2S or TACs emissions.

Asbestos Containing Material Emissions

The existing water-cooling tower would be demolished as a cumulative action. Chapter II, article IV, section 467 of the LCAQMD Rules and Regulations outlines the Asbestos Emissions Control Measures requirements. Demolition of the water-cooling tower would be required to comply with section 467 for the control of potential emissions of asbestos to the atmosphere and provide appropriate waste handling and disposal procedures. An inspection and report for asbestos-containing material in the existing water-cooling tower would be required prior to demolition of the water-cooling tower to comply with all LORS. The amended BRPP would not

cause emissions of asbestos-containing materials, as discussed above. No cumulative impact from emissions of asbestos-containing materials would occur.

3.1.4 Compliance with Laws, Ordinances, Regulations, and Standards

The emissions resulting from construction of the amended BRPP would be below the BAAQMD's significance thresholds, which were used to assess significance since LCAQMD has no such thresholds. Furthermore, the amended BRPP would comply with all LCAQMD rules and regulations. Operation of the amended BRPP would conform with all applicable LORS related to air quality, as discussed in 3.1.2 Environmental Analysis, and would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

For GHG emissions, additional state regulations have been adopted since the initial decision and subsequent amendment that are applicable to the amended BRPP. These include Executive Order No. B-30-15, Senate Bill 32, Senate Bill 100, and Executive Order B-55-18, all of which aim to reduce the state's GHG emissions over time and accelerate the state's generation of renewable energy to eventually achieve carbon neutrality. As a renewable energy project, the amended BRPP conforms with the applicable LORS related to GHG emissions and would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

3.1.5 Conditions of Certification

The amended BRPP would not result in any new or more severe air quality impacts than the approved BRPP and no additional COCs are needed to address air quality. The amended BRPP is subject to COCs which address any potential impacts from the amended BRPP. COCs DOC-5, DOC-11, DOC-23, AC20, AC24-1,AC24-2, AC24-3,AC24-4, AC24-5, AC24-6, AC26-1, AC26-2, AC26-3, AC26-4, AC26-5, AC26-6, are not applicable to the amended BRPP because the condensate would be contained in pipelines and vessels throughout the process and would not be a source of air emissions. In addition, the amended BRPP would not use the turbine generators, steam stacking system, or water-cooling tower and the steam stacking system and water-cooling tower would be demolished; conditions applying to the demolished infrastructure would no longer be applicable to the BRPP. Many COCs require modifications as shown in ~~strikethrough~~ and <u>underline</u> below to reflect changes in proposed BRPP infrastructure from use of the turbine generators to use of the proposed binary power generation units, to revise or remove references to infrastructure that would no longer occur on the site, and to update for changes in the owner and operator of the facilities. With the proposed changes in the COCs, the amended BRPP would comply with current LORS and impacts of the amended BRPP would not exceed the impacts of the approved BRPP.

DOC-2 The atmospheric emissions control system (AECS) described in the AFC and revision to the AFC, April 18, 1980, shall be utilized. The system as described, which constitutes the best available control technology, shall consist of the following concurrently available major components:

a) A ~~surface condenser~~ condensate tank to facilitate the partitioning of H2S into the non condensable gas phase;

b) A Stretford unit or a catalyst reactor as specified in the AFC to reduce the H2S concentration in the non condensable gases to 10 parts per million by volume (ppmv) or less;

~~c) Secondary condensate treatment which includes sufficient hydrogen peroxide (H2O2) and catalyst injection and reaction time to ensure the power plant will comply with the emission limitation specified in Condition DOC 1;~~

~~d) A turbine by-pass system sufficiently sized to accept 100 percent of full steam flow during generating outages so that the power plant emission control system can be utilized to treat steam normally stacked during the outage.~~

e) The air emissions control system specified above shall be properly winterized.

f) If a solids removal system is necessary as a result of solids formation in the condensate, such facility shall be incorporated into the system.

g) In the event of Bottle Rock generation loss, an alternate source of power to enable the continued use of the air emissions control system specified above shall be available.

h) A stand by generator capable of sustaining station power and the Emergency ~~Stacking~~ Venting System shall be available and fueled with low sulfur fuel of 0.5 percent or less for use in case of concurrent transmission line and generator failure.

DOC-3 The major components of the air emissions control system, Stretford, catalyst reactor, and vent system abatement ~~Turbine by-pass, and condensate abatement~~ shall incorporate a design to enable a 99 percent availability excluding scheduled maintenance on these individual major components. If such design criteria cannot be established, abatement systems shall be retrofitted as necessary to achieve performance at this level.

~~**DOC-5** The cooling tower shall have a guaranteed drift rate of no more than 0.00002 as described in the AFC.~~

DOC-6 The off-gas vent to the atmosphere shall be used only during legitimate emergencies and to enable the cold start-up of the power plant ~~turbine~~. Steam flows shall not exceed 25,000 lbs/hr to the power plant during direct venting of untreated non condensable gases in the steam. The ~~turbine by-pass~~ vent system

abatement shall be used if possible to avoid direct venting into the atmosphere of undiluted non-condensables. The LCAQMD shall be notified when cold start-ups in excess of 5 lbs H2S/hr are to occur and may cancel such activity if deemed necessary.

DOC-7 The project ~~owner~~ operator shall install alarms and switches on the following units to ensure immediate corrective action is initiated to prevent outages and potential ~~stacking~~ venting. Alarm/trip conditions noted with an asterisk have a separate alert and trip alarm function and those alarm/trip conditions without an asterisk are coincident alarm/trip functions:

~~Turbine Generator~~ ORC Units –

1. Excessive vibration switch, alarm and trip;

~~2. Lateral motion switch on the turbine shaft, alarm and trip;~~

3.2. * High lube oil temperature switch, alarm and trip;

4.3. * Low lube oil pressure switch with indicating light in control room;

5.4. * Low lube oil sump level switch, alarm;

6.5. Over-speed switch, alarm and trip;

~~7. * High hydrogen gas temperature and low purity hydrogen alarm and trip;~~

~~8. * Seal oil level switch and alarm;~~

~~9. * Differential pressure switch to prevent low differential pressure between the seal oil and hydrogen pressure, alarm and trip;~~

~~10. * Generator moisture detector and alarm;~~

~~11. * Vacuum switch to prevent low vacuum in the seal oil detaining tank, alarm and trip;~~

*~~Turbine~~ Expander bearing metal temperature alarm and trip.

7. Evaporator high pressure alarm and trip

~~Condensers~~ Heat Exchangers-

1. * Pressure switch to prevent ~~condenser~~ heat exchanger pressures from exceeding design levels, alarm and trip;

2. * ~~Condensate~~ Heat exchanger level switches to ~~start and stop pump~~ open and close control valve and, prevent excessively high ~~condensate~~ levels in ~~hot well~~ tank;

3. * High or low ~~condensate~~ heat exchanger pressure levels alarms.

~~Cooling Towers~~ Air Cooled Condensers -

~~1. *Float switches and indicators to start and stop the pump in the cooling tower overflow basin and provide alarms;~~

2.1. Excessive vibration switch~~es~~ and alarms on each ~~cooling tower~~ air cooled condenser fan.

Electrical System -

1. Generator differential current trip and alarm;

2. Generator over-current trip and alarm;

3. Generator ground fault trip and alarm;

4. Generator anti-motoring trip and alarm;

5. Generator field ground trip and alarm;

6. * Generator stator over temperature alarm and trip;

7. Loss of excitation trip and alarm;

8. System negative phase sequence trip and alarm;

DOC-10 The project owner's approved-for-construction drawings or other drawings acceptable to the LCAPCO of the Stretford unit and catalyst reactor ~~turbine bypass, and secondary abatement (condensate treatment) system~~ shall be submitted to the LCAQMD and CEC for comment and review at the earliest possible date and in time for such drawings to be commented upon and modified if necessary.

The project owner shall not be required to submit proprietary information unless specifically requested by the LCAPCO pursuant to Section 91010, Title 17, California Administrative Code.

~~**DOC-11** The project owner shall submit to the LCAQMD, ARB, and CEC the results of the pilot test program performed by Bechtel National, Inc., no later than February 1, 1982, or within one month before the finishing of final design of the hydrogen peroxide/catalyst abatement system.~~

DOC-14 Within sixty (60) days after initial power production, the project owner shall demonstrate that the applicable emissions limitations are being maintained during normal power plant operations. The project owner shall submit a detailed performance test plan to the LCAQMD at least thirty (30) days prior to such tests. Such plans shall also be designed to determine the particulate emissions rate and components of particulate emitted. The project owner's proposed test plan must receive LCAQMD and CEC staff approval before such tests may be conducted to determine compliance.

The ARB shall arbitrate difference if concurrence on a test procedure can not be reached between CEC, the project owner and the LCAQMD and recommend a binding procedure. Safe sampling access and ports to enable the LCAQMD to gather samples from the ~~freshly-treated condensate, cooling tower stack and~~ treated gas from the Stretford or catalyst reactor system shall be provided.

DOC-15 Reports shall be issued quarterly to the LCAQMD detailing: a) hours of operation, b) any periods for which abatement equipment malfunctioned and the action taken; ~~c) chemicals utilized for treatment of condensate~~; d) periods of scheduled and unscheduled outages and the reasons for such outages; and e) summary of the output of continuous emissions monitors with explanations of any irregularities.

DOC-19 The incoming steam to the power plant shall be analyzed quarterly and reported to the CEC and LCAQMD for radon-222 and its daughters, mercury, arsenic, silica, boron, benzene, ammonia, and total suspended solids for the first two years of operation. The results of these tests shall be reviewed by the LCAPCO to determine if thereafter annual testing will suffice. ~~The project owner may join with the steam supplier in performing such tests. Results of any tests performed upon the cooling tower sludge shall also be forwarded to the LCAQMD.~~

DOC-20 H2S emissions shall be monitored continuously by measuring total volume flow rates and H2S concentrations at the following locations: a) incoming steam; and b) outlet of the Stretford unit or catalyst reactor~~; and c) in the treated condensate~~. A log of such monitoring shall be maintained and be made available to LCAQMD staff upon request. The devices must have accuracies of +1 ppm, provide measurements at least every 15 minutes, and be accessible to LCAQMD staff. Flow rate measuring devices must have accuracies of +5 percent at 40 to 100 percent of the total flow rate and calibrations must be performed at least quarterly. Calibration records must be made available to LCAQMD staff upon request. Monitoring shall be required pursuant to Section 42303 of the California Health and Safety Code. In the event that acceptable continuous monitors are not available,

The project owner shall conduct testing no less than once every thirty (30) days to ensure the efficiencies of the H2S abatement systems are being maintained. The testing procedure used to determine compliance must be approved by the LCAPCO. A log of such testing shall be maintained and be available to LCAQMD staff upon request. The project owner shall on an annual basis after the date of the decision submit for approval by the LCAQMD, CEC and ARB a summary of the project owner's efforts to develop, research, let for contract to research, or let for contract to implement use of equipment, that is to be a likely candidate for a ~~continuous condensate and~~ noncondensable gas monitor for hydrogen sulfide.

In either case, a summary of the monitoring and/or testing shall be forwarded to the LCAQMD every three (3) months.

~~**DOC-23 Added condition resulting from modification 1982 Modified Determination of Compliance.**~~

~~A) Regarding secondary abatement:~~

~~LCAQMD shall incorporate into the Bottle Rock Power Plant construction the ability to control the pH of treated condensate, provide for the oxidation of H2S utilizing H2O2, ensure a residence time of 75 or more seconds, and incorporate the ability to add on a catalyst injection capability to the secondary system should operating experience show such is necessary. Chemical storage capacity shall be as specified in the AFC amendments and no less than one weeks supply shall remain on site at all times. Alternatively, DWR the project owner can provide information acceptable to the LCAQMD and ARB establishing pH adjustment and control is not necessary at the Bottle Rock Power Plant or provide temporary facilities (portable) for the injection of NaOH during power plant start ups until the question of pH control can be resolved.~~

~~Required Future Reports & Documents:~~

~~The project owner shall forward the Bechtel H2S Oxidation Study final report immediately upon its being finalized. And, no less than two months prior to initiating construction of the condensate abatement system, a detail design of the condensate abatement system shall be submitted formally in writing to the LCAQMD to enable compliance with these DOC requirements to be established by the LCAQMD.~~

~~B) Regarding the turbine by-pass to power plant main condenser~~ vent ~~system:~~

~~The project owner shall incorporate reliable and proven valves, noise attenuation of the valving, and desuperheating of by-passed steam/or account for in the~~

~~design of the system, the ability to successfully by-pass 100 percent of the steam load.~~

~~Required Future Reports & Documents:~~

~~The project owner shall submit to the LCAQMD within 60 days a report detailing at a minimum:~~

~~(1) The selection of the turbine by-pass valves, the operating experience with the selected valves, and the specific reason the valve design selected was chosen. To the extent possible, this report shall address the material presented in the Gibbs & Hill report on the subject.~~

~~(2) The design features incorporated and/or operating experience to ensure that the absence of desuperheating ability will not adversely affect the operation of the turbine by-pass or power plant emissions control system.~~

~~The project owner shall within sixty days prior to installation of the by-pass system provide detailed engineering drawings and a description in writing of the operation procedure for the turbine by-pass to power plant condenser system. The design shall incorporate the ability to by-pass during start-up and partial curtailment as well as total turbine failure.~~

~~The project owner, prior to operation of Bottle Rock shall with the steam supplier enter into an agreement detailing the responsibilities for operations of the turbine by-pass and emergency stacking abatement systems. Also, the interface between the stacking system controls shall be delineated by the steam supplier and the project owner and approved by the LCAQMD. A copy of the agreement shall be filed with the LCAQMD no less than 60 days prior to initial power plant operation.~~

~~**AC-20** The gas ejectors shall remain operable and available for use in the event of failure of the mechanical vacuum pump.~~

AC20-5 The applicant shall provide the District, no less than 30 days subsequent to the installation and operation of the herein authorized modification, with as-built drawings for the modification, including Non-Condensable line(s) and AECS showing gas flow, and rich condensate collection and disposal method (reinjection ~~or reflashing in the condenser~~).

~~**District Permit # A/C 2006-24, Condensate H2S Abatement System Modifications**~~

~~**AC24-1** This permit is for refinements to the existing condensate piping and valving servicing the Bottle Rock Geothermal Power Plant and permanent addition of the iron chelate chemical injection system; all other permits, associated conditions,~~

and limitations are not modified herein. The permitted modification is described in the application for modification and evaluated in the analysis accompanying this permit issuance. Equipment utilized and/or modified which is significantly different than that described in the permit application is subject to permit application and review. A permit to operate application, containing operating scenarios and contingency actions, shall be made within one year of initial operation, and the permit to operate may be incorporated into the general permit for the power plant. A performance plan consistent with rule 655 is recommended. The condensate reroute and iron chelate addition modifications shall be installed in a manner so as to minimize emissions from the facility by extending the contact time with oxygenated cooling tower basin waters to the maximum extent and consistent with documentation in the application and permit review issuance. Injection of iron chelated catalyst at the cooling tower basin or within the cooling tower circulating water shall be incorporated.

AC24-2 The permit holder shall properly install and maintain a properly sized, winterized condensate (cooling tower working water, condensate reroute valving and piping) H2S abatement system modification incorporating the availability of an iron chelate (Fe•HEDTA) catalyst, hydrogen peroxide, and other additives as approved by the APCO, to achieve an overall emissions rate specified in A/C 80-034A.

AC24-3 BRPC shall cause to be performed tests that establish compliance with permit emissions limitations under anticipated plant and AECS components operating scenarios, consistent with existing facility AQMD permits and the DOC. This shall include cooling tower stack source testing as described in Appendix 2 of the permit reviews and the DOC. Planned operating scenarios shall be described in writing, include required emission testing protocols, and be provided the APCO a minimum of two weeks prior to any operational tests or scheduled source testing. To the extent possible, operating scenarios shall identify measurable parameters that can indicate compliance, or the lack thereof to be correlated with cooling tower stack emissions testing.

A source test plan consistent with the facility permit requirements to determine H2S emissions, for any operating scenario of more than one week duration, shall be provided two weeks prior to testing the scenario. Source tests plans shall be approved by the AQMD prior to testing. Required cooling tower stack source testing can be delayed and H2O2 addition presumed unnecessary, unless requested by the APCO, provided all of the following are met: 1) AECS components are available, supplied and operable; 2) the cooling tower basin water has excess available dissolved oxygen and the hot well condensate is directed to the cooling tower basin; 3) incoming steam is 450 ppmw H2S or less; 4) the Fe•HEDTA concentration is 5 ppm or greater in the working water; and 5) delivered steam to tire plant does not exceed 150,000 lbs/hr.

~~**AC24-4** The applicant shall provide the District, no less than 30 days subsequent to installation and operation of the herein authorized modification, with as-built drawings for the modification, detailing the condensate and cooling tower portions of the facility associated with secondary H2S abatement. The submittal shall identify in detail the selected operational scenario, approved by the APCO (based on testing performed under Condition 3) to be utilized at the facility. This shall include flow routing of cooling tower working water, hot well condensate flow rate and routing, reinjection rate (H2S rich and normal).~~

~~Fe•HEDTA and all chemical feed injection rate(s) and location(s), arid factors effecting contract times of dissolved H2S in aerated working waters or with H2O2.~~

~~**AC24-5** Except as specified in Condition 2 this permit does not modify or make less restrictive any emission limitation, reporting, and/or monitoring/ testing requirements that presently exist for this facility.~~

~~**AC24-6** The operator shall provide safe access for representatives of the District, ARB, or EPA to inspect, review records, or collect samples as approved by the APCO, from this facility. Should the plant be secured by locks or gates, the District shall be provided keys, combinations or other means to gain immediate access for purpose of testing or inspection.~~

AC25-2 Stretford or catalyst reactor tail gas monitor output shall be recorded ~~on a continuous paper strip chart recorder or an APCO approved equivalent device~~ in a DCS historian system.

~~**District Permit # A/C 2006-26, Steam Transmission Line Modification**~~

~~**AC26-1** This Authority to Construct is to modify the existing geothermal fluid (steam) transmission pipeline, steam wash, and emergency steam stacking system servicing the Bottle Rock Power Plant; all other permits, associated conditions, and limitations are not modified. The permitted modification is described in the application and evaluated in the analysis accompanying this permit issuance. The pipeline shall be constructed and operated in a manner to not increase steam stacking during scheduled and unscheduled power generation or transmission line outages or during power plant startups and shutdowns of the unit. Equipment utilized and/or modified which is significantly different than that described in the permit application is subject to permit application and review. A permit to operate application shall be made within one year of initial operation, and the subject permit shall be incorporated into the general permit for the power plant.~~

~~**AC26-2** Pipeline cleanout, testing and startup emissions shall be consistent with the submitted project application and minimized to the extent feasible. The operator~~

~~shall provide the District 72 hours advance notice of scheduled cleanout and testing operations and obtain prior APCO approval for the date and time of emissions release or obtain a variance.~~

~~**AC26-3** All drain water discharged shall be directed to the rich condensate collection and disposal line.~~

~~**AC26-4** This permit does not modify or make less restrictive any emission limitation, reporting, and/or monitoring/testing requirements that presently exist for this facility.~~

~~**AC26-5** The applicant shall provide the District, no less than 30 days subsequent to installation of the herein authorized modification, with as-built drawings for the modification, including all steam or gas vent locations.~~

~~**AC26-6** The operator shall provide safe access to sampling ports that enable representatives of the LCAQMD, ARB, or EPA to collect samples, as approved by the APCO, from the steam stacking muffler, condensate collection basins, or any point release of steam, gas, or emissions to the ambient air.~~

1-3 The project owner shall use atmospheric emissions control systems as specified by the LCAQMD Authority to Construct for the Bottle Rock Power Plant (Permit # 80-034A) and approved by the CEC CPM. The emissions control systems shall include a Stretford or catalyst reactor H2S abatement system~~, a secondary H2S treatment system utilizing iron chelate and/or hydrogen peroxide injected into hot condensate,~~ and an emergency ~~steam turbine bypass~~ system for outages.

2-2. If the radon-222 concentration exceeds 3.0 picocuries per liter (pCi/l) in the ~~cooling tower~~ air-cooled condenser exhaust, the project owner must inform the CDHS/RHS and CEC CPM with a special report within 30 days of confirming an exceedance.

Verification: The project owner shall provide a written report to CDHS/RHS and CEC CPM of sample results within 30 days of confirming an exceedance of 3.0 (pCi/l) radon- 222 in the ~~cooling tower~~ air-cooled condenser exhaust. Confirmation includes the reanalysis of the sample by the project owner or another qualified laboratory. Confirmation of sample results must be accomplished in the most expedient manner possible. The procedures used shall be the same as the normal analysis but may include sending samples to CDHS/RHS and/or outside qualified laboratories for analysis. The confirmation of a sample should take less than five calendar days. The project owner shall notify the CEC of corrective actions taken.

2-3. If the radon-222 concentrations exceed 6.0 pCi/l in the ~~cooling tower~~ air-cooled condenser exhaust, the project owner shall notify the CDHS/RHS and the CEC by email or telephone within 24 hours of confirmation of the sample result.

3.1.6 References

BAAQMD . 2017. "California Environmental Quality Act Air Quality Guidelines." May.

California Air Pollution Control Officers Association. n.d. *CalEEMod Version 2020.4.0 .* Accessed [month accessed] 2021. https://www.caleemod.com/.

California Energy Commission. 2006. "Bottle Rock Geothermal Power Plant (79-AFC-4C) Staff Analysis of Petition to Change the Ownership, Allow the Restart of Operation After Suspension, and Allow 11 Facility Design Changes." November 13.

—. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant (79-AFC-04C)." December.

—. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project (79-AFC-04C)." https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=79-AFC-04C, October.

—. 2006. "Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes." December 14. 48.

Lake County Air Pollution Control District (LCAPCD). 1982a. "Determination of Compliance (DOC), DWR/Bottle Rock Geothermal Power Plant." September 24.

Lake County Air Pollution Control District (LCAPD). 1982b. "Modified Determination of Compliance (DOC), DWR/Bottle Rock Geothermal Power Plant." Februray 22.

Lake County Air Quality Management District (LCAQMD). 2006. "Permitting Review for Bottle Rock Power Corporation." August 30.

Purification Solutions. 2022. "Estimated Performance Sheet (EPS) – 69596, Schlumberger SULFATREAT* 2242." December 23.

RHC Group. 2023. "Mayacma Geothermal Project, Air Quality and Greenhouse Gas Emissions Technical Report." March.

3.2 Biological Resources

This subsection includes an evaluation of the amended BRPP effects on biological resources and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts on biological resources, and no impacts would be greater than those previously analyzed in Order 79-AFC-4. The project modification is consistent with Order-79 AFC-4, and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

3.2.1 Affected Environment

A habitat evaluation was conducted to identify and characterize existing conditions within amended BRPP site and 1,000 feet surrounding the BRPP site (study area), as well as to assess the potential for special-status species, sensitive habitats, and jurisdictional features to occur in the area (Vollmar 2023). The Biological Evaluation Report is provided in Attachment B. The study area was also previously evaluated for biological resources in Order 79-AFC-4 and the Bottle Rock Power Steam Project EIR (Lake County 1979).

Vegetation Communities/Habitat Evaluation

The areas within the fenced BRPP site consists of developed areas that are paved or graveled and devoid of vegetation. Access roads to the BRPP site are paved. Habitats within the buffer areas surrounding the BRPP site consist of cismontane woodland, chaparral, lower montane coniferous forest, serpentine chaparral, and valley and foothill grassland as shown on Figure 3.2-1. The vegetation communities in the BRPP study area are generally consistent with those evaluated in Order 79-AFC-4; however, the areas adjacent to BRPP infrastructure are currently subject to routine vegetation clearing for defensible space consistent with CAL FIRE requirements.

Special-Status Species

Special-status species are species legally protected under the California Endangered Species Act (CESA) and federal Endangered Species Acts (FESA) or under other regulations, or are species that are considered sufficiently rare by the scientific community to qualify for such listing. These species meet one of the following criteria:

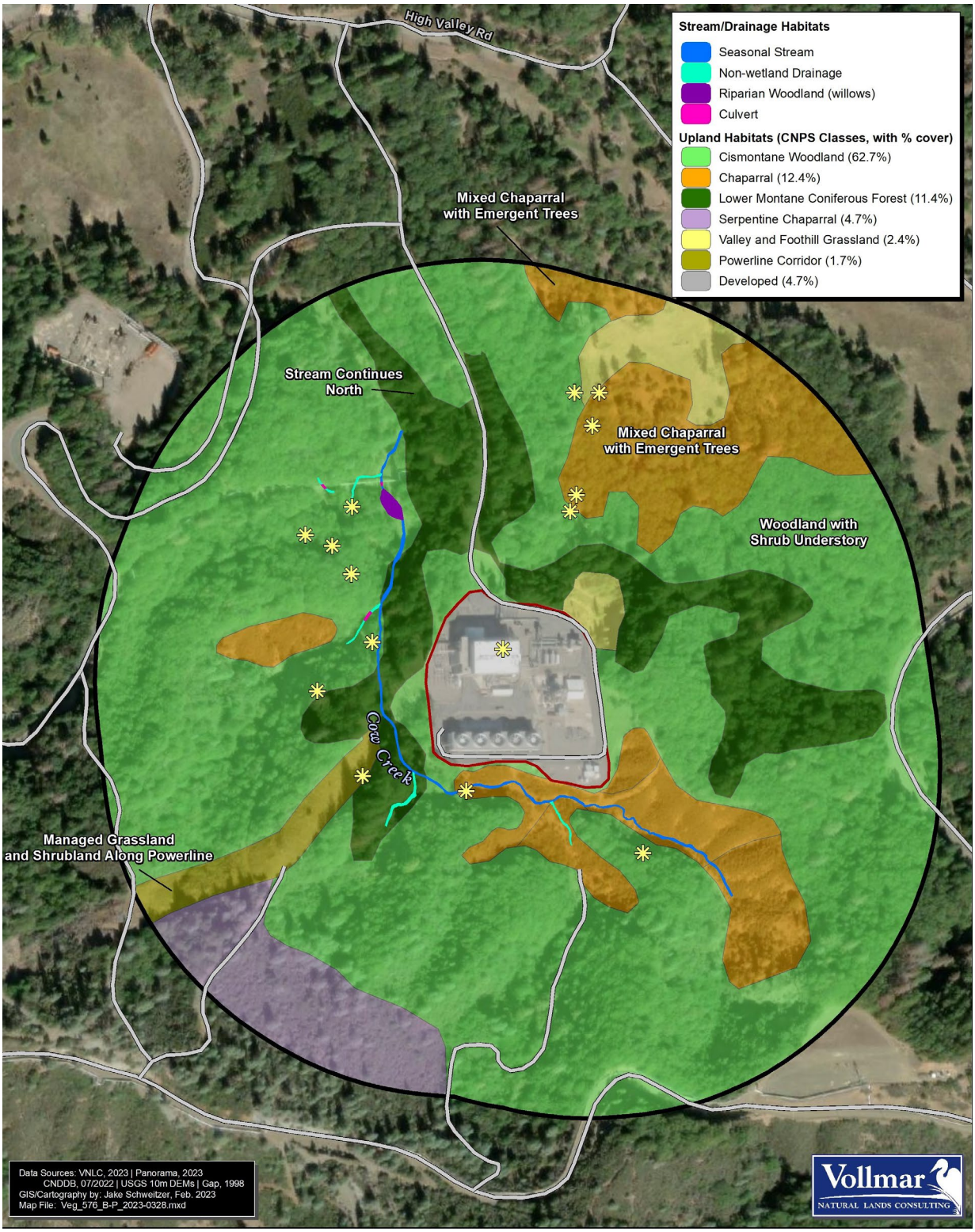
1. Species listed or proposed for listing as threatened or endangered under the federal ESA (50 CFR § 17.12 [listed plants], 17.11 [listed animals] and various notices in the Federal Register [FR] [proposed species]);
2. Species that are candidates for possible future listing as threatened or endangered under the federal ESA (61 FR § 40, February 28, 1996);
3. Species listed or proposed for listing by the State of California as threatened or endangered under the California ESA (14 CCR § 670.5);
4. Plants listed as rare or endangered under the California Native Plant Protection Act (California Fish and Game Code, Section 1900 *et seq.*);

5. Species that meet the definitions of rare and endangered under CEQA. CEQA Guidelines Section 15380 provides that a plant or animal species may be treated as "rare or endangered" even if not on one of the official lists;
6. Plants considered by the California Native Plant Society (CNPS) to be "rare, threatened or endangered in California" (California Rare Plant Rank 1A, 1B, 2A, and 2B) as well as California Rare Plant Rank 3 and 4 plant species;
7. Species designated by CDFW as Fully Protected or as a Species of Special Concern;
8. Species protected under the federal Bald and Golden Eagle Protection Act;
9. U.S. Fish and Wildlife Service Birds of Conservation Concern (BCC) or species included in the 2014 State of the Birds Watch List; and
10. Bats considered by the Western Bat Working Group (WBWG) to be "high" or "medium" priority (Western Bat Working Group 2015).

Based on habitat requirements and occurrence distributions, there are a total of ten special-status wildlife species and eighteen special-status plant species with some potential to occur within the study area (Vollmar 2023, Appendix B). No special-status species were documented within the study area during the reconnaissance biological surveys.

The potential for each special-status species to occur in the study area is summarized in Table 3.2-1 and additional details are provided in Appendix B. While the study area was previously evaluated in the BRPP Decision and subsequent amendments, species distribution patterns and listing status have changed since 1980. Table 3.2-1 includes the current listing status of wildlife species that could occur in the study area. Northern spotted owl is the only special-status wildlife species that is currently listed under FESA and CESA with potential to occur in the study area. Monarch butterfly is currently a federal candidate species; however, no overwintering habitat for monarch butterfly is present within the study area. All other wildlife species are California species of special concern, which are species tracked by the State of California for potential future listing. Table 3.2-2 provides the current California Rare Plant Rank (CRPR) for special-status plants that could occur in the study area. None of the special-status plants that have a potential to occur in the study area are state or federally listed species.

Figure 3.2-1 Vegetation Communities in Bottle Rock Study Area



Source: Vollmar 2003

Table 3.2-1 Special-Status Species Potential to Occur in the Study Area

Species	Status	Habitat	Potential to Occur in Study Area
Amphibians			
Foothill yellow-legged frog (*Rana boyleg*)	SSC (North Coast Clade)	Rocky streams in a variety of habitats.	**Potential.** Cow Creek provides low-to-moderately suitable habitat for dispersal (not breeding). There are a few pools, sunny areas, and some gravelly substrate.
Red-bellied newt (*Taricha rivularis*)	SSC	Redwood forest, conifer and hardwood woodland, and rapid/permanent streams.	**Low potential**. Cow Creek provides low-to-moderately suitable habitat for overland migration. Newt could utilize drainages to migrate through to other more suitable stream habitats in the watershed. Species has been identified around Cobb Mountain in recent years.
Birds			
Purple martin (nesting) (*Progne subis*)	SSC	Mountain forests or Pacific lowlands, woodpecker cavities and dead snags.	**Potential**. Nesting habitat is present within the study area. Several snags were observed and at least one woodpecker cavity is present.
Northern spotted owl (*Strix occidentalis caurina*)	FT (listed in 1990 ST (listed in 2016)	Dense blocks of mature, multi-layered forests of mixed conifer, redwood, and Douglas-fir habitat.	**Low potential**. Cismontane woodland and coniferous forest habitats within the study area could provide suitable habitat for the species. Designated critical habitat is present approximately 2.8 miles from the study area. Recently documented within 4 miles of the study area.
Insects			
Monarch butterfly (*Danaus plexippus plexippus*)	FC(listed in 2020)	Wind-protected tree groves, tall trees in large groups, milkweed (*Asclepias sp.*) vegetation.	**Potential**. Outside of the known overwintering range (generally within 1.5 miles of the coast) of this species. The study area could provide suitable spring/summer breeding and foraging habitat but does not contain overwintering habitat.
Mammals			
Pallid bat (*Antrozous pallidus*)	SSC; WBWG:H	Rocky outcrops and cliffs, caves, mines, trees, and various human structures (bridges, barns, porches, bat boxes, and buildings).	**Potential**. Trees and buildings could provide suitable day and night roosts, and grassland, woodland, and forests provide suitable foraging habitat. No obvious roost locations were observed during the field survey.

Species	Status	Habitat	Potential to Occur in Study Area
Townsend's big-eared bat (*Corynorhinus townsendii*)	SSC; WBWG:H	Caves, cliffs, rock ledges, and man-made structures.	**Potential**. Could roost within buildings and hollow trees within the study area. Grassland, woodland, and forests provide suitable foraging habitat. No obvious roost locations were observed.
Hoary bat (*Lasiurus cinereus*)	WBWG: M	Deciduous and coniferous forests and woodlands, including areas altered by humans. Open areas, including spaces over water and along riparian corridors.	**Potential**. Trees provide suitable day and night roosts, and grassland, woodland, and forests provide suitable foraging habitat. No obvious roost locations were observed.
Long-eared myotis (*Myotis evotis*)	WBWG: M	Semiarid shrublands, sage, chaparral, agricultural areas, and coniferous forests. Roost under exfoliating tree bark, hollow trees, caves, mines, cliff crevices, sinkholes, rocky outcrops and human structures (buildings and under bridges).	**Potential**. Trees provide suitable day and night roosts, and grassland, woodland, and forests provide suitable foraging habitat. No obvious roost locations were observed.
Fringed myotis (*Myotis thysanodes*)	WBWG: H	Pinyon-juniper, valley foothill hardwood, and hardwood-conifer.	**Potential**. Trees provide suitable day and night roosts, and grassland, woodland, and forests provide suitable foraging habitat. No obvious roost locations were observed.

Notes:
FT = federally listed as threatened
ST = state listed as threatened
FC = candidate for federal listing
SSC = species of special concern
WBWG (Western Bat Working Group)
H = high priority
M = medium priority

Source: Vollmar 2023

Table 3.2-2 Special-Status Plants Potential to Occur in the Study Area

Species	Status	Habitat, Elevation, and Blooming Period	Potential to Occur in Study Area
Plants			
Dimorphic snapdragon *Antirrhinum subcordatum* (Plantaginaceae)	CRPR 4.3	Chaparral, Lower montane coniferous forest. Microhabitat: Serpentinite; 605-2,625 feet; April-July	**Potential**. Suitable habitat is present.
Konocti manzanita *Arctostaphylos manzanita ssp. Elegans* (Ericaceae)	CRPR 1B.3	Chaparral, Cismontane woodland, Lower montane coniferous forest. Microhabitat: Volcanic; 1,295-5,300 feet; (January) March-May (July)	**Potential**. Suitable habitat is present.
Rincon Ridge ceanothus *Ceanothus confuses* (Rhamnaceae)	CRPR 1B.1	Chaparral, Cismontane woodland, Closed-cone coniferous forest. Microhabitat: Serpentinite, Volcanic; 245-3,495 feet; February-June	**Potential**. Suitable habitat is present
Calistoga ceanothus *Ceanothus divergens* (Rhamnaceae)	CRPR 1B.2	Chaparral (rocky, serpentinite, volcanic). Microhabitat: none; 560-3,115 feet; February-April	**Potential**. Suitable habitat is present
Cascade downingia *Downingia willamettensis* (Campanulaceae)	CRPR 2B.2	Cismontane woodland (lake margins), Valley and foothill grassland (lake margins), Vernal pools. Microhabitat: none; 50-3,640 feet; June-July (September)	**Potential**. Suitable habitat is present
Brandegee's eriastrum *Eriastrum brandegeeae* (Polemoniaceae)	CRPR 1B.1	Chaparral, Cismontane woodland. Microhabitat: Sandy, Volcanic; 1,395-2,755 feet; April-August	**Potential**. Suitable habitat is present
Greene's narrow-leaved daisy *Erigeron greenei* (Asteraceae)	CRPR 1B.2	Chaparral (serpentinite, volcanic). Microhabitat: none; 260-3,295 feet; May-September	**Potential**. Suitable habitat is present
Snow Mountain buckwheat *Eriogonum nervulosum* (Polygonaceae)	CRPR 1B.2	Chaparral (serpentinite). Microhabitat: none; 985-6,905 feet; June-September	**Potential**. Suitable habitat is present

Species	Status	Habitat, Elevation, and Blooming Period	Potential to Occur in Study Area
Toren's grimmia *Grimmia torenii* (Grimmiaceae)	CRPR 1B.3	Chaparral, Cismontane woodland, Lower montane coniferous forest. Microhabitat: Carbonate, Openings, Rocky, Volcanic, boulder and rock walls; 1,065-3,805 feet; no bloom period listed	**Potential**. Suitable habitat is present
Hall's harmonia *Harmonia hallii* (Asteraceae)	CRPR 1B.2	Chaparral (serpentinite). Microhabitat: none; 1,000-3,200 feet; (March) April-June	**Potential**. Suitable habitat is present
Glandular western flax *Hesperolinon adenophyllum* (Linaceae)	CRPR 1B.2	Chaparral, Cismontane woodland, Valley and foothill Grassland. Microhabitat: Serpentinite (usually); 490-4,315 feet; May-August	**Potential**. Suitable habitat is present
Two-carpellate western flax *Hesperolinon bicarpellatum* (Linaceae)	CRPR 1B.2	Chaparral (serpentinite). Microhabitat: none; 195-3,295 feet; (April) May-July	**Potential**. Suitable habitat is present
Colusa layia *Layia septentrionalis* (Asteraceae)	CRPR 1B.2	Chaparral, Cismontane woodland, Valley and foothill Grassland. Microhabitat: Sandy, Serpentinite; 330-3,595 feet; April-May	**Potential**. Suitable habitat is present
Cobb Mountain lupine *Lupinus sericatus* (Fabaceae)	CRPR 1B.2	Broadleafed upland forest, Chaparral, Cismontane woodland, Lower montane coniferous forest. Microhabitat: none; 900-5,005 feet; March-June	**Potential**. Suitable habitat is present
Sonoma beardtongue *Penstemon newberryi* var. *sonomensis* (Plantaginaceae)	CRPR 1B.3	Chaparral (rocky). Microhabitat: none; 2,295-4,495 feet; April-August	**Potential**. Suitable habitat is present
Socrates Mine jewelflower *Streptanthus brachiatus ssp. brachiatus* (Brassicaceae)	CRPR 1B.2	Chaparral, Closed-cone coniferous forest. Microhabitat: Serpentinite; 1,790-3,280 feet; May-June	**Potential**. Suitable habitat is present

Species	Status	Habitat, Elevation, and Blooming Period	Potential to Occur in Study Area
Freed's jewelflower *Streptanthus brachiatus ssp. hoffmanii* (Brassicaceae)	CRPR 1B.2	Chaparral, Closed-cone coniferous forest. Microhabitat: Serpentinite; 1,790-3,280 feet; May-June	**Potential**. Suitable habitat is present
Oval-leaved viburnum *Viburnum ellipticum* (Viburnaceae)	CRPR 1B.2	Chaparral, Cismontane woodland. Microhabitat: Serpentinite; 1,610-4,005 feet; May-July	**Potential**. Suitable habitat is present

Source: Vollmar 2023

Critical Habitat

The study area is not located within any designated critical habitat areas.

Riparian Areas, Wetlands, and Sensitive Natural Communities

Cow Creek and its tributaries include wetland and riparian vegetation along the stream banks and surroundings. The riparian areas within the study area are shown on Figure 3.2-1. The wetlands appear to be limited to small, localized portions of Cow Creek below the tops of banks and were not mapped during the field survey. Aside from Cow Creek and its tributaries there are no sensitive habitats within the study area. None of the onsite natural habitats within the study area would be classified as sensitive due to their species composition. All of the dominant plant species within the habitat types in the study area are relatively common in the region or otherwise common in California.

3.2.2 Environmental Analysis

Special-Status Species

Overview

Activities to construct and operate the amended BRPP would not result in a loss of vegetation or wildlife habitat because all proposed modifications would be conducted in previously disturbed areas. The fenced BRPP site is developed and does not contain habitat. The area immediately east of the BRPP fence where the steam pipeline and condensate pipeline are proposed were disturbed during grading of the BRPP site and are currently subject to annual vegetation management activities including vegetation clearing to maintain defensible space around the BRPP. The area of new foundations and excavation would be contained within the graded and disturbed BRPP site. The amended BRPP would not require vegetation removal, and, therefore would not directly remove habitat for any special-status species.

Plants, Amphibians, and Insects

The amended BRPP would not involve removal of vegetation as all areas of construction and operation of the BRPP are within areas that are developed or disturbed by existing BRPP infrastructure. Because the amended BRPP would not remove vegetation or require work in

undisturbed habitat, the amended BRPP would have no potential direct effect on special-status plants or insects. The amended BRPP does not require any new roads or modify any crossings of streams and would not affect any habitat for special-status amphibians. The amended BRPP would involve implementation of erosion control measures in COCs 5-1.e, 5.1-f, and 5-3.h to avoid effects from erosion and sedimentation on habitat for special-status plants, amphibians, or insects. Because the amended BRPP would not affect any habitat for special-status plants, amphibians, and insects, and sufficient erosion control measures are required under existing COCs, the amended BRPP would not affect special-status plants, amphibians, or insects.

Construction

As discussed above, the project would not remove any nesting or foraging habitat for special-status birds. Construction of the amended BRPP would involve use of noise-generating heavy equipment. Impacts to wildlife from increased noise during construction would be short-term (8 months). Construction is anticipated to occur between the hours of 7:00 a.m. and 7:00 p.m., Monday through Saturday. No work would occur on Sundays or holidays. While construction activities would be short-term, the irregular noise and increased noise levels at the site could potentially affect special-status bird nesting activities if construction activities commenced during the nesting season for special-status birds in proximity to active bird nests.

Northern Spotted Owl

U.S. Fish and Wildlife Service (USFWS) recommends a no disturbance buffer of 0.25 mile from any nest of Northern spotted owl during the nesting season. In order to avoid potential effects on Northern spotted owl breeding behavior and to comply with USFWS guidance for avoidance of noise disturbance, if project construction activities commence during nesting/breeding season of Northern spotted owl (typically February 1 to July 31), applicant proposed measure (APM) BIO-1 includes protocol surveys would be conducted by a qualified biologist, following USFWS 2011 Northern Spotted Owl survey protocol. If any Northern spotted owl nesting pair was documented within 0.25 mile of the amended BRPP site, no construction activity would commence until after the Northern spotted owl nesting season. APM BIO-1 includes procedures to avoid affects on Northern spotted owl nesting consistent with current LORS.

> **APM BIO-1. Northern Spotted Owl Avoidance.** If project construction commences during nesting/breeding season of northern spotted owl (February 1 to July 31), protocol surveys for noise disturbance projects shall be conducted by a qualified biologist, following USFWS's 2011 Northern Spotted Owl survey protocol. This protocol requires six visits between March 15 and May 31, and the goal would be to determine if spotted owls are nesting in the immediate vicinity of the project area. The surveys shall cover all spotted owl habitat within 0.25-mile of the project site. If no nests are documented, the surveys are effective until the beginning of the following nesting season (February 1). If northern spotted owl nests are documented in the immediate project area no construction activities may commence within 0.25 mile of any active nest and the United States Fish and Wildlife Service (USFWS) shall be consulted to define appropriate nest buffers or other mitigation measures.

Purple Martin

If construction activities were to commence during the nesting season for purple martin (February 15 to August 15) and purple martin were nesting within proximity to the project site, the construction noise could affect purple martin nesting activities. To avoid impacts on purple martin and other migratory birds, APM BIO-2 includes a pre-construction survey for nesting birds conducted by a qualified biologist at most two weeks prior to initiation of on-the-ground activities, for commencement of activities within nesting/breeding season (February 15 to August 15). If any nesting birds are observed during the pre-construction survey a no-disturbance buffer of 50 feet for passerines, 200 feet for raptors, and 500 feet for rookery nests shall be established until the young have fledged the nest. APM BIO-2 includes protocols to avoid effects on purple martin and other nesting birds consistent with current LORS.

> **APM BIO-2. Nesting Bird and Raptor Avoidance.** Project construction shall be timed to avoid bird nesting season (February 15 – August 15) to the extent feasible. If construction activities start during the nesting season, a pre-construction survey for nesting birds shall be conducted by a qualified biologist within one week prior to initiation of construction activities. If construction ceases for a period of 48 hours or more or if construction activities move into areas that have not been subject to routine construction noise disturbance then new avian surveys shall be conducted for nesting birds. If active nests are observed in proximity to the construction, the following standard no-disturbance buffers shall be implemented: 50-foot buffer for passerine (songbird) nests, 200-foot buffer for raptor nests, and 500-foot buffer for purple martin nests. The no disturbance buffer may be adjusted by the biologist based on site specific conditions. The no disturbance buffer shall be maintained until the young have fledged and left the nest, as determined by a qualified biologist.

Mammals

Townsend's bat and pallid bat use buildings, such as those on the BRPP site, as roosting habitat. Hoary bat, long-eared myotis, and fringed myotis could potentially use trees in proximity to the BRPP site as roosting habitat. The project would not remove any bat roosting habitat including buildings or trees. Construction of the amended BRPP would occur more than 50 feet from any suitable bat roosting areas including the existing BRPP building. Because the amended BRPP would not affect any bat habitat or use heavy equipment in proximity to suitable roosting habitat, the amended BRPP would not affect special-status bats.

Operation

Operation of the amended BRPP would generate constant sound at the ORC units and ACCs. Sound reduction measures including enclosures around the ORC expanders are included as part of the project to reduce noise levels to 45 dB at the nearest property line. Because the noise increase from operation of the amended BRPP would be contained to the BRPP site and would not generate increased noise levels in areas containing habitat, noise generated during operation of the amended BRPP would not impact special-status birds or mammal species.

The amended BRPP would also include installation of lighting on steel posts (up to 30 feet tall) around the perimeter of the new ORC units. Lighting would be on motion sensors, downcast, and dark sky compliant to avoid impacts on the night sky. Where it is feasible to use shorter light posts due to focused work areas on the ground, lights would be mounted at a height of 10 to 16 feet to reduce light scatter. Lighting would comply with outdoor lighting standards in California Energy Code Title 24 part 6. Because all lighting would be located within the perimeter of the BRPP site, which already contains lighting and lighting would be focused on the amended BRPP infrastructure, no new impacts to wildlife from lighting would occur.

Riparian Habitat, Sensitive Natural Communities, and Wetlands

The amended BRPP would not locate any infrastructure in riparian habitat or wetlands. No sensitive natural communities occur within the study area therefore no sensitive natural community would be affected by the amended BRPP. The amended BRPP construction would be focused in areas that are currently developed and would not increase the risk of erosion and associated sediment impacts on riparian habitat or wetlands. In addition, the amended BRPP would involve implementation of erosion control measures in COCs 5-1.e, 5.1-f, and 5-3.h to avoid effects from erosion and sedimentation on any riparian habitat or wetlands.

Connectivity Corridors

The amended BRPP would be located within the developed BRPP site and directly adjacent to the site. The amended BRPP would not affect any wildlife migration or connectivity corridor.

Critical Habitat

No critical habitat occurs on the BRPP site or in the study area. The amended BRPP would not affect any critical habitat.

Summary

The amended BRPP involves very limited earth work and ground disturbance and would not affect any habitat for plants or wildlife. In addition, APMs BIO-1, BIO-2, and BIO-3 are proposed to reduce and avoid impacts on special-status species that could use habitat in proximity to the BRPP site. Therefore, no impacts to biological resources beyond those described in Order 79-AFC-4 and subsequent amendments would occur. All amended BRPP activities would be conducted in accordance with the 2013 COCs, as modified, and all applicable LORS.

3.2.3 Cumulative Effects

The amended BRPP would not result in new impacts to biological resources that would approach the level of significance. There are no impacts that could combine cumulatively with those of other projects. Demolition of the water-cooling tower within the BRPP site would not affect biological resources. Thus, the amended BRPP would not result in a cumulatively considerable impact, and the impact is consistent with the findings of Order 79-AFC-4 and subsequent amendments.

3.2.4 Consistency with Laws, Ordinances, Regulations, and Standards

The amended BRPP would comply with all applicable LORS related to biological resources and would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments. The change in species listing statu

3.2.5 Conditions of Certification

The amended BRPP would comply with biological resources COCs 5-1 a, b, e, f; 5-2; and 5-3 a-d, h-j. These COCs are adequate to address any new potential impacts from the amended BRPP. COCs 5-1b, 5-2, 5-3b, and 5-3i include minor changes to reflect the name change from California Department of Fish and Game to California Department of Fish and Wildlife. The naming conventions and timing of surface and groundwater sampling in measures COC 5.3-b and 5.3-c has been updated to reflect the naming convention and sampling timing in water board Order 99-091 for the project. Two groundwater wells, Union Oil Spring and Jadiker (Wright) Spring are located on Calpine leases and are not accessible to the applicant for sampling. Sampling of Union Oil Spring is also unsafe; therefore, those groundwater sampling locations have been recommended for removal from COC 5.3-c. In addition, measure 5.3-d is proposed for deletion because years of biological monitoring in the area have demonstrated that species prefer use of the native habitat rather than the nest boxes. Changes to the COCs are shown in ~~strikethrough~~ and underline. With the proposed changes in the COCs, the amended BRPP would comply with current LORS, and impacts of the amended BRPP would not exceed the impacts of the approved BRPP.

5-1.b. The project owner shall prepare a revised detailed Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) which includes mitigation measures with their implementing methodologies, and submit it to the CEC CPM for review and approval in consultation with the California Department of Fish and ~~Game~~ Wildlife(CDF~~G~~W). The project owner shall implement the approved biological resources mitigation and monitoring measures specified in the approved BRMIMP.

5-2. One year prior to power plant deactivation, the project owner shall include in the decommissioning plan a biological resources element identifying mitigation measures.

Verification: The project owner shall submit the biological resources element of the decommissioning plan to the CEC CPM for a determination in consultation with CDF~~G~~W of adequacy and acceptability.

5-3.b. The project owner shall continue surface water sampling at the following 5 sites: Kelsey Creek near Kelseyville (SW-6), Kelsey Creek above High Valley Road (SW-7), High Valley Creek above Kelsey Creek (SW-8), Adler Creek above Glenbrook (SW-9), and Kelsey Creek above Glenbrook (SW-10).~~Kelsey Creek immediately upstream of the confluence with Alder Creek; Kelsey Creek 500 feet downstream of its confluence with High Valley Creek; Alder Creek immediately upstream of its confluence with Kelsey Creek; High Valley Creek immediately upstream of its confluence with Kelsey Creek; and Kelsey Creek near Kelseyville.~~

Sampling shall be conducted in quarterly ~~April, July, and October~~ of each year.

Protocol: Each surface water sample shall be analyzed for boron, sodium, sulfate, calcium-magnesium hardness, Ph, alkalinity, settlable solids, nonfilterable residue, turbidity, specific electrical conductivity, magnesium, calcium, copper, iron, lead, manganese, and zinc.

As determined necessary by the CEC CPM, based on water quality sampling results and consultation with the CDF~~G~~W, the project owner shall, during April, July and October, collect and identify bottom-dwelling organisms from at least one square meter of stream-bed at each site and make special trace metal determinations for copper, iron, manganese, lead and zinc.

5-3.c. The project owner shall continue groundwater sampling at the following five sites: ~~Nance~~ Barrett Spring (GW-1), ~~Union Oil Spring ,~~ Coleman Well (GW-4), ~~Jadiker Spring~~ and Francisco Well (GW-3).

Sampling shall be conducted in ~~April, July, and October of~~ quarterly each year.

Protocol: Each groundwater sample shall be analyzed for boron, sodium, sulfate, calcium-magnesium hardness, pH, alkalinity, non-filterable residue, specific electrical conductivity, copper, iron, manganese, lead and zinc.

~~**5-3.d.** The project owner shall replace and maintain the nest boxes as originally prescribed, and maintain wildlife water basins in working condition. Wildlife use of these habitat improvement projects shall be monitored biennially using the same methodology that has been used in the past and thoroughly described in the BRMMSP. (See 5-3.i. below)~~

5-3.i. A Biological Resources Mitigation and Monitoring Status Report (BRMMSR) shall be prepared to provide the results of the previous year's monitoring. This report shall be submitted by December 15th each year. The report will collate and summarize all monitoring results including methodologies used to satisfy conditions 5-3.a. through 5-3.h. The project owner shall include in the BRMMSR appropriate maps of suitable scale with a detailed discussion of the current status of all mitigation and monitoring actions.

Verification: The project owner shall submit to the CEC CPM by December 15th, of each year, an annual BRMMSR which verifies compliance with the Biological Resource Conditions of Certification.

Upon reasonable notice the CEC CPM, Lake County staff, the Regional Water Quality Control Board staff, and the California Department of Fish and ~~Game~~Wildlife(CDF~~G~~W) staff, shall be granted access for inspections.

5-3.j. If any specific mitigation measure or monitoring program is determined to be ineffective, or if the CEC CPM receives any submittal, complaints, or other information from the project owner, other agencies, or the public, that indicates one or more

significant impacts are occurring on the leasehold subject to CEC jurisdiction, the project owner shall undertake actions to correct or reverse these impacts with advice and consent from the CEC CPM.

Verification: The project owner in consultation with CEC CPM will take action to correct the problem. If the problem cannot be resolved, the compliance monitoring dispute resolution process will be utilized.

3.2.6 References

CEC. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." *Docket Number 79-AFC-4.* October.

—. 2006. "Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

—. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." *Docket Number: 79-AFC-04C.* December.

Lake County. 1979. California Department of Water Resources, Bottle Rock Geothermal Power Plant Draft Environmental Impact Report. *Application No. 79-AFC-4*.

Vollmar. 2023. Biological Evaluation Report. Mayacma Geothermal Project, Lake County, California. Prepared by Vollmar Natural Lands Consulting.

3.3 Cultural Resources

This subsection provides an evaluation of the amended BRPP's effects on cultural resources and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts on cultural resources, and no impacts would be greater than those previously analyzed in Order 79-AFC-4. The project modification is consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

3.3.1 Affected Environment

The amended BRPP affected environment consists of the developed BRPP site, which primarily encompasses the graveled and paved pad within the fence line of the BRPP. A new condensate pipeline and new segment of steam pipeline would extend from the ORC units within the BRPP site to the east of the BRPP fence line, and then would turn north and parallel the fence line just outside the site boundary. All areas of ground disturbance were previously evaluated in 79-AFC-4 and Bottle Rock Power Steam Project EIR (DWR 1979). The BRPP is less than 50 years old and is therefore not eligible as a historic resource. No cultural resources have been identified at the BRPP site (including areas within the proposed steam and condensate pipelines alignment adjacent to the fence) . The nearest cultural resource is an archaeological site located approximately 90 feet north of the BRPP (Archaeological Services, Inc. 2010).

3.3.2 Environmental Analysis

As discussed in Section 2.0 Project Description, the project involves construction of the amended BRPP, including installation of two new ORC units, new segments of steam pipeline and vent stack, new condensate pipeline, new PDCs, new ACCs, and new electrical lines. The new ORC units, ACCs, and PDCs would be located on foundations that would extend up to 5 feet below grade. The new electrical pipelines would be buried in a trench that would extend up to 3 feet below grade. The new condensate and steam pipeline segments would be co-located on new pipeline supports secured to foundations that would extend up to 5 feet below grade. The area of new foundations and excavation would be contained within the graded and disturbed BRPP site, and there is very low potential for disturbance of cultural resources given the history of grading and disturbance within and adjacent to the BRPP site and absence of any known cultural resources in the area. No impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur. Resource protection measures 4-1 through 4-5 included in the existing 2013 COC are adequate to address potential impacts to cultural resources due to the amended BRPP. All amended BRPP activities would be conducted in accordance with the 2013 COCs and all applicable LORS.

3.3.3 Cumulative Effects

The amended BRRP would not cause a substantial adverse change in the significance of a historical resource. None of the project features that would be demolished are historic and the demolition would not affect cultural resources. There are no impacts that could combine cumulatively with those of other projects. Thus, the amended BRRP would not result in a cumulatively considerable impact, and no cumulative impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.3.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP complies with all applicable LORS related to cultural resources and would not alter the conclusions made in the Order 79-AFC-4 and subsequent amendments.

3.3.5 Conditions of Certification

The amended BRPP would not result in changes to previously identified cultural resources impacts. The amended BRPP would be subject to COCs 4-1 through 4-5 (Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes, 2006; Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant, 2013), which address any potential impacts from the amended BRPP. No COCs would be modified as a result of the proposed amendment.

3.3.6 References

Archaeological Services, Inc. 2010. "Bottle Rock Power Stream Project Cultural Resources Investigation Near Glenbrook, Lake County, California."

Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant. 2013. Docket Number: 79-AFC-04C. (California Energy Commission, December 16).

Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project. 1980. Docket Number 79-AFC-4 (California Energy Commission, November).

DWR. 1979. "Bottle Rock Geothermal Power Plant, Lake County, CA Draft Environmental Impact Report."

Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes. 2006. Docket No. 79-AFC-4C (California Energy Commission, December 13).

3.4 Geologic Hazards and Resources

This subsection includes an evaluation of the amended BRPP effects on geologic resources and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts from geologic hazards nor create greater impacts to geologic resources that were not previously analyzed in Order 79-AFC-4. The project modification is consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

3.4.1 Affected Environment

The affected environment includes the existing BRPP site and the area of the proposed steam pipeline and condensate pipeline located immediately adjacent to the BRPP fence . The BRPP site was graded to construct the BRPP, and the current conditions of the site include a paved and graveled area. All facilities within the BRPP site are as described and previously evaluated in Order 79-AFC-4 and the Bottle Rock Power Steam Project EIR (DWR 1979). No mineral resources or unique geological resources of historical, scientific, or recreational interest are found within the BRPP site (DWR 1979).

No known traces of active faults are located at the project site or in the immediate vicinity; however, the site is subject to seismic shaking based on the presence of faults in the region. The primary earthquake hazards are ground shaking and its potential to induce landslides. Earthquake potential and potential for earthquake induced landslides in the area were previously evaluated for the BRPP. Earthquake risk and associated hazards have not changed since licensing of the BRPP.

3.4.2 Environmental Analysis

The proposed modifications to the BRPP would be completed within and immediately adjacent to the existing developed BRPP site. Construction of the amended BRPP would require excavation of approximately 500 cubic yards of material for installation of subsurface electrical lines and construction of the ORC pad and placement of approximately 750 cubic yards of concrete for new foundations and concrete pads. The depth of excavation for the proposed foundations would be up to 5 feet if spread footings are used. All trenching and foundation drilling would be located within previously graded, compacted graveled, or paved areas. Excavation and foundation construction would not create a new risk of geologic hazards as all areas of excavation would be repaved and stabilized and the foundations would be designed to meet current engineering standards.

All facilities for the amended BRPP would be constructed in accordance with the current California Building Standards Code (CBSC), also known as, California Code of Regulations, Title 24, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and other applicable codes and standards

in effect when the design and construction of the amended BRPP would begin. A geotechnical investigation and final geotechnical report would be prepared before completion of the final engineering design. The final engineering design would comply with all geotechnical recommendations.

The existing geotechnical/seismic hazards and civil engineering COCs included in the existing BRPP license ensure that construction and demolition-related activities at the project site would comply with appropriate geologic hazard and resource protection plans and applicable LORS. Because all major infrastructure (i.e., ACCs, ORCs, PDCs, H_2S abatement) included in the amended BRPP would be located within the existing graded and developed BRPP site, the amended BRPP would not result in potential geologic hazards, nor would it result in potential impacts to geologic resources more significant than those analyzed in Order 79-AFC-4 and subsequent amendments. The geologic resource COCs included in the existing BRPP license address the geologic hazards and potential impacts to geologic resources that could result from construction and demolition activities of the amended BRPP. The amended BRPP would be constructed and demolished in accordance with applicable LORS and COCs.

The potential for ground rupture at the site is considered low, and it is therefore unlikely that faults within the immediate area would produce any large damaging earthquakes due to either natural or induced activity during the economic life of the proposed facilities. Activities associated with the withdrawal of steam for producing electric power may cause or induce small quakes to occur in the field; these smaller quakes are frequently felt by those who work at the field and by nearby residents (USGS 2023). Seismic hazards would be minimized by conformance with the recommended seismic design criteria of the current CBC. Compliance with the current CBC requirements (and other state and local LORS) would reduce the exposure of people to the risks associated with large seismic events, liquefaction potential, and expansive soils to less-than-significant levels. Additionally, major structures would be designed to withstand the strong ground motion of a *design-basis earthquake* as defined by the CBC. Compliance with CBC standards would ensure no impacts associated with geologic hazards beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

The amended BRPP would be located in the same areas and on the same geologic units as the existing BRPP and would not result in a loss of availability of a known mineral resource that would be of value to the region and the residents of the state. No such resources have been identified on or near the site; therefore, no impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.4.3 Cumulative Effects

The amended BRPP would not result in new impacts to geologic resources or increase geologic hazards. Because structures would be designed to meet seismic requirements of the CBC, the amended BRPP would not cause adverse impacts to geologic resources and would not cause an exposure of people or property to geologic hazards. There are no impacts that could combine cumulatively with those of other projects; therefore, the amended BRPP would not result in a

cumulatively considerable impact, and no cumulative impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.4.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP would comply with all applicable LORS related to geologic hazards, including the 2022 CBSC, which went into effect on January 1, 2023, and would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

3.4.5 Conditions of Certification

The amended BRPP would not result in any new or more severe impacts related to geologic hazards and resources than the approved BRPP and no additional COCs are needed to address geologic hazards and resources impacts. The amended BRPP is subject to approved COCs 7-1 and 7-3 (geotechnical/seismic hazards). The amended BRPP would also be subject to COCs for structural engineers (COCs 10-1 through 10-6). COCs 10-1, 10-5, and 10-6 require modifications for the amended BRPP, as shown in ~~strikethrough~~ and underline below, to reflect the current CBSC and to reflect changes in proposed BRPP infrastructure. With the proposed changes in the COCs, the amended BRPP would comply with current LORS, and impacts of the amended BRPP would not exceed the impacts of the approved BRPP.

10-1. The project owner shall design and construct the Bottle Rock Geothermal Power Plant and its related facilities to be in conformance with applicable laws, ordinances, standards, and practices and with the information, criteria. And methods set forth in the following documents:

> Bottle Rock AFC, Section IV.D. (entitled, "Seismic Performance Criteria," revised May 22, 1980), Appendix A (Part III, entitled, "Structural Design and Construction Policy," revised May 22, 1980, and Appendix B (entitled, "A Report on Geysers Power Plants," by Dr. Haresh C. Shah, dated May 1980).
>
> The project owner will use the Applied Technology Council "Tentative Provisions Applicant's responses (dated November 5, 1979) to Staff Interrogatories.
>
> The project owner will use the Applied Technology Council "Tentative Provisions Record of telephone conversation, Gaylon Lee (CEC) and Dale Martfeld (DOER), July 21, 1980.
>
> Applicable Findings and Conclusions regarding Structural Engineering of the Joint Prehearing Conference Statement of the Commission Staff and the Applicant dated August 29, 1980.

In case of discrepancies between various criteria, laws, ordinances, and standards, the most conservative requirement will be used. For the turbine generator building, ~~turbine generator pedestal, cooling tower,~~ ORC units, air-cooled condensers, power distribution center, and Stretford absorber columns, the project owner will clearly demonstrate through design calculations and drawings that the proposed final plans and specifications are based on and

conform with design criteria and methods required by the certificate or that any nonconformance is justified.

Upon submittal by the project owner to the CEC CPM of adequate quality assurance/quality control procedures for review and checking of final design plans and specifications for the proposed structure and equipment, CEC staff may delegate to the project owner responsibility for determining that the proposed final plans and specifications comply with ~~CBSC 2001~~ CBSC 2022 or other requirements of the certificate.

The Lake County CBO shall review and comment on compliance of proposed plans and specifications with requirements (primarily ~~CBSC 2001~~ CBSC 2022) of County Ordinance ~~2473~~ 2935. The CEC staff or its agent shall review the project owner's proposed design criteria and methods, preliminary and final plans and specifications, and upon request, may review proposed procurement specifications to determine that the proposed design or design approach conforms with terms and conditions of the certificate (other than County requirement) or, if not, that any nonconformance is justified.

If the project owner's proposed design criteria or methods, final plans and specifications, and procurement specifications are not acceptable to the CEC staff, the design documents shall be modified by the project owner until substantial compliance is attained.

The project owner shall not begin construction of any structure or foundation for which final plans and specifications have not been accepted by CEC CPM. At least 30 days prior to submittal of any design documents, the project owner will notify the CBO and CPM of the intended submittal date.

The project owner will furnish two sets of preliminary plans and specifications to both the CEC CPM and to the Lake County Chief Building Official (CBO) for review and comment concurrently with the Applicant's staff review process.

The project owner will simultaneously submit two complete sets of final structural designs, plans, and specifications for each structure and structure foundation to the CBO at least 75 days prior to the intended date of bid opening.

Verification: The project owner's design engineer(s) shall sign and/or stamp all proposed final plans and specifications, and shall certify in writing that to his personal knowledge:

- The proposed final plans and specifications are consistent with the applicable referenced criteria and with any other applicable terms and conditions of the certificates and were developed using design criteria and methods accepted by CEC staff, and
- The utility's procurement specifications for components purchased from a vendor, comply with the referenced criteria and with any other applicable terms and conditions of the certificate.

The final plans and specifications will reflect the inclusion of approved criteria, assumptions, and methods used to develop the design, and for the turbine-generator building, ~~cooling tower,~~ ORC units, air-cooled condensers, power distribution center, and Stretford absorber column, shall include design calculations.

The CBO will within 50 days of submittal of both preliminary and final plans and specifications by the project owner, file concurrently with the project owner and the CEC CPM, a compliance letter containing the county's review comments.

The CPM will, within 70 days of receipt by CEC of the project owner's proposed final plans and specifications, file a compliance letter to notify the project owner if the proposed plans and specifications are acceptable to CEC staff or, if not, what changes are recommended by CEC staff. Should the CPM fail to file a compliance letter within 70 days, the project owner may deem its proposed final plans and specifications acceptable to CEC.

Final plans are defined as the plans upon which construction will be based (e.g., used for bid purposes).

10-5. The project owner will file with the CEC CPM or its designated agent substantial design changes to the final plans as required by CBSC ~~2001~~ 2022. "Substantial changes" include all changes requiring an alteration in design concept and preparation of new design plans consistent with the AFC conditions of certification. Minor changes shall be reflected in the "as-built" drawings submitted after construction.

10-6. Inspection shall be performed in accordance with ~~Chapters 3 and 70 of the Uniform Building Code (1979 edition)~~ the International Building Code (2021 edition). The CEC CPM or its designated agent may delegate responsibility for special and continuous inspections to the project owner as provided in the CBSC ~~2001~~ 2022. The CEC CPM or its designated agent, may upon reasonable notice, inspect the construction at any time.

The project owner will provide, through its Construction Office, a staff of field engineers and inspectors to monitor conformance with the accepted final plans, specifications, and change orders. These field engineers and inspectors will be present on site at all times to monitor construction activities.

Upon submittal by the project owner to the CEC CPM of adequate quality assurance/quality control procedures for inspection of construction work, CEC staff may delegate to the project owner responsibility for determining that construction work conforms with CBSC ~~2001~~ 2022 or other requirements of the certificate.

Should the CEC delegate responsibility for inspections to the project owner, the project owner shall certify that the designated inspectors have the authority to:

- Stop construction work which does not conform with approved plans, specifications, and change orders;
- Require changes or remedial work to reestablish conformance; and

- Report substantial nonconformance to the CEC or its designated agent as soon as discovered.

Should the project owner propose substantial corrective measures for any nonconforming construction work, the project owner's responsible engineer shall sign and stamp the proposed corrective plan, and specifications shall certify that they conform with the applicable criteria. Any nonconformance shall be justified by the project owner.

Any proposed substantial corrective measures shall be reviewed by the CEC or its designated agent to determine that they conform with the applicable criteria or with the design intent.

Upon request by the project owner's responsible engineer, selected fabricated materials shall be inspected for compliance with contract specification, either in the supplier's shops or on site, by the utility's Engineering Quality Control Inspection Group. The test requirements shall be described in the project owner's contract specification or referenced standards.

3.4.6 References

CEC. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." *Docket Number 79-AFC-4.* October.

—. 2006. "Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

—. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." *Docket Number: 79-AFC-04C.* December.

DWR. 1979. " Bottle Rock Geothermal Power Plant Draft Environmental Impact Report. *Application No. 79-AFC-4.*"

USGS. 2023. Frequently Asked Questions. Why are there so many earthquakes in the Geysers area in Northern California? Website accessed 02/20/2023: https://www.usgs.gov/faqs/why-are-there-so-many-earthquakes-geysers-area-northern-california#faq.

3.5 Hazards and Hazardous Materials

This subsection includes an evaluation of the amended BRPP effects on human health and the environment from the storage and use of hazardous materials as well as compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts from the storage or use of hazardous materials, and no impacts would be greater than those previously analyzed in Order 79-AFC-4 and subsequent amendments. The proposed modification would be consistent with Order 79-AFC-4, and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

An evaluation of impacts from potentially hazardous waste materials are addressed in the "Waste Management," subsection.

3.5.1 Affected Environment

The amended BRPP affected environment for hazards and hazardous materials consists of the existing BRPP site as licensed under Order 79-AFC-4 and the area immediately adjacent to the fence line. The existing BRPP is currently non-operational, but the existing facilities and storage and use of hazardous materials are covered in various plans, policies, and permit conditions that are designed to avoid or reduce impacts to human health and the environment from the storage and use of hazardous materials.

Existing Hazardous Materials Storage and Use

The main plant building contains offices, electrical rooms, a maintenance room, a computer room, a three-stage turbine, a condensate process equipment room, and an associated switchyard. The aboveground pipeline connects the plant to the three well fields and includes the main steam-header inlet pipe, steam-stacking unit (emergency steam bypass), and chemical storage area. Additional on-site structures include a wellfield office and laydown yard, the Stretford H_2S abatement facility, an outdoor parts storage area, a standby generator and weather station building, a water-cooling condensing tower and pumping station, a hazardous waste storage and parts building, and two water supply well buildings. The open surface areas of the geothermal plant are primarily asphalt and graveled. The main access to the site is from High Valley Road.

Three diesel and one gasoline AST and two lube oil tanks are present on the site (Wood 2022). In addition, 22 ASTs associated with the geothermal process are located on site and include process water, sodium hypochlorite, hydrogen peroxide, sodium hydroxide, condensate, and potassium carbonate tanks. Various drums of lubricants and oils, *intermediate bulk containers* (IBCs; commonly called totes) containing various chemicals, and smaller quantities of chemicals were identified around the BRPP and associated buildings. All chemicals are stored on secondary spill containment pallets or in nonflammable cabinets. No staining of soil was observed near the ASTs and chemical storage areas.

Four transformers occur on the BRPP site (Wood 2022). Three of the transformers are owned by BRPP and were installed between 1983 and 1984, based on the attached name plates. One transformer is owned by PG&E and appears to have been recently installed. The transformers are located on concrete pads. A *de minimis* stain was observed on the concrete pad below the transformer located in the switchyard. No other concrete or soil stains were observed near the transformers.

A review of the federal, state, tribal, and proprietary records summary provided by EDR (a third-party provider of environmental and land use records) indicates the site was listed in four databases (Wood 2022):

- Lists of state and tribal registered storage tanks
- List of hazardous waste/ contaminated sites
- Local list of registered storage tanks
- Certified Unified Program Agency Database (CUPA)

An off-site listing called "Intermountain High School" was identified within 0.5 and 1 mile of the site and was listed in the Department of Toxic Substances Controls (DTSC) – Site Mitigation Brownfields Reuse Program (SMBRP). No other federal, state, or tribal findings were identified within the respective American Society for Testing Materials (ASTM) standard search radii. In addition, no orphan sites near the target property were reported. Results of the Phase I Environmental Site Assessment (ESA) concluded that the sites listed in the databases would not pose an environmental threat to the site (Wood 2022). No *recognized environmental conditions* (RECs) were observed on site during the completion of the Phase I ESA in 2022 (Wood 2022). There are no documented hazardous materials release sites in the vicinity of the project area based on a review of the State Cortese List (CAL 2023) and the Phase I ESA (Wood 2022).

Hazardous Materials Management

The BRPP's Hazardous Materials Business Plan (HMBP) contains detailed information about the storage of hazardous materials at the site, including a hazardous materials inventory, related emergency response/contingency plans and an employee training plan (Bottle Rock Power 2012). The current Spill Prevention, Control, and Countermeasures (SPCC) Plan establishes the procedures to prevent discharge of oil and hazardous substances and defines activities required to mitigate discharges should they occur (ES Engineering 2017).

Fire Risk

The BRPP is located in a *very high fire hazard severity zone* (VHFHSZ). There is an existing fire protection system in place at the BRPP, including fire hydrants and pumps designed to protect the BRPP from fires. Fire hazard is also reduced with the maintenance of defensible space surrounding the site. The BRPP is responsible for maintaining defensible space in compliance with the Wildland Fire Operating Plan developed by the Geysers steam field operators, including The Geysers Power Company, LLC, Northern California Power Agency, Ormat, and AltaRock, and the Sonoma-Lake Napa Unit of CalFire (Geysers Power Company, AltaRock, NCPA, Ormat 2022).

Naturally Occurring Asbestos

The project area is located in a known geothermal resource area that has naturally occurring hazardous substances (e.g., asbestos) found in the soils, groundwater, and geothermal steam. NOA occurs in serpentine soils in proximity to the BRPP site. The presence of NOA was previously documented and evaluated on the BRPP parcels including surrounding area.

3.5.2 Environmental Analysis

Hazardous Materials Transport and Use

No substantial impacts to the environment related to hazardous materials have historically occurred as a result of licensed BRPP operations, and none would occur with the amended BRPP. Although some hazardous substance releases, such as spills of condensate, have occurred in the past, BRPP has taken corrective action to comply with permit conditions. Small spills and releases that have occurred did not exceed hazardous cleanup levels. The amended BRPP would maintain the previously constructed impermeable spill-collection containment system to preclude discharges of hazardous waste and materials from the power plant pad.

The amended BRPP would use and store hazardous materials during project construction, operation, and decommissioning in a manner similar to the licensed BRPP. The types and volume of hazardous materials used and stored on site would be similar to or less than those analyzed in Order 79-AFC-4 and subsequent amendments due to the smaller geothermal generation capacity of the amended BRPP and associated reduction in demand and use of hazardous materials. Hazardous materials would be stored in the existing hazardous material storage room between the generator building and the BRPP or in the chemical storage area within the Stretford control building. The hazardous materials storage room has secondary containment and complies with all standards for storage of hazardous materials. Two 500-gallon ASTs and one 1,000-gallon AST located at the BRPP would also continue to be used for storage of diesel fuel for operation of the emergency generator. All ASTs would continue to be monitored to ensure that there are no leaks of diesel fuel. ASTs would continue to be anchored to prevent overturning or sliding during seismic events.

The transportation of hazardous materials during project construction, operation, and decommissioning of the proposed project would comply with Code of Federal Regulations Title 29, part 1910 (Occupational and Safety Health Standards), the Resource Conservation and Recovery Act, U.S. Department of Transportation regulations, the California Vehicle Code (CVC) sections 34500 and 31303 through 31309, and all other applicable codes and regulations. The transport of hazardous materials during construction, operation, and decommissioning of the amended BRPP would not result in a greater impact than those analyzed in Order 79-AFC-4 and subsequent amendments.

Fire Hazard

The existing fire protecting system, including the fire water system, would be re-used to the extent possible, and any modifications would meet current fire code standards. A sprinkler system would be installed for any proposed elements that contain more than 500 gallons of oil.

All proposed facilities would be constructed with metal to reduce fire risk. Operation and maintenance of the proposed facilities includes routine inspections and maintenance of the facility to ensure proper operating conditions and maintenance of defensible space around the facility in compliance with California Department of Forestry and Fire Protection requirements and annual updates to the Geysers Wildland Fire Operating Plan.

Conclusion

Safety of the public and on-site workers as well as protection of the environment are implemented and documented through existing BRPP policies and procedures, as described in the Hazardous Materials Business Plan, including the SPCC, emergency response site contingency plans, incident reporting requirements, final closure plan, and annual compliance plans. Compliance with all applicable LORS relating to potential hazards in the project area would ensure the protection of public health, worker safety, and the environment. The storage and use of hazardous materials associated with decommissioning, construction, operations, and final closure at the amended BRPP site are in accordance with COCs and all applicable LORS. No impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.5.3 Cumulative Effects

The amended BRPP would not result in new impacts to human health or the environment from use or storage of hazardous materials. Demolition of the water-cooling tower as a cumulative project would reduce fire hazard potential as it would remove a large wooden structure from the site. There are no impacts of the proposed modification that could combine cumulatively with those of other projects. Thus, the amended BRPP would not result in a cumulatively considerable impact, and the impact would be consistent with the findings of Order 79-AFC-4 and subsequent amendments.

3.5.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP would comply with all applicable LORS related to storage and use of hazardous materials. Defensible space around the facility would continue to be maintained in compliance with California Department of Forestry and Fire Protection (CalFIRE) requirements. The amended BRPP would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

3.5.5 Conditions of Certification

The amended BRPP would not result in changes to human health and the environment from the storage and use of hazardous materials or increase risk associated with potential hazards from hazardous spills, fire, or other events. The amended BRPP would be subject to approved COCs related to emergency response contingency planning (COM-12) and incident reporting (COM-13), including plans to avoid or limit potential hazards and impacts resulting from hazardous spills. COM-15 (Closure Planning) assures adequate consideration of hazardous materials related to facility closure. Other COCs developed to reduce or avoid impacts from storage and use of hazardous materials include maintaining the previously constructed

impermeable spill collection-containment system to preclude discharges of toxic hazardous waste and materials from the power plant pad (COC 6-3), certifying that all storage bins and cylinder anchorages for flammable and hazardous substances are designed and constructed to resist an *equivalent lateral force* (ELF) of 0.5 *effective seismic weight* (W) (COC 12-4), abiding by an approved accident prevention program (COC 12-8), maintaining a SCCP (COC 6-2), and others to verify and monitor compliance. The project would adhere to applicable fire safety codes and standards and ensure compliance with the fire insurance provider's requirements prior to operation (COC 12-7). The transmission will also be inspected annually to ensure that the line maintains required clearances especially during the fire season (COC 13-2). No COCs would be modified as a result of the proposed amendment.

3.5.6 References

Bottle Rock Power LLC. 2012. Hazardous Materials Business Plan.

CAL. 2023. California EnviroStor. Department of Toxic Substances Control. Site/Facility Search Tool, accessed February, 6, 2023: https://www.envirostor.dtsc.ca.gov/public/map/?global_id=17100002.

CEC. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." Docket Number 79-AFC-4. October.

—. 2006. "Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

—. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." Docket Number: 79-AFC-04C. December.

ES Engineering. 2017, October. Spill Prevention, Control, and Countermeasures Plan, Bottle Rock Power Plant and Steam Field, Cobb, California. Prepared for Bottle Rock Power, LLC.

Geysers Power Company, AltaRock, NCPA, Ormat. 2022. Wildland Fire Operating Plan.

Wood. 2022. Phase I Environmental Site Assessment for the Bottle Rock Geothermal Facility. Prepared for Open Mountain Energy, Project No. 2281400507.

3.6 Land Use

This subsection includes an evaluation of the amended BRPP's effects on land use and compliance with applicable LORS and COCs. The amended BRPP would not create any land use related impacts. The project modification would be consistent with Order 79-AFC-4 and subsequent amendments and will comply would all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

3.6.1 Affected Environment

The affected environment for land use includes the existing BRPP site and the area of the proposed steam pipeline and condensate pipeline located immediately adjacent to the BRPP fence . The Lake County General Plan land use designation for the BRPP site (Parcel 013-002-04) is designated as *rural lands* (Lake County 2008). Typical uses permitted in the rural lands designation include, but are not limited to, animal raising, crop production, single-family residences, game preserves, and fisheries. Other typical uses permitted conditionally include, but are not limited to, recreational facilities, agricultural processing operations, geothermal power production, mining, and airfields. Residences in very low-density settings, some of which are occupied seasonally, are located near the project area. The nearest residence is approximately 1,500 feet northeast of the BRPP.

3.6.2 Environmental Analysis

The amended BRPP's impacts on land use would remain unchanged from the licensed BRPP. Designated land use within the amended BRPP site would not change, and the amended BRPP would be consistent within the Lake County General Plan land use designation and zoning codes that currently apply to the licensed BRPP (Lake County 2008). Land use impacts from the BRPP and the BRPP's compatibility with nearby existing and planned land uses or other designations in the General Plan were considered insignificant (Lake County 1979). The amended BRPP involves geothermal power production and would be consistent with the existing geothermal use of the site. The geothermal wells, pipelines, and access roads would continue to be maintained in compliance with the existing Lake County use permits. The amended BRPP would not result in land use impacts.

3.6.3 Cumulative Effects

The amended BRPP would have no land use impacts and would therefore would not contribute to any cumulative land use impacts. The impact would be consistent with the findings of the licensed BRPP, and no cumulative impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.6.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP complies with all applicable LORS related to land use and would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

3.6.5 Conditions of Certification

No COCs apply to land use. Because the modification would not impact land use, no COCs are required for land use.

3.6.6 References

CEC. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." *Docket Number 79-AFC-4.* October.

—. 2006. "Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

—. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." *Docket Number: 79-AFC-04C.* December.

Lake County. 1979. California Department of Water Resources, Bottle Rock Geothermal Power Plant Draft Environmental Impact Report. *Application No. 79-AFC-4*.

Lake County. 2008. Lake County General Plan. Chapter 3 – Land Use.

3.7 Noise and Vibration

This subsection includes an evaluation of the amended BRPP effects on noise and vibration and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts from noise and vibration and no impacts to noise and vibration would be greater than those previously analyzed in Order 79-AFC-4. The project modification is consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

3.7.1 Affected Environment

The affected environment for noise includes the existing BRPP site and areas where noise generated from the amended BRPP would be audible to sensitive receptors. All facilities within the BRPP site are as described and previously evaluated in Order 79-AFC-4 and the Bottle Rock Power Steam Project EIR (Lake County 1979).

Prior BRPP Operational Noise

Previous noise sources at the BRPP include the operation of facilities that were licensed by the CEC under Order 79-AFC-4. Major noise sources during prior BRPP operations included the water cooling towers, steam stacking system and rock muffler, a small facility located directly south of the office and communications building, and the Stretford system. Noise levels measured from these sources when the BRPP was operational in 2009 ranged from 75 to 81 decibels (dB) (Illingworth & Rodkin 2009).

In 2009, Lake County received a noise complaint from a neighboring residence, and a formal noise survey was conducted at the BRPP. This noise survey indicated that noise levels at the nearest residence were typically in the range of 45 dB and noise at the property line was in the range of 65 dB and out of compliance with COC 16-1 (Bottlerock Power, Rives and McKinsey 2012). The project owner identified two oxidizer blowers located on the Stretford system as the likely source of the off-site noise and the high-pitch tones (Bottlerock Power, Rives and McKinsey 2012). In 2010 and 2011, there were two more complaints regarding the noise emanating from the BRPP (Bottlerock Power, Rives and McKinsey 2012). In November 2011, a second noise survey was performed, and it was determined that the new blowers on the Stretford system produced significantly less ambient noise compared to the old blowers and were measured at typically around 40 dB at the nearest residence and 60 dB at the nearest fence line (Bottlerock Power, Rives and McKinsey 2012). Although the BRPP was in compliance with the 45 dB *equivalent continuous sound level* (L_{eq}) threshold at the nearest residence, the noise levels at the BRPP property line (typically around 60 dB) were above the limit allowed in Noise COC 16-1 (Bottlerock Power, Rives and McKinsey 2012). Lake County indicated that if a project exceeds the County's noise standards but the local property owners are not disturbed by it, the County does not generally take any action (Bottlerock Power, Rives and McKinsey 2012). Since there were no further complaints from the neighboring residence, the County considered the case resolved and did not require any further noise abatement at the BRPP (Bottlerock Power,

Rives and McKinsey 2012). A sound wall was constructed directly north of the Stretford system, to reduce operational noise.

Noise-sensitive Receptors

Noise-sensitive receptors in the Lake County Noise Element are defined to include residential areas, hospitals, convalescent homes and facilities, schools, and other similar land uses. The nearest residential structure to the BRPP is approximately 1,500 feet northeast of the fence line, and the nearest property line is approximately 200 feet east of the BRPP site fence line. No new noise-sensitive receptors have established in proximity to the BRPP site since the time of the initial BRPP AFC and Decision (Order 79-AFC-4). No other noise-sensitive receptors such as hospitals, schools, convalescent homes, and other similar land uses are within 1 mile of the BRPP.

Noise Measurement Surveys 2022

Continuous long-term (72-hour) noise measurements were conducted between November 15, 2022, and November 17, 2022, to evaluate the ambient noise environment at the BRPP. Additional short-term measurements were conducted at the BRPP well pad location and in the vicinity of the nearest residence to the northeast of the BRPP. Table 3.7-1 summarizes the locations and results of the noise measurements. Figure 3.7-1 shows the noise-measurement locations. The BRPP was non-operational when noise measurements were conducted. The main sources of existing noise at the BRPP are the existing transformer and backup generator, airplanes, birds, and wind (RCH Group 2023). Noise measurement data is provided in Appendix D.

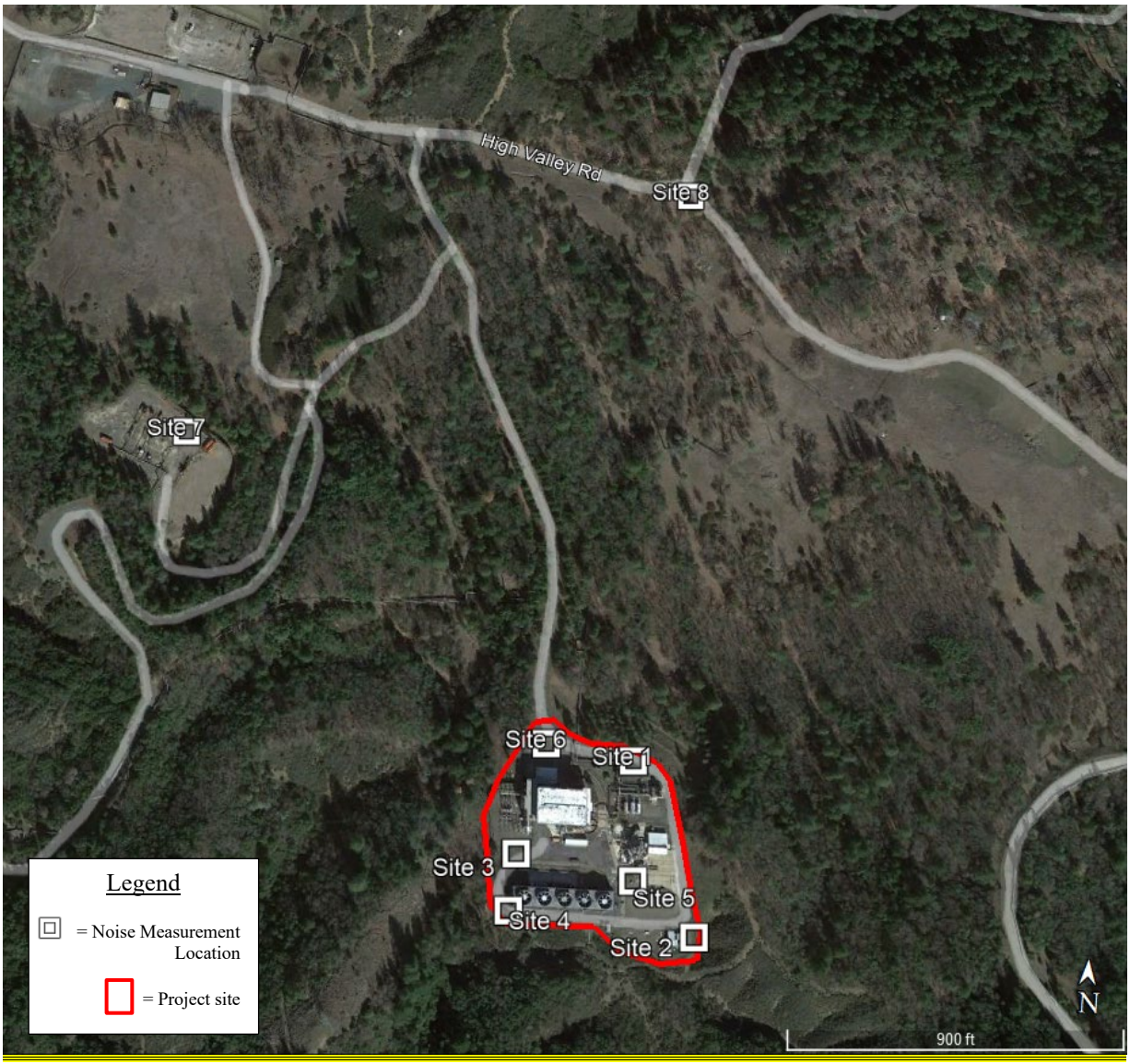
Table 3.7-1 Existing Noise Levels

Location	Time period	Noise levels (decibels)	Noise sources
Site 1: Northeast area of project site, on a chain-link fence	Tuesday November 15, 12:00 a.m. through November 17, 11:59 p.m. 72-hour measurement	Hourly L_{eq} ranged from 40 to 45 dB CNELs: 47 dB, 46 dB, 47 dB *	Unattended noise measurements do not identify noise sources.
Site 1: Northeast area of project site, on a chain-link fence	Monday, November 14, 2022, 10:34 a.m. to 10:44 a.m.	5-minute L_{eq}: 34 dB, 37 dB	Very quiet area. Wind: 40 dB
Site 2: Southeast area of project site, on a chain-link fence	Tuesday, November 15, 12:00 a.m. through Thursday November 17, 11:59 p.m. 72-hour measurement	Hourly L_{eq} ranged from 43 to 47 dB CNELs: 49 dB, 49 dB, 49 dB	Unattended noise measurements do not identify noise sources.

Location	Time period	Noise levels (decibels)	Noise sources
Site 2: Southeast area of project site, on a chain-link fence	Monday, November 14, 10:07 a.m. to 10:17 a.m.	5-minute L_{eq}: 41 dB, 40 dB	Constant buzzing from backup generator facility: 40 dB.
Site 3: East area of project site, approximately 50 feet south of existing electrical transformer	Monday, November 14, 2022, 9:33 a.m. to 9:43 a.m.	5-minute L_{eq}: 50 dB, 50 dB	Constant buzzing from the transformer: 50 dB; wind: 49 dB
Site 4: Southwest area of project site, directly south of cooling towers	Monday, November 14, 2022, 9:45 a.m. to 10:05 a.m.	5-minute L_{eq}: 37 dB, 36 dB, 36 dB, 43 dB	Very quiet area. Birds: 42 dB.
Site 5: East of cooling tower	Monday, November 14, 10:18 a.m. to 10:28 a.m.	5-minute L_{eq}: 38 dB, 37 dB	Very quiet area. Wind: 40 dB.
Site 6: Directly south of main entrance	Monday, November 14, 10:47 a.m. to 10:57 a.m.	5-minute L_{eq}: 40 dB, 44 dB	Maintenance manager truck passby: 55 dB.
Site 7: Approximate center of the Coleman Well Pad	Monday, November 14, 2022 11:03 a.m. to 11:13 a.m.	5-minute L_{eq}: 37 dB, 39 dB	Very quiet area. Chain rattling on nearby equipment: 38 dB.
Site 8: Intersection of High Valley Road and private residential access road	Monday, November 14, 2022 11:28 a.m. to 11:38 a.m.	5-minute L_{eq}: 43 dB, 33 dB	Very quiet area: Wind 45 dB.

Source: (RCH Group 2023)

Figure 3.7-1 Noise Measurement Locations at BRPP



Source: (RCH Group 2022); (GoogleEarth 2023)

3.7.2 Environmental Analysis

Noise and Vibration Thresholds

Per Lake County Code section 41.11(e)(5), noise from construction sites is exempt from Lake County noise standards from the hours of 7:00 a.m. to 7:00 p.m. Construction noise would be considered a significant impact of the amended BRPP should construction occur outside the hours of 7:00 a.m. to 7:00 p.m.

Per Lake County Code chapter 21, article 41, sections 21 through 41 and 41.11, operational noise impacts would be significant if the amended BRPP would generate noise levels at the nearest property line that would exceed the following 1-hour average exterior noise levels: 55 dB from 7:00 a.m. to 10:00 p.m. or 45 dB from 10:00 p.m. to 7:00 a.m. Because operation of the new equipment would be constant at the amended BRPP site, the applicable standard exterior noise standard would be 45dB L_{eq}[9] for any 1 hour at the nearest residential property line.

For vibration, the Federal Transit Administration (FTA) considers a *peak particle velocity* (ppv) threshold of 0.5 inch per second or greater to be potentially significant because it can cause architectural damage and minor structural damage. Vibration impacts from the amended BRPP would be significant should construction or operation vibration exceed the structural damage threshold of 0.5 ppv for structures on adjacent properties.

Construction Noise Impacts

Construction activities would result in a temporary increase in ambient noise levels in the vicinity of the BRPP. Construction activities would require the use of numerous pieces of noise-generating equipment, such as excavating machinery (e.g., excavators, loaders) and other construction equipment (e.g., scrapers, dozers, compactors, trucks). The noise levels generated by construction equipment would vary greatly depending upon factors such as the type and specific model of the equipment, the operation being performed, the condition of the equipment, and the prevailing wind direction. The maximum noise levels for various types of construction equipment that would be used during project construction are provided in Table 3.7-2. Maximum noise levels generated by construction equipment used for the project would range from 74 to 89 dB L_{max} at a distance of 50 feet (see Table 3.7-2). Table 3.7-3 provides typical construction activity noise levels (in dB L_{eq}) at 50 feet for various phases of construction.

Maximum noise levels generated by construction equipment at the BRPP would range from 74 to 89 dB, L_{max} at a distance of 50 feet. Construction activities would only occur during the hours of 7:00 a.m. to 7:00 p.m. and would not conflict with the exempt hours of construction outlined in Lake County Code section 41.11(e)(5). The types of construction equipment used for construction of the amended BRPP would be similar to the types of construction equipment that

[9] This is the maximum 1-hour average noise level. Because equipment during operations would be operating constantly, this would equate to an L_{max} level at the nearest residential property line.

were previously evaluated for construction of the licensed BRPP and prior amendments, with the exception that the construction activities would not involve any grading and would be less intensive and of shorter duration than the initial construction activities. Therefore, project construction noise would be consistent with local noise standards and no impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

Table 3.7-2 Typical Noise Levels from Construction Equipment

Construction equipment	Noise level (dB L_{max} at 50 feet)
Air compressor	78
Backhoe	78
Excavator	81
Dozer	82
Front end loader	79
Compactor	83
Water truck	80
Crane	81
Manlift	75
Welder/torch	74
Pneumatic tools	85
Scraper	85
Dump truck	76
Vibratory concrete mixer	80
Concrete mixer truck	79
Jackhammer	89
Front end loader	79

NOTES:
dB L_{max} = the highest sound level measured during a single noise event

Source: (Federal Highway Administration (FHWA) 2006)

Table 3.7-3 Typical Construction Activities Noise Level

Construction phase	Noise Level (dB_{Leq} at 50 feet)
Ground clearing	84
Excavation	89
Foundations	78
Erection	85
Finishing	89

NOTES:
Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase of construction and 200 feet from the rest of the equipment associated with that phase.

Source: (U.S. Environmental Protection Agency 1973)

Operational Noise Impacts

Operational Noise Sources

The amended BRPP includes installation of the following equipment, which would produce noise during operation:

- **ORC units.** Two new units capable of producing a combined total of 7.5 MW net of geothermal power are proposed. The ORC units would be installed within an graveled portion of the site currently used for equipment storage. Each ORC unit would be approximately 40 feet long by 60 feet wide and up to 24.6 feet in height. The expander on the ORC units would be the primary source of noise. Noise enclosures would be placed either around both ORC units or around the expanders on each ORC unit. The enclosure walls on the north, south, and west would have soundproof rating of 39 *outdoor/indoor transmission class* (OITC) and a roof with a soundproof rating of 24 OITC. No walls are proposed on the east due to the absence of sensitive receptors to the east.
- **Air-cooled condensers.** Air-cooled condensers would be installed at the current location of the existing water-cooling tower after demolition. The air-cooled condensers would extend slightly north of the footprint of the existing water-cooling tower. The air-cooled condensers would be approximately 33,330 square feet and up to 36 feet in height. The air-cooled condensers would produce noise from operation of the fans contained within each cell.
- **Relocated vent stack.** The vent stack would be used during shutdowns and would not produce noise during routine operation. The vent stack would be relocated to the southern portion of the BRPP site and would be further from sensitive receptors. The vent stack would include modern technology for noise reduction during venting of steam.

The existing Stretford H_2S abatement system would be refurbished for the amended BRPP. The refurbished Stretford H_2S abatement system would generate noise levels similar to the noise levels produced by the Stretford equipment during operation of the BRPP after installation of the new, less noisy blowers. The sound wall north of the Stretford H_2S abatement system would be restored and would continue to be used during operation of the facility. Because noise from the Stretford H_2S abatement system was previously analyzed in Order 79-AFC-4, no additional analysis of the Stretford equipment is included in the PTA. The catalyst reactor would not involve noise-producing equipment and is therefore not included in the noise modeling.

Noise Modeling Approach

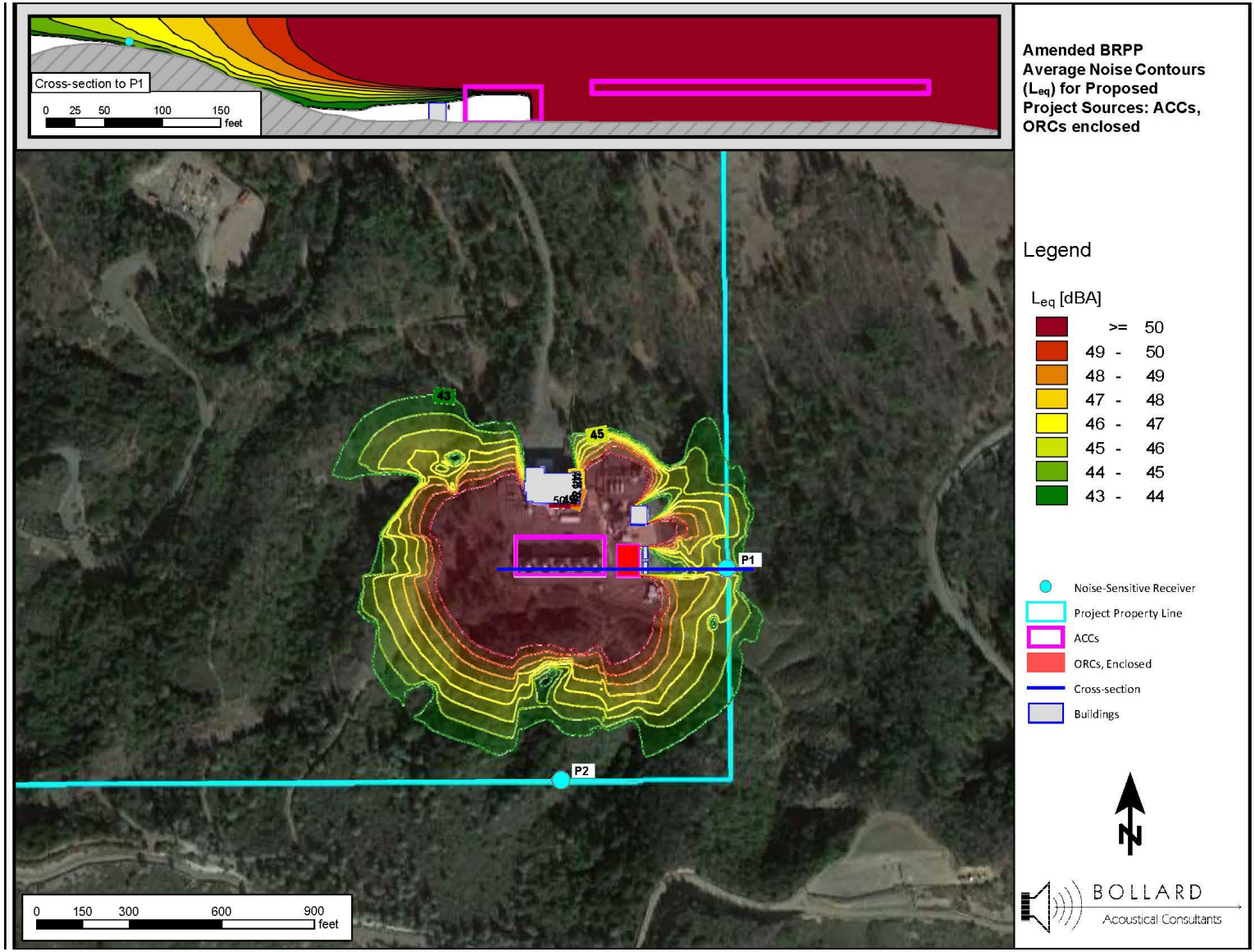
SoundPLAN Version 8.2 was used to model the noise generation from the proposed ORC units and ACCs. The following is a list of assumptions used for the noise inputs that are used in the model (RCH 2023).

- The model assumes that each ORC unit would produce a noise level of 86 dB L_{eq} at a distance of 50 feet. This is the noise level produced from similar ORC units observed at the Star Peak Geothermal site (RCH 2022). The ORC units at the Star Peak Geothermal site are designed for a 12.5-MW system and did not have any noise reduction features (e.g., sound blankets, sound walls) that were installed to the system when RCH recorded ambient measurements. Therefore, the representative noise level of 86 dB L_{eq} at 50 feet is a conservative assumption, and the actual noise levels at the amended BRPP ORC units would be less. The model assumes that each ORC unit would be fully enclosed in a building with walls that have an OITC soundproof rating of 39 and a roof with an OITC soundproof rating of 24.
- The model assumes that the entire air-cooled condenser system would produce a noise level of 44.4 dB L_{eq} at 400 feet (Kaishan Group 2022).
- A metal PDC enclosure would be located adjacent each ORC unit to enclose and protect the electrical equipment related to the ORC. These PDC enclosures do not generate noise and would provide some reduction of noise (as noise reflective barriers) being generated by the ORC units at the nearest property line.

Operational Noise Impacts

Figure 3.7-2 shows the predicted noise level contours from operations of the ORC units and the air-cooled condensers in terms of the average noise descriptor (dB L_{eq}). The noise modeling indicates that the noise levels at the nearest single-point receiver at the nearest property line (P-1) to the east would be below 45 dB L_{eq}. However, noise levels along some areas of the nearest property line would be in the range of 43 to 47 dB L_{eq} and would exceed the Lake County exterior nighttime noise standard of 45 dB L_{eq} (see Figure 3.7-2). Noise levels at the nearest residence would be well below 45 dB L_{eq}.

Figure 3.7-2 Modeled Noise Contours for Amended BRPP



The representative noise levels for the ORC units that were modeled in SoundPLAN represent a conservative operational scenario given that the noise levels that were recorded from similar equipment at the Star Peak Geothermal site are designed for a geothermal plant with approximately 72 percent more capacity than the amended BRPP ORC units. Because of this, it is unlikely that the noise level contours from operations of the ORC units and the air-cooled condensers would actually exceed the 45 dB L_{eq} threshold along the property line. While the modeling indicates the ORC noise generation could exceed the exterior noise standard of 45 dB L_{eq} at some areas along the nearest property line, actual noise measurements should be used during operation to verify the model because of the conservative nature of the assumptions used in the modeling approach. It is also noteworthy that the proposed equipment would produce substantially less noise than the noise level measured from the prior operating equipment at the site based on noise measurements conducted in 2009 and 2012.

The amended BRPP would comply with COC Noise 16-1, which requires noise levels to not exceed 45 dB at any point beyond the property line, and COC Noise 16-2, which requires the project owner to prepare a noise survey and report within 90 days after the project reaches its rated power generation capacity. If operational noise were observed to exceed the thresholds in COC 16-1 during the survey, additional measures such as modifications to equipment to reduce noise levels or installation of a sound barrier along the eastern property line would be implemented to meet the noise standard. Because the amended BRPP facility would produce less noise than the previously approved BRPP facility, and because the amended BRPP would comply with all applicable COCs and LORS, impacts from noise generation would not exceed those described in Order 79-AFC-4 and subsequent amendments.

Vibration Impacts

Construction activities have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. In most cases, vibration induced by typical construction equipment does not result in adverse effects on people or structures (Caltrans, 2013). Vibrational effects from typical construction activities are only a concern within 25 feet of existing structures (Caltrans 2002). There are no off-site structures within 25 feet of the amended BRPP construction areas. The nearest residential structure is approximately 1,500 feet northeast of the fence line of the BRPP site. At this distance, vibration would be well below the 0.5-ppv threshold. Operation of the project would generate minimal vibration that would not be perceptible to anyone outside the project site. No vibration impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.7.3 Cumulative Effects

The amended BRPP would not result in increased noise or vibration compared to operation of the licensed BRPP. Demolition of the on-site facilities, considered as a cumulative project, would be consistent with the noise evaluation in Order 79-AFC-4. Once removed, the water-cooling tower and existing steam vent would not produce any noise. Because the demolition activities include removal of equipment that previously produced noise at the site, the

cumulative impact on noise would be beneficial. Because operation of the amended BRPP in combination with the cumulative projects would result in a cumulative net reduction in noise compared to operation of the licensed BRPP, no adverse cumulative noise effects would occur.

3.7.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP would comply with all applicable LORS related to noise and vibration and would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

3.7.5 Conditions of Certification

The amended BRPP would not result in new or more significant impacts from generation of noise or vibration, and no additional COCs are needed to address the amended BRPP's noise and vibration impacts. The amended BRPP is subject to COCs for noise (16-1 through 16-3). COCs 16-1 and 16-2 require minor clarifications, as shown in ~~strikethrough~~ and underline below, to improve implementation of the COCs during the amended BRPP implementation.

16-1. Project owner shall comply with Lake County's noise ordinance, which is 55 dBA L_d[10] and 45 dBA L_n[11] at any point beyond the property line of the source. In the event the Lake County or the project owner receives public complaints of any noise, project owner and Lake County (if requested by the complainant) agree to promptly conduct and investigation to determine the extent of the problem. Project owner shall take reasonable measures to resolve the complaints.

Protocol: Within 10 days of a request by Lake County or the CEC CPM, project owner shall conduct noise surveys at the sensitive receptors registering complaints and at the facility property line nearest the complaining receptors. Surveys shall be conducted, when possible, under circumstances similar to those when the complaints were perceived. The survey should be reported in terms of hourly L_{eq} and hourly L_x[12]~~z~~ at levels x=10, 50, and 90.

16-2. Within 90 days after the plant reaches its rated power generation capacity and construction is complete, the project owner shall conduct a noise survey at 500 feet from the generating station or at a point acceptable to ~~DWR,~~ CEC CPM~~,~~ and Lake County.

[10] L_d (or L_{day}) is the A-weighted L_{eq} over the 12-hour day period (07:00–19:00).
[11] L_n (or L_{night}) is the A-weighted, L_{eq} over the 8-hour day period (23:00–07:00).
[12] L_x is the percentile noise level, where *x* is a percentage of time between 0.01 percent and 99.9 percent, calculated by statistical analysis, and usually includes a descriptor. The most common L_x values are the L_{10} and L_{90} level, widely used in the assessment of environmental noise levels and regulations.

The survey will cover a 24 hour period with results reported in terms of hourly L_x (x= 10, 50, and 90), hourly L_{eq}[13] ~~Z~~ and Ldn[14] levels.

The project owner shall prepare a report of the survey that will be used to determine the plant's conformance with county standards. In the event that county standards are being exceeded, the report shall also contain a mitigation plan and a schedule to correct the noncompliance. No additional noise surveys of off-site operational noise are required unless the public registers complaints or the noise from the project is suspected of increasing due to a change in the operation of the facility.

3.7.6 References

Bottlerock Power, Stoel Rives, and J. McKinsey. 2012. "CEC Letter to Bottle Rock Power Regarding Noise 16-1." July 13.

California Energy Commission. 2006. "Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes." December 14. 48.

Caltrans. 2013. "Technical Noise Supplement to the Traffic Noise Analysis Protocol." California Department of Transportation Division of Environmental Analysis Environmental Engineering Hazardous Waste, Air, Noise, Paleontology Office, September.

Caltrans. 2002. *Transportation Related Earthborne Vibrations Technical Advisory, Vibration TAV-02-01-R9601.* California Department of Transportation Division of Environmental Analysis Office of Noise, Air Quality, and Hazardous Waste Management Sacramento, CA, 33.

Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant. 2013. Docket Number: 79-AFC-04C (California Energy Commission, December).

Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project. 1980. Docket Number 79-AFC-4 (California Energy Commission, https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=79-AFC-04C October).

Federal Highway Administration (FHWA). 2006. "Roadway Construction Noise Model User's Manual."

[13] L_{eq} (equivalent sound level) is the value of a constant sound level for a given measurement period that has sound energy equal to the time-varying sound energy of the same measurement period.
[14] L_{dn} is the day–night average sound level that is equal to the 24-hour A-weighted equivalent sound level with a 10-decibel penalty applied to night, defined as between 10:00 p.m. and 7:00 a.m.

GoogleEarth. 2023. "Satellite Imagery."

Illingworth & Rodkin. 2009. "BRP Steam Project Noise Assessment." September.

Kaishan Group. 2022. "BRP Steam Project Noise Assessment."

Lake County. 1979. "Bottle Rock Power Steam Project EIR."

RCH Group. 2023. "BRP Steam Project Noise Assessment." March.

RCH Group. 2022. "SOWTP Reliability Improvements Project Noise Technical Support." El Sobrante.

U.S. Environmental Protection Agency. 1973. "Legal Compilation."

3.8 Paleontological Resources

This subsection includes an evaluation of the amended BRPP's effects on paleontological resources and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts on paleontological resources, and no impacts would be greater than those previously analyzed in Order 79-AFC-4. The project modification is consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2013; CEC 2006).

3.8.1 Affected Environment

The affected environment includes the developed BRPP site and the area of the proposed the steam pipeline and condensate pipeline located immediately adjacent to the fence line.. All areas of ground disturbance were previously evaluated in 79-AFC-4 and Bottle Rock Power Steam Project EIR (Lake County 1979). Two paleontological studies were previously conducted at the BRPP site and vicinity. The previous paleontological investigations identified areas containing chert and areas with excavation greater than 4 meters (13.2 feet) within the Franciscan mélange as geologic units that could produce fossils. The BRPP site and adjacent steam and condensate pipeline alignment are located in the Franciscan formation and no paleontological resources were previously identified in the area (Archaeological Services, Inc. 2010).

3.8.2 Environmental Analysis

The proposed modifications to the BRPP would occur within the developed BRRP site and immediately adjacent to the eastern side of the BRPP fence . The amended BRPP would construct new ACCs, two ORC units, PDCs, new segments of steam pipeline and vent stack, new condensate and steam pipelines, and electrical lines. Construction would require excavation of approximately 500 cubic yards of material for installation of subsurface electrical lines and construction of the ORC pad and placement of approximately 750 cubic yards of concrete for new foundations and concrete pads. The area of new foundations and excavation would be contained within previously graded and developed areas within and immediately adjacent to the BRPP site, and there is very low potential to disturb paleontological resources given the history of grading at the site. The amended BRPP is within the Franciscan Formation and no chert has been mapped for the area. The depth of excavation would be approximately 5 feet if spread footings were used and would not extend to an excavation depth of 13.2 feet; therefore, the likelihood of fossils being impacted during construction is very low. Given the limited amount of earthwork and ground disturbance for the amended BRPP and the absence of known paleontological resources in the area, no impacts to paleontological resources beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.8.3 Cumulative Effects

The amended BRPP would not result in new impacts to paleontological resources. There are no impacts that could combine cumulatively with those of other projects. Thus, the amended BRPP

would not result in a cumulatively considerable impact, and the impact is consistent with the findings of Order 79-AFC-4 and subsequent amendments.

3.8.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP would comply with all applicable LORS related to paleontological resources and would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

3.8.5 Conditions of Certification

The amended BRPP would not result in changes to previously identified paleontological resource impacts. No COCs apply to paleontological resources, and no COCs for paleontological resources are required for the amended BRPP.

3.8.6 References

Archaeological Services, Inc. 2010. "Bottle Rock Power Stream Project Cultural Resources Investigation Near Glenbrook, Lake County, California."

CEC. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." *Docket Number: 79-AFC-04C.* December.

—. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." *Docket Number 79-AFC-4.* October.

—. 2006. "Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

Lake County. 2010. "Bottle Rock Power Steam Project Draft Environmental Impact Report/ Environmental Assessment." September 16.

3.9 Public Health

This subsection includes an evaluation of the amended BRPP effects on public health and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts on public health, and no impacts would be greater than those previously analyzed in Order 79-AFC-4 and subsequent amendments. The project modification would be consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980, 2006, 2013).

3.9.1 Affected Environment

Sensitive Receptors

A *sensitive receptor* is defined as a facility or land use that includes members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of these sensitive receptors are residences, schools, hospitals, and daycare centers. The CARB has identified the following groups of individuals as those most likely to be affected by air pollution: persons over 65, children under 14, athletes, and persons with cardiovascular or chronic respiratory diseases such as asthma, emphysema, and bronchitis. The nearest sensitive receptor is a resident located approximately 1,500 feet northeast of the power plant. The location of the nearest sensitive receptor has not changed since the BRPP was approved in 1980, and the land uses surrounding the BRPP site are the same as those considered in the Order 79-AFC-4 and subsequent amendments.

BRPP Resource Composition

The composition of the geothermal resource at the amended BRPP would be very similar to the resource composition at the time of prior BRPP operation. The NCG composition and flow rate for the amended BRPP are presented in Table 3.1-3, in Subsection 3.1 Air Quality. The BRPP geothermal resource also contains other minerals and potential pollutants, as presented in Table 3.9-1.

Table 3.9-1 BRPP Geothermal Resource Concentration

Constituent	Concentration in steam	Analysis date	Location
Benzene	1.15 mg/kg	Average 2009–2013	Main steam
Radon-222	2.7 pCi/kg	Average 2009–2013	Main steam
Arsenic	0.0163 mg/L	Average 2009–2013	Main steam
Mercury	0.0047 mg/L	Average 2009–2013	Main steam
Boron	5.97 mg/L	Average 2009–2013	Main steam
Silica	0.0088 mg/L	Average 2009‑2013	Main steam
Fluoride	205 ppb	Average 1980	Main Steam

Notes:

[b] mg/kg = milligram/kilogram, ppm = parts per million

[c] pCi/kg = picocurie/kilogram

[d] mg/L = milligram/liter

[e] ppb= parts per billion

Source: (AltaRock 2015)

3.9.2 Environmental Analysis

Construction

As discussed in Section 2.0 Project Description, the amended BRPP involves installation of two new ORC units, new segments of steam and condensate pipelines, new PDCs structures, new ACCs, and new electrical lines. During construction, localized emissions of criteria air pollutants would be generated from construction vehicles and equipment powered by internal combustion engines as well as earth moving activities. Operation of diesel-powered equipment would generate diesel exhaust emission, a TAC. TAC emissions associated with construction of the amended BRPP are presented in Subsection 3.1 Air Quality, Table 3.1-1. As discussed in Subsection 3.1, Air Quality, the emissions from construction of the BRPP would be below the significance thresholds and would not exceed those analyzed in Order 79-AFC-4. The amended BRPP facilities would be located on the disturbed BRPP site and would not require grading. The level of construction activity would be much less than the initial BRPP site development and construction activity.

Operation and Maintenance

The amended BRPP would generate 7.5 MW of geothermal power, and the steam production would constitute approximately 13 percent of the approved 55-MW facility. Mercury, arsenic, silica, boron, benzene, ammonia, and radon-222 would be emitted with the NCGs at the exhaust on the ACCs during operation of the amended BRPP. A mercury scrubber was added to the Stretford system during a prior BRPP amendment in 2006 (CEC 2006). The mercury scrubber on the Stretford system would be maintained for the new amended BRPP use. In addition, a mercury scrubber has been included in the design of the catalyst reactor so that mercury

removal would be included when the catalyst reactor is operating (e.g., during Stretford system maintenance).

Vanadium is used in the Stretford H_2S abatement system and would be present in the sulfur produced from the amended BRPP at the same levels as operation of the licensed BRPP. As discussed in Subsection 2.4 of the Project Description, approximately 12 percent of the sulfur byproduct produced from the Stretford system has historically produced sulfur materials containing vanadium in excess of 24 milligrams per liter (mg/L), which would be processed as hazardous waste and sent to a facility that is licensed to accept hazardous waste in compliance with LORS.

The amended BRPP consists of a binary power plant, which would return the majority of the geothermal resource to the geothermal reservoir as condensate rather than evaporating the resource through a dry steam process. The condensate would be collected during the power production process and sent to the Coleman Well Pad for reinjection via a new condensate pipeline. The processed condensate would not be exposed to the air and would not be a source of emissions. Because the condensate would not be exposed to the air, the amended BRPP would avoid the existing BRPP process emissions impacts from the condensate in the cooling tower basin.

Because the total volume of geothermal resource/steam that would be processed would be approximately 13 percent of the permitted capacity and the project would use equipment that performs with the same or better efficiency in H_2S and mercury removal, total emissions generated from operation of the amended BRPP would be substantially less than those analyzed in Order 79-AFC-4 and subsequent amendments (see also Subsection 3.1 Air Quality). The pollutant concentrations at any sensitive receptor would be less than those previously considered in Order 79-AFC-4 and subsequent amendments because the total emissions would be substantially less than permitted while the point of emissions (exhaust from the air-cooled condensers) would be at the same distance from the nearest sensitive receptor. Therefore, potential public health impacts during operation of the amended BRPP would be in accordance with COCs and all applicable LORS. No impacts to public health beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.9.3 Cumulative Effects

The amended BRPP would not result in new impacts to public health. Removal of the existing water-cooling tower, which is considered a cumulative project, would remove the risk of bacterial growth in the cooling tower, including legionella, which can be found in man-made water systems and is the primary cause of Legionnaires' Disease. Removal of the existing water-cooling tower would therefore result in a public health benefit by avoiding the risk of legionella at the site. Demolition of the water-cooling tower and other BRPP infrastructure would comply with all LORS for asbestos-containing material, as discussed in Subsubsection 3.1, Air Quality. Thus, the amended BRPP would not result in an adverse cumulatively considerable impact, and

cumulative project effects would be beneficial due to demolition of the water-cooling tower and abatement of the legionella risk.

3.9.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP complies with all applicable LORS related to public health and would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

3.9.5 Conditions of Certification

The amended BRPP would not result in any new or more severe public health impacts, and no additional COCs are needed to address public health impacts of the amended BRPP. The amended BRPP is subject to COCs 2-1 through 2-9 (CEC 2013), which address any potential impacts from the amended BRPP. COC 2-10 is no longer applicable to the amended BRPP due to the demolition of the existing cooling tower and installation of the NCG exhaust at the air cooled condensers. COCs 2-2 and 2-3 require modifications and deletions, as shown in ~~strikethrough~~ and underline, respectively, below to reflect changes in proposed BRPP infrastructure. With the proposed changes in the COCs, the amended BRPP would comply with current LORS, and impacts of the amended BRPP would not exceed the impacts of the approved BRPP.

2-2. If the radon-222 concentration exceeds 3.0 picocuries per liter (pCi/l) in the ~~cooling tower~~ air-cooled condenser exhaust, the project owner must inform the CDHS/RHS and CEC CPM with a special report within 30 days of confirming an exceedance.

Verification: The project owner shall provide a written report to CDHS/RHS and CEC CPM of sample results within 30 days of confirming an exceedance of 3.0 (pCi/l) radon- 222 in the ~~cooling tower~~ air-cooled condenser exhaust. Confirmation includes the reanalysis of the sample by the project owner or another qualified laboratory. Confirmation of sample results must be accomplished in the most expedient manner possible. The procedures used shall be the same as the normal analysis but may include sending samples to CDHS/RHS and/or outside qualified laboratories for analysis. The confirmation of a sample should take less than five calendar days. The project owner shall notify the CEC of corrective actions taken.

2-3. If the radon-222 concentrations exceed 6.0 pCi/l in the ~~cooling tower~~ air-cooled condenser exhaust, the project owner shall notify the CDHS/RHS and the CEC by email or telephone within 24 hours of confirmation of the sample result.

Verification: The project owner shall notify CDHS/RHS and the CEC within 24 hours of confirming the sample results (See 2-2 above for confirmation requirements). The project owner shall notify the CEC of corrective actions taken.

~~**2-10** The project owner shall develop and implement a Cooling Water Management Plan to ensure that the potential for bacterial growth in cooling water is kept to a minimum. The Plan shall be consistent with either staff's "Cooling Water Management Program Guidelines" or with the Cooling Technology Institute's "Best Practices for Control of~~

~~Legionella" guidelines but in either case, the Plan must include sampling and testing for the presence of Legionella bacteria at least every six months. After two years of power plant operations, the project owner may ask the CEC CPM to re-evaluate and revise the Legionella bacteria testing requirement.~~

~~**Verification:** At least 60 days prior to the restart of cooling tower operations, the Cooling Water Management Plan shall be provided to the CEC CPM for review and approval.~~

3.9.6 References

AltaRock. 2015. "Bottle Rock Steam Chemistry Database Final ."

CEC. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." *Docket Number: 79-AFC-04C.* December.

—. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." *Docket Number 79-AFC-4.* October.

—. 2006. "Order Approving the Change of OWnership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

3.10 Socioeconomics/Aesthetics

This subsection includes an evaluation of the socioeconomics and aesthetic effects from the amended BRPP and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant socioeconomic or aesthetic impacts, and no impacts would be greater than those previously analyzed in Order 79-AFC-4 and subsequent amendments. The project modification is consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

3.10.1 Affected Environment

Socioeconomics

The affected socioeconomic environment for the amended BRPP is Lake County and the surrounding Cobb community. As of the 2020 census, the population in Lake County was 68,163 people (U.S. Census Bureau 2023). Approximately 67 percent of the population is white alone (not Hispanic or Latino) and about 24 percent of the population is considered Hispanic or Latino. Based on preliminary 2022 estimates, the civilian labor force in Lake County is 28,130 workers, with 1,430 unemployed. The unemployment rate in Lake County was 5.1 percent in December 2022, one percent higher than the state of California's unemployment rate (Lake County 2023). Lake County's unemployment rate in December 2022 earned it the ranking of 41 statewide among the state's 58 counties. Most industry sectors in Lake County showed drops in employment rates or no change, with the exception of professional and business services, which showed an increase of 2.8 percent, and retail trade, up by 0.4 percent in the December 2022 report (Lake County 2023). Overall, the socioeconomic conditions in the surrounding project area are similar to the conditions at the time the initial BRPP was permitted. There has not been any major residential development in the area surrounding the project; residences, some of which are occupied seasonally, are in very low-density settings near the project area. The nearest residence is 1,500 feet from the BRPP.

Aesthetics

Aesthetics include the natural and cultural features of the environment that can be seen and that contribute to the public's enjoyment of the environment. The affected aesthetic environment for the amended BRPP includes Lake County and the surrounding Cobb community.

3.10.2 Environmental Analysis

Socioeconomics

Labor and Workforce

Lake County is expected to experience increased employment and income directly and indirectly attributable to construction and operation of the amended BRPP. Construction would employ an average of 15 workers per day, with a maximum of 30 workers per day over an eight-month period. The construction workers are expected to be recruited from the local labor force. The use of local labor during construction would not strain the local labor supply. The

project construction would have a temporary positive impact on employment and income for employees in Lake and Sonoma counties and would generate indirect and induced income from construction workers and suppliers purchasing meals and supplies from businesses in proximity to the project. Due to the short duration of construction (8 months) and limited number of workers (15 employees) that would be employed during construction, construction of the amended BRPP would have a less than significant impact on employment and income in the region and no impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

Operation and maintenance of the amended BRPP would require approximately two to four full-time employees. Because of on-going geothermal power plant operations in the Geysers, a labor pool of geothermal power plant operators currently resides near the project area. Therefore, with this small number of additional staff added, the potential for the proposed project to result in income and employment effects would be low and no impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

Because the labor requirements for the amended BRPP could be drawn from the existing resident labor workforce, without significantly increasing the population, the amended BRPP would not adversely affect socioeconomic infrastructure of the area. Possible changes in community structure lifestyle would not occur because the workforce is already present to a large degree in the resident populations of Lake County. Therefore, construction and operation of the amended BRPPP would not result in impacts beyond those described in Order 79-AFC-4 and subsequent amendments.

Public Health

Sections 3.1, Air Quality, and 3.9, Public Health, examine the project's potential impacts to public health and do not identify any disproportionately high or adverse human health effects related to the project. During construction, localized air emissions of criteria pollutants would be generated from construction vehicles and equipment powered by internal combustion engines as well as from earth moving activities. Operation of diesel-powered equipment would generate diesel exhaust emission, a TAC. Exhaust emissions would disperse rapidly from the project site and would not substantially impact the nearest sensitive receptors. Toxic air emissions associated with demolition and construction of the amended BRPP would be less than those analyzed in Order 79-AFC-4 because the amended facilities would be located on the disturbed BRPP site and would not require grading, and the level of construction activity would be much less than the initial BRPP site development and construction activity.

Because the total volume of geothermal resource/steam that would be processed for the amendment would be far less than the permitted BRPP and the amended BRPP would employ equipment that has equivalent or better efficiency of H_2S and mercury removal, total emissions generated from operation of the amended BRPP would be substantially less than those analyzed in Order 79-AFC-4 and subsequent amendments (see also Section 3.1, Air Quality). Pollutant concentrations at any sensitive receptor would be less than those previously analyzed

in Order 79-AFC-4 and subsequent amendments because the total operational emissions of the amended BRPP would be substantially less than that of the permitted BRPP.

Local Economy
Construction and operation of the amended BRPP would generate local sales and tax revenue in Lake County and there would be no adverse effect on the local economy from construction or operation of the amended BRPP. The effect would be beneficial.

Conclusion
The project would not result in a substantial adverse change to social, economic, physical, environmental, or health conditions so as to disproportionately affect any particular low-income or minority population. The proposed project would not adversely impact any particular population, including minority or low-income populations, and the population in the vicinity of the proposed project is not comprised primarily of minority or low-income populations.

The amended BRPP would have an overall positive socioeconomic impact on Lake County through creation of local jobs during construction, purchase of local materials where possible, and generation of annual tax revenue for the County. The amended BRPP would not result in greater socioeconomic impacts than those analyzed in Order 79-AFC-4 and subsequent amendments.

Aesthetics

Aesthetic impacts are generally defined in terms of a project's physical characteristics and potential visibility as well as the extent to which the project's presence would change the visual character and quality of the environment in which it would be located. Proposed modifications to the site include installation of two 24.6-foot-tall ORC units, two 15-foot-tall PDCs, replacement of the 51-foot-tall water-cooling tower with 36-foot-tall ACCs, refurbishment of the Stretford system with no change in appearance or height, demolition of the steam-stacking pipelines and rock muffler at the northern portion of the site, and installation of new segments of steam pipeline and condensate pipeline that would be less than 20 feet at maximum height (i.e., road crossing). The majority of the proposed infrastructure would be located within the interior of the BRPP site and would be shorter in elevation than the existing infrastructure on the site. The new condensate and steam pipelines would follow the existing fence line and would be consistent with the existing industrial nature of the BRPP landscape and existing adjacent steam pipelines. Furthermore, the amended BRPP would not be visible from any publicly accessible vantage point. As such, the amended BRPP would not affect visual resources in the surrounding area, and no impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

The proposed amendment includes installation of new lighting at the ORC units. The lighting would be on motion sensors and would comply with Title 24 outdoor lighting requirements if the lighting is in an unenclosed area. Furthermore, all outdoor lighting would be downcast and dark sky compliant. While the amended BRPP includes new sources of light, the proposed

amendment would not create a substantial source of light that would affect nighttime views. No impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.10.3 Cumulative Effects

The amended BRRP would not result in substantial adverse change to socioeconomic or aesthetic conditions. The amended BRRP would not result in a cumulatively considerable impact, and the impact is consistent with the findings of Order 79-AFC-4 and subsequent amendments. No cumulative impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.10.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP conforms with all applicable LORS related to socioeconomics and aesthetics. The proposed lighting would comply with the requirements of the 2022 California Energy Code, including section 140.7 – Prescriptive Requirements for Outdoor Lighting. The amended BRPP would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

3.10.5 Conditions of Certification

The existing BRPP was developed in compliance with Socioeconomic/Aesthetic COCs 3-1 and 3-2. Because the amended BRPP facilities would be shorter in height than the existing facilities at the BRPP and would be shielded from view, no COCs are applicable to socioeconomics or aesthetics for the proposed amendment.

3.10.6 References

CEC. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." *Docket Number 79-AFC-4.* October.

—. 2006. "Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

—. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." *Docket Number: 79-AFC-04C.* December.

Lake County. 2023. Employment Development Department, Labor Market Information Division. Industry Employment and Labor Force Information. January 20, 2023.

US Census Bureau. 2023. Quick Facts, Lake County, California. Website: https://www.census.gov/quickfacts/fact/table/lakecountycalifornia/PST045222#PST045222, accessed 02/23/2023.

3.11 Soil and Water Resources

This subsection includes an evaluation of the amended BRPP effects on soil and water resources and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts on soil and water resources, and no impacts would be greater than those previously analyzed in Order 79-AFC-4. The project modification is consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2013; CEC 2006).

3.11.1 Affected Environment

The affected environment for soil and water resources consists of the developed BRPP site and the area of the proposed the steam pipeline and condensate pipeline located immediately adjacent to the BRPP fence. The existing BRPP is covered with impervious surfaces including pavement and compacted gravel that impedes or prevents natural infiltration of water into soil. The proposed steam pipeline and condensate pipeline would follow the existing fence line in an areas that are previously disturbed and cleared of vegetation to maintain defensible space. All areas of ground disturbance within the BRPP site were previously evaluated in Order 79-AFC-4 and the Bottle Rock Power Steam Project EIR (Lake County 1979). The project area also includes two groundwater wells (Well #1 and Well #2) that supply water to the BRPP site. These wells were previously constructed under the CEC license and County permits.

Environmental Analysis

Construction of the majority of the proposed infrastructure modifications would be completed on paved and graveled areas within the existing BRPP site. The proposed steam and condensate pipelines would be co-located on new pipeline supports located on the perimeter of the BRPP site just outside of the eastern fence line. Project construction would require excavation of approximately 500 cubic yards of material for installation of subsurface electrical lines and construction of the ORC pad and placement of approximately 750 cubic yards of concrete for new foundations and concrete pads. The depth of excavation for the proposed foundations would be up to 5 feet if spread footings are used. All trenching and foundation drilling would be located within the graded, compacted graveled, or paved areas in or adjacent to the BRPP site. Excavation and foundation construction would not create a new risk of erosion as all areas of excavation would be repaved and stabilized at the completion of construction.

The proposed ACC would be located above the existing fire-water system and stormwater basin. The ACC would be constructed on foundations that would avoid impacts on the fire-water system, and the new foundations would not conflict with the function of the stormwater basin. The area of foundations within the stormwater basin would not change as the project would also remove or reuse the existing cooling-tower foundations. The amended BRPP would not change the drainage patterns of the BRPP site. Stormwater would continue to be collected on site in the basin beneath the ACCs, and stormwater would be conveyed to the existing injection well via the existing HDPE pipeline. The amended BRPP would continue to collect and manage stormwater runoff in the same manner as the existing BRPP.

Access would be provided via the existing access road and entrance gate. Work crews would access the project site via Bottle Rock Road and High Valley Road, which are maintained in compliance with Lake County Use Permit MMU 10-01. Staging and storage of equipment and materials for demolition and construction would occur within existing paved areas at the BRPP or the existing storage area at Francisco Well Pad. No grading would be required to construct the project. All ground disturbance associated with site access, staging, and storage of equipment would be confined to areas that were graded and disturbed during development of the BRPP site.

Construction water use would be limited to water required for dust control, concrete mixing, compaction, and worker drinking water and sanitation. Water for the project would be sourced from the existing groundwater wells at the site. The total water use during construction would be approximately 80,000 gallons.

Operations and maintenance of the amended BRPP would require an estimated 780 gpd of water for the Stretford process water and worker uses, which is less water than was previously evaluated and approved for the BRPP in Order 79-AFC-4. The amended BRPP would use ACCs instead of water cooling during power generation. Use of ACCs in place of the water-cooling tower would substantially reduce the water demand for the amended BRPP.

Operational water for worker use would be sourced from on-site groundwater wells. Fire water or general plant washdown water would be used for plant washdown during normal operation and Stretford system cleanout (approximately 67,000 gallons once every 2 years). Fresh water would also be needed for the mist eliminator cleaning spray lance on top of the polishing tower that operates six times a day for 30 seconds at a time. A sprinkler system would be needed for fire protection of the ORCs. The amended BRPP would use the existing water supply system, septic system, and fire water system at the BRPP, with only a minor modification to the fire-water system proposed with the addition of a sprinkler system for the ORCs. Maintenance and testing of the water supply, septic, and fire-water facilities would be conducted prior to operation to ensure proper function of the facilities in compliance with LORS and COCs.

3.11.2 Cumulative Effects

The amended BRPP would not result in increased impacts to soil and water resources. The amended BRPP's use of ACCs in place of the licensed BRPP's water-cooling tower would substantially reduce water demand required for the project. There are no impacts that could combine cumulatively with those of other projects; therefore, the amended BRPP would not result in a cumulatively considerable impact, and the impact is consistent with the findings of Order 79-AFC-4 and subsequent amendments.

3.11.3 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP construction would comply with all applicable LORS related to soil and water resources, including the requirements of the State of California Construction General

Permit (Order 2009-000--DWQ). The amended BRPP would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

3.11.4 Conditions of Certification

The amended BRPP would not result in changes to impacts to soil or water resources. The amended BRPP would be subject to COCs 6-1 through 6-6 (water resources) and 8-1 and 8-4 (soils), which address any new potential impacts from the amended BRPP. No COCs would be modified as a result of the proposed amendment.

3.11.5 References

CEC. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." *Docket Number 79-AFC-4.* October.

—. 2006. "Order Approving the Change of Ownership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

—. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." *Docket Number: 79-AFC-04C.* December.

Lake County. 1979. California Department of Water Resources, Bottle Rock Geothermal Power Plant Draft Environmental Impact Report. *Application No. 79-AFC-4*.

3.12 Traffic and Transportation

This subsection provides an evaluation of the amended BRPP effects on traffic and transportation and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts on traffic and transportation, and no impacts would be greater than those previously analyzed in Order 79-AFC-4 and subsequent amendments. The project modification is consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

3.12.1 Affected Environment

The affected environment for traffic and transportation includes the road network that would be accessed to construct and operate the amended BRPP. No major changes to existing transportation infrastructure have occurred since development of the BRPP under Order 79-AFC-4. Regional access to the project site is provided by California State Route (SR) 175. Local access to the project site includes the following roadways (Lake County 2010):

- **Bottle Rock Road.** Bottle Rock Road is a remote two-way public road maintained by the County with 12-foot-wide travel lanes and limited shoulders. The speed limit is generally 45 miles per hour (mph) and reduced to 25 mph through curves.
- **High Valley Road.** High Valley Road is a narrow one-lane private road that connects Bottle Rock Road to the BRPP access road. The speed limit is 15 mph and contains various traffic control devices and signs, including radar speed feedback signs, mirrors at curves, and yield signs.

A secure gate with remote-open capabilities and code-entry system is located at the intersection of Bottle Rock Road and High Valley Road. Residents and property owners along High Valley Road have 24-hour access to the gate (Bottle Rock Power, LLC 2011). The County and emergency service providers also have access to the code for the gate at the intersection of High Valley Road and Bottle Rock Road (Bottle Rock Power, LLC 2011).

There is no existing public transportation available on Bottle Rock Road and High Valley Road. Lake Transit operates the Route 2 bus route Monday through Friday along SR 175 from Kit's Corner to the Twin Pines Casino. No existing bicycle routes are within the vicinity of the project site or surrounding roadways (Lake County 2017). However, The Lake County Regional Transportation Plan (2017) identifies Bottle Rock Road as a Class III proposed bikeway[15] (Lake County 2011).

[15] A Class III bikeway is defined as a bike route that provides a right-of-way designated by signs or permanent markings and shared with pedestrians or motorists.

3.12.2 Environmental Analysis

Construction and Operational Traffic

Construction of all proposed infrastructure modifications would be completed within or immediately adjacent to the existing BRPP site. Access to the amended BRPP site during project construction and operation would be provided via existing access roads. High Valley Road and Bottle Rock Road would continue to provide emergency access to the project site. As such, emergency vehicle access would be the same as that analyzed in the Order 79-AFC-4 and subsequent amendments.

Vehicle Hazards

The amended BRPP would continue to maintain High Valley Road in compliance with the Lake County Traffic Control and Road Maintenance Plan (MMU 10-01). Construction and operation of the amended BRPP would not alter the conditions of any public roads. As with the existing facility, any large loads accessing the amended BRPP would comply with the requirements of Caltrans Transportation Permit(s), if applicable.

Appropriate traffic control devices would be installed along access roads to control vehicle speed and traffic during construction. Traffic controls would follow the recommendations in the California Temporary Traffic Control Handbook regarding basic standards for the safe movement of traffic on highways and streets in accordance with section 21400 of the California Vehicle Code. In addition, the access roads and vehicle traffic would continue to be maintained in compliance with the Traffic Control and Road Maintenance Plan (MMU 10-01).

The transportation of hazardous materials during project construction and operation of the amended BRPP would need to comply with CCR Title 29, section 1910, the Resource Conservation and Recovery Act, U.S. Department of Transportation regulations, the CVC sections 34500 and 31303 through 31309, and all other applicable codes and regulations. The transport of hazardous materials during construction and operation of the amended BRPP would not result in a greater impact than those analyzed in the Order 79-AFC-4 and subsequent amendments.

Vehicle Miles Traveled

The Office of Planning and Research identifies a screening threshold to define *small land use project* as a project that generates or attracts fewer than 110 trips per day. Projects that generate fewer than this threshold number may be assumed to cause a less-than-significant transportation impact (Office of Planning and Research 2017). Approximately 640 total truck trips are expected during demolition of the cooling tower, and 1,400 total truck trips are expected during construction of the amended BRPP. As shown in Section 2.0, Project Description, Table 2.3-2, daily construction-vehicle trips would range from 8 to 50 vehicle trips depending on the construction phase. Construction of the amended BRPP would generate a peak of 50 one-way worker trips per day, which is fewer than the screening threshold number of 110 trips per day. Operation of the amended BRPP would generate approximately 20 vehicle trips per day and would not exceed the screening threshold of 110 trips per day. The amended

BRPP would not generate traffic greater than that analyzed in Order 79-AFC-4 and subsequent amendments.

3.12.3 Cumulative Effects

The amended BRRP would not cause a substantial adverse change to traffic and transportation. Cumulative projects such as the proposed geothermal testing activities and demolition activities would use the same road network as construction of the new facilities, but the level of travel would not compound to create a cumulatively significant impact. Thus, the amended BRRP would not result in a cumulatively considerable impact, and the impact is consistent with the findings of Order 79-AFC-4 and subsequent amendments.

3.12.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP would comply with all applicable LORS related to traffic and transportation and would not alter the conclusions made in the Order 79-AFC-4 and subsequent amendments. High Valley Road would continue to be maintained in compliance with Lake County requirements.

3.12.5 Conditions of Certification

The amended BRPP would not result in changes to previously identified traffic and transportation impacts. No COCs apply to traffic and transportation, and no COCs for traffic and transportation are required for the amended BRPP.

3.12.6 References

Bottle Rock Power, LLC. 2011. "Traffic Control and Road Maintenance Plan for High Valley Road."

CEC. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." *Docket Number: 79-AFC-04C.* December.

—. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." *Docket Number 79-AFC-4.* October.

—. 2006. "Order Approving the Change of OWnership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

Lake County. 2011. "2011 Lake County Regional Transportation Bikeway Plan."

Lake County. 2010. "Bottle Rock Power Stream Project Draft Environmental Impact Report/Environmental Asessment."

Lake County. 2017. "Lake County Regional Transportation Plan Final."

Office of Planning and Research. 2017. *Technial Advisory on Evaluating Transportation Impacts in CEQA.* Sacramento: State of California.

3.13 Waste Management

This subsection includes an evaluation of the amended BRPP's effects on human health from nonhazardous and hazardous waste generation and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts from waste generation, and no impacts would be greater than those previously analyzed in Order 79-AFC-4. The project modification is consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

3.13.1 Affected Environment

Class III nonhazardous waste disposal facilities located in proximity to the BRPP site include the Eastlake Sanitary Landfill, South Lake Resource Recovery and Compost, Healdsburg Transfer Station, and Lake County Waste Solutions. The Eastlake Sanitary Landfill and South Lake Resource Recovery and Compost facilities are located in Lake County, approximately 12 miles northeast of the amended BRPP, and have permitted capacities of 200 tons per day. The Lake County Waste Solutions facility is also located in Lake County, approximately 14 miles northwest of the amended BRPP, and has a permitted capacity of 250 tons per day. The Healdsburg Transfer Station is located in Sonoma County, approximately 14 miles southwest of the amended BRPP, and has a permitted capacity of 720 tons per day. The nearest Class I facility permitted to accept hazardous waste is the Kettleman Hills Landfill, which has a permitted capacity of 9,000 cubic yards per day.

3.13.2 Environmental Analysis

The amended BRPP would generate hazardous and nonhazardous waste during project construction and operation. Nonhazardous waste generated during construction would include lumber, excess concrete, metal, glass scrap, empty nonhazardous containers, and waste generated by workers. Office waste and other waste generated by workers would be the primary source of solid waste during operation. Nonhazardous waste would be disposed of at a Class III facility or an appropriate recycling center. As discussed above, three Class III waste facilities in Lake County and one facility in Sonoma County are within 14 miles of the amended BRPP and could accept nonhazardous waste. Non-recyclable waste generated by construction and operation of the amended BRPP would be hauled to the Eastlake Sanitary Landfill, Healdsburg Transfer Station, or Lake County Waste Solutions facilities. The South Lake Resource Recovery and Compost facility would be able to accept any recyclable or compostable waste generated during construction or operation of the amended BRPP. The types of nonhazardous waste generated during construction and operation would be similar to those analyzed in Order 79-AFC-4 and subsequent amendments. Because the power produced by the amended BRPP would be less than the licensed BRPP, the associated number of workers and equipment generating waste would also be reduced. Therefore, the total volume of waste generated by the amended BRPP would be less than that generated by the licensed BRPP.. The spent catalyst within the catalyst reactor tank would be removed and sent to a Class III landfill

as needed. The sulfur produced from the Stretford operation that contains less than 24 mg/L vanadium would be reused commercially and would not be sent to a landfill.

During project operations, the Stretford facility would generate approximately 200,000 lbs of sulfur annually that would be classified as hazardous waste due to vanadium concentrations that exceed 24 mg/L. In addition, the mercury produced in the activated carbon mercury vessels would be classified as hazardous waste. These types of hazardous waste would be the similar to those analyzed in Order 79-AFC-4 and subsequent amendments, but the total volume of hazardous waste produced, including sulfur containing vanadium in excess of 24 mg/L and mercury from the activated carbon filter, would be substantially less due to the smaller geothermal generation capacity of the amended BRPP (the currently proposed 7.5 MW compared to the previously permitted 55 MW). In addition, replacing the existing water-cooling tower with the proposed ACCs would eliminate the sludge produced by the water-cooling tower. Hazardous wastes would be recycled or managed and disposed properly at the Kettleman Hills Landfill facility, which is authorized to accept the waste. Transport, use, and disposal of hazardous waste would be conducted in accordance with applicable LORS and the existing COCs. No impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.13.3 Cumulative Effects

The amended BRPP would not result in new impacts from waste generation. The total volume of waste produced from the amended BRPP would be less than was previously evaluated for the licensed BRPP. Demolition and removal of the existing cooling tower, cooling tower pipelines, demister, demister tanks, rupture relief system, rock muffler, and steam-stacking pipelines was previously considered for the existing BRPP; therefore, the demolition activities are considered a cumulative impact. Any potentially hazardous materials (e.g., treated wood waste, asbestos, lead-based paint) generated during demolition would be disposed of at a licensed landfill classified to accept hazardous waste. All non-hazardous demolition waste would be recycled where possible and disposed of at a Class III landfill. Thus, the amended BRPP would not result in a cumulatively considerable impact, and no cumulative impacts beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.13.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP would comply with all applicable LORS related to waste management, including CALGreen, which requires diversion of at least 65 percent of construction and demolition waste, California's Short-Lived Climate Pollutant Reduce Law (Senate Bill 1383), which sets goals to reduce disposal of organic waste in landfills. The amended BRPP and would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments. .

3.13.5 Conditions of Certification

The amended BRPP would not result in new or more significant impacts from generation of nonhazardous or hazardous wastes. The amended BRPP is subject to the COCs for solid waste management. COCs 11-1 through 11--7 address potential impacts to waste management

resulting from the amended BRPP. COC 11-2 requires modifications as shown in underline below to address waste from the catalyst reactor. COC 11-8 no longer applies to the BRPP due to removal of the water-cooling tower, as indicated in ~~strikethrough~~ below. With the proposed changes in the COCs, the amended BRPP would comply with current LORS, and impacts of the amended BRPP would not exceed the impacts of the approved BRPP.

11-2. The only Stretford process waste is sulfur cake with some entrained process chemicals. The project owner shall ensure that the sulfur cake is properly stored in an appropriate container and removed periodically to be sold or disposed at a site approved for such wastes. Spent surfactant from the catalyst reactors shall be removed and disposed at a site approved for such wastes.

~~**11-8** The project owner shall ensure that the cooling tower sludge is tested pursuant to Title 22, California Code of Regulations, section 66262.10 and report the findings to the CPM.~~

~~Verification: The project shall include the results of sludge testing in a report provided to the CEC CPM. If four consecutive tests show that the sludge is nonhazardous, the project owner may apply to the CPM to discontinue testing.~~

3.13.6 References

CEC. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." *Docket Number: 79-AFC-04C.* December.

—. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." *Docket Number 79-AFC-4.* October.

—. 2006. "Order Approving the Change of OWnership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

3.14 Worker Health and Safety

This subsection includes an evaluation of the effects of the amended BRPP on worker health and safety and compliance with applicable LORS and COCs. The amended BRPP would not create any new significant impacts on worker health and safety, and no impacts would be greater than those previously analyzed in Order 79-AFC-4 and subsequent amendments. The project modification is consistent with Order 79-AFC-4 and subsequent amendments and would comply with all applicable LORS and COCs (CEC 1980; CEC 2006; CEC 2013).

3.14.1 Affected Environment

The affected environment for worker health and safety for the amended BRPP reflects the conditions of the developed BRPP, including existing equipment and facilities. The BRPP is currently non-operational; however, the existing BRPP could resume operation under its existing permits at any time, and the affected environment reflects the safety conditions under operation of the permitted BRPP. Maintenance workers at the BRPP are currently subject to the safety risks presented from the non-operational equipment, including the fire risk from the wooden water-cooling tower, and have also historically been subject to safety risks from the operational equipment during active BRPP operations.

3.14.2 Environmental Analysis

Construction would primarily occur within the existing BRPP site. Construction and operation of the amended BRPP would expose workers to construction and operational hazards similar to those of the existing BRPP. During construction, operation, and maintenance of the amended BRPP, workers could be exposed to potential hazards from loud noises, operation of heavy equipment, hazardous materials, fires, and equipment exhaust.

The amended BRPP would implement several plans to achieve worker health and safety objectives, including an Emergency Preparedness and Action Plan and an Injury and Illness Prevention Plan. The Emergency Preparedness and Action Plan includes employee training in emergency notification and communication, rescue and medical response, evacuation procedures, fire prevention and control, and hazardous materials management. In accordance with CCR Title 8, section 3203 et seq., the amended BRPP would implement an Injury and Illness Prevention Program to ensure employees comply with safe and healthy work practices.

The amended BRPP would adhere to all applicable Occupational Safety and Health Administration (OSHA) and California Occupational Safety and Health Administration (Cal/OSHA) regulations. Compliance with all applicable LORS relating to potential hazards in the project area would ensure worker health and safety. As discussed in Section 3.5, Hazards and Hazardous Materials, measures to ensure the health and safety of workers are implemented and documented through BRPP policies and procedures such as the emergency response site contingency plans, incident reporting requirements, final closure plan, and annual compliance plans.

The amended BRPP would use the existing fire protection system on the BRPP site and would include installation of sprinklers for any new equipment containing more than 500 gallons of oil, as described in Section 2.0, Project Description. The amended BRPP would continue to implement the Wildland Fire Operating Plan (CALFIRE and Geyers Steam Field Operators 2022) in coordination with California Department of Forestry and Fire Protection (CalFIRE) Sonoma-Lake-Napa Unit and regional geothermal operators. The Wildland Fire Operating Plan identifies potential fire hazards and ignition sources and describes fire prevention activities and operating procedures to minimize the potential for wildland fires. In the event of a fire, the South Lake County Fire District would continue to provide emergency service to the amended BRPP. Furthermore, the proposed amendment would result in an overall net reduction in fire safety hazards to workers through replacement of the wooden water-cooling tower with metal ACCs.

3.14.3 Cumulative Effects

The amended BRPP would not result in any new or more significant impacts to worker health or safety. The impacts from demolition of infrastructure on the site was previously addressed in Order 79-AFC-4 and demolition of the water-cooling tower, lube oil skid, and other infrastructure is therefore considered a cumulative project. Demolition of the wooden water-cooling tower would reduce fire hazards at the BRPP. The existing water-cooling tower also harbors a potential for the growth of bacteria including Legionella, which is the cause of legionellosis, also known as Legionnaires' Disease. Cooling tower systems have been known to disseminate aerosols containing Legionella and present a hazard to workers who come in contact with cooling tower mists. Removal of the existing water-cooling tower would eliminate the risk of Legionella bacteria growth in the cooling tower and the associated risk of transmission of Legionella to workers. Removal of the lube oil skid, hydrogen and oxygen storage, and CO_2 gas storage tanks would abate the potential risk to workers from by reducing the amount flammable and combustible materials on the site. The cumulative effect on worker safety from demolition of the existing wooden water-cooling tower and other infrastructure would result in a net benefit at the site. Thus, the amended BRPP would not result in a cumulatively considerable impact, and no cumulative impact beyond those described in Order 79-AFC-4 and subsequent amendments would occur.

3.14.4 Compliance with Laws, Ordinances, Regulations, and Standards

The amended BRPP would comply with all applicable LORS related to worker health and safety, including all current OSHA standards and requirements. The amended BRPP would not alter the conclusions made in Order 79-AFC-4 and subsequent amendments.

3.14.5 Conditions of Certification

The amended BRPP would not result in new or increased impacts from generation of nonhazardous and hazardous wastes. The amended BRPP is subject to COCs for worker health and safety and public health. COCs 2-10, 12-3, 12-5, and 12-6 would not apply to the amended BRPP as the lube oil storage tanks and CO_2 gas storage would be removed from the site. In

addition, hydrogen and oxygen systems would not be required for the BRPP. The removed conditions are indicated in ~~strikethrough~~ below.

~~**2-10** The project owner shall develop and implement a Cooling Water Management Plan to ensure that the potential for bacterial growth in cooling water is kept to a minimum. The Plan shall be consistent with either staff's "Cooling Water Management Program Guidelines" or with the Cooling Technology Institute's "Best Practices for Control of Legionella" guidelines but in either case, the Plan must include sampling and testing for the presence of Legionella bacteria at least every six months. After two years of power plant operations, the project owner may ask the CEC CPM to re-evaluate and revise the Legionella bacteria testing requirement.~~

~~Verification: At least 60 days prior to the restart of cooling tower operations, the Cooling Water Management Plan shall be provided to the CEC CPM for review and approval.~~

~~**12-3.** The project owner shall certify that lube oil storage tanks are designed and constructed according to Article 145, Title 8, CCR and anchored to resist a force of an ELF of 0.5 W.~~

~~Verification: The project owner will prepare and submit a certificate stamped by a registered civil, mechanical or industrial engineer prior to commercial operation.~~

~~**12-5.** The project owner shall certify that hydrogen and oxygen systems are installed according to Articles 138 and 139, Title 8, CCR.~~

~~Verification: The project owner will prepare and submit a certificate of compliance stamped by a registered civil, mechanical or industrial engineer prior to commercial operation.~~

~~**12-6.** The project owner shall certify that ammonia and C02 gas are stored according to Articles 107 and 76, Title 8, CCR.~~

~~Verification: The project owner will prepare and submit a certificate of compliance stamped by a registered civil, mechanical or industrial engineer prior to commercial operation.~~

3.14.6 References

CALFIRE and Geyers Steam Field Operators. 2022. "2022 Wildland Fire Operating Plan."

CEC. 2013. "Commission Decision on the Petition to Amend the Conditions of Certification for the Bottle Rock Geothermal Power Plant." *Docket Number: 79-AFC-04C.* December.

—. 1980. "Decision on the Department of Water Resources Application for Certification for the Bottle Rock Geothermal Project." *Docket Number 79-AFC-4.* October.

—. 2006. "Order Approving the Change of OWnership, the Restart of Operation after Suspension, and 11 Facility Design Changes ." December.

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Appendix A – Property Owners

APPENDIX A – MAILING LIST

Table 1 Mailing List for Property Owners within 1,000 feet of BRPP Parcels

Assessor's Parcel Number	Contact and Mailing Address
1300210	2870 LOWELL AVE RICHMOND CA 94804
1300209 1300249	226 SHERMAN DR RED BLUFF CA 96080
1300240	PO BOX 3288 HOUSTON TX 77253

Appendix B – Air Quality Technical Report

MAYACMA GEOTHERMAL PROJECT

AIR QUALITY AND GREENHOUSE GAS EMISSIONS SUPPORTING INFORMATION

MARCH 2023

Prepared by:

RCH GROUP
planning & environmental consulting

AIR QUALITY SETTING

AIR QUALITY ENVIRONMENTAL SETTING

The project site is in the southern portion of Lake County, California, which is located within the Lake County Air Basin (LCAB) and is within the jurisdictional boundaries of the Lake County Air Quality Management District (LCAQMD). The LCAB is a federally and state recognized geographic area that is the same as the county boundary.

Topography, Climate, and Meteorology

Air quality is affected by the rate, amount, and location of pollutant emissions and the associated meteorological conditions that influence pollutant movement and dispersal. Atmospheric conditions, including wind speed, wind direction, stability, and air temperature, in combination with local surface topography (i.e., geographic features such as mountains, valleys, and water bodies), determine the effect of air pollutant emissions on local air quality.

The LCAB lies entirely within the Coast Range Mountains and constitutes one of the major inter-mountain basins of the region. Isolated valleys can prevent the dispersion of trapped pollutants during inversion periods. Inversion is an atmospheric condition where a layer of cold air is trapped near the ground by an overlying layer of warm air. The warm air prevents the cooler air from rising and dispersing any accumulated pollutants. Instead, the contaminated air is spread horizontally, exacerbating the situation.

Mountains surrounds the LCAB, which is why it is rarely influenced by outside meteorology. Summer months in the LCAB are characterized by high temperatures, approximately 90 degrees Fahrenheit (ºF) with little to no rainfall. Winter months are mild with temperatures in the mid-50 ºF. During the winter, rainfall averages 27 inches. Annual rainfall in Middletown average approximately 44 inches.[1]

Criteria Air Pollutants

Criteria air pollutants are defined as those pollutants for which the federal and state governments have established air quality standards for outdoor or ambient concentrations to protect public health with a determined margin of safety. Ozone (O_3), coarse particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$) are generally considered to be regional pollutants because they or their precursors affect air quality on a regional scale. Pollutants such as carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2) are considered to be local pollutants because they tend to accumulate in the air locally. PM_{10} and $PM_{2.5}$ are also considered a local pollutant.

Carbon Monoxide

CO in the urban environment is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. CO combines with hemoglobin in the bloodstream and reduces the

[1] Western Regional Climate Center (WRCC), Middletown, California (045598), Period of Monthly Climate Summary, accessed at: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5598

amount of oxygen that can be circulated through the body. High CO concentrations can cause headaches, aggravate cardiovascular disease, and impair central nervous system functions. CO concentrations can vary greatly over comparatively short distances. Relatively high concentrations of CO are typically found near crowded intersections and along heavy roadways with slow moving traffic. Even under the most severe meteorological and traffic conditions, high concentrations of CO are limited to locations within relatively short distances of the source.

Nitrogen Oxides

Nitrogen gas comprises about 80 percent of the air and is naturally occurring. At high temperatures and under certain conditions, nitrogen can combine with oxygen to form several different gaseous compounds collectively called nitric oxides (NO_x). Motor vehicle emissions are the main source of NO_x in urban areas. NO_x is very toxic to animals and humans because of its ability to form nitric acid with water in the eyes, lungs, mucus membrane, and skin. In animals, long-term exposure to NO_x increases susceptibility to respiratory infections, and lowering resistance to such diseases as pneumonia and influenza. Laboratory studies show that susceptible humans, such as asthmatics, who are exposed to high concentrations can suffer from lung irritation or possible lung damage. Precursors of NO_x, such as NO and NO_2, attribute to the formation of O_3 and $PM_{2.5}$. Epidemiological studies have also shown associations between NO_2 concentrations and daily mortality from respiratory and cardiovascular causes and with hospital admissions for respiratory conditions.

Sulfur Oxides

SO_2 is a combustion product of sulfur or sulfur–containing fuels such as coal and diesel. SO_2 is also a precursor to the formation of atmospheric sulfate and particulate matter and contributes to potential atmospheric sulfuric acid formation that could precipitate downwind as acid rain.

Ozone

O_3 is a secondary pollutant, meaning it is not directly emitted. It is formed when volatile organic compounds (VOCs) or reactive organic gases (ROGs) and NOx undergo photochemical reactions that occur only in the presence of sunlight. The primary source of ROG emissions is unburned hydrocarbons in motor vehicle and other internal combustion engine exhaust. NOx forms as a result of the combustion process, most notably due to the operation of motor vehicles. Sunlight and hot weather cause ground-level O_3 to form. Ground-level O_3 is the primary constituent of smog. Because O_3 formation occurs over extended periods of time, both O_3 and its precursors are transported by wind and high O_3 concentrations can occur in areas well away from sources of its constituent pollutants.

People with lung disease, children, older adults, and people who are active can be affected when O_3 levels exceed ambient air quality standards. Numerous scientific studies have linked ground-level O_3 exposure to a variety of problems including lung irritation, difficult breathing, permanent lung damage to those with repeated exposure, and respiratory illnesses.

Particulate Matter

PM includes both aerosols and solid particulates of a wide range of sizes and composition. Of concern are those particles smaller than or equal to 10 micrometers in diameter size (PM_{10}) and small than or equal to 2.5 micrometers in diameter ($PM_{2.5}$). Smaller particulates are of greater concern because they can penetrate deeper into the lungs than larger particles. PM_{10} is generally emitted directly as a result of mechanical processes that crush or grind larger particles or form the resuspension of dust, typically through construction activities and vehicular travel. PM_{10} generally settles out of the atmosphere rapidly and is not readily transported over large distances. $PM_{2.5}$ is directly emitted in combustion exhaust and is formed in atmospheric reactions between various gaseous pollutants, including NOx, sulfur oxides (SOx) and VOCs or ROGs. $PM_{2.5}$ can remain suspended in the atmosphere for days and/or weeks and can be transported long distances.

The principal health effects of airborne PM are on the respiratory system. Short-term exposure of high $PM_{2.5}$ and PM_{10} levels are associated with premature mortality and increased hospital admissions and emergency room visits. Long-term exposure is associated with premature mortality and chronic respiratory disease.

Lead

Ambient lead concentrations meet both the federal and State standards in the Project area. Lead has a range of adverse neurotoxin health effects and was released into the atmosphere via leaded gasoline products. The phase-out of leaded gasoline in California has resulted in dramatically decreased levels of atmospheric lead. Metal processing is currently the primary source of lead emissions in the SCAB. The highest concentrations of lead in air are generally found near lead smelters and general aviation airports, where piston aircraft use leaded fuel. Other stationary sources that generate lead emissions include waste incinerators, utilities, and lead-acid battery manufacturers. The maximum lead concentrations recorded in the Project area are below federal and California standards. Notably, diesel fuel does not contain lead emissions and gasoline fuel is unleaded.

Toxic Air Contaminants

In addition to the criteria pollutants discussed above, toxic air contaminants (TACs) are another group of pollutants of concern. TACs are considered either carcinogenic or noncarcinogenic based on the nature of the health effects associated with exposure to the pollutant. For regulatory purposes, carcinogenic TACs are assumed to have no safe threshold below which health impacts would not occur, and cancer risk is expressed as excess cancer cases per one million exposed individuals. Noncarcinogenic TACs differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis.

There are many different types of TACs, with varying degrees of toxicity. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. Public exposure to TACs can result from emissions from normal operations, as well as from

accidental releases of hazardous materials during upset conditions. The health effects of TACs include cancer, birth defects, neurological damage, and death.

Most recently, California Air Resources Board (CARB) identified DPM as a TAC. DPM differs from other TACs in that it is not a single substance but rather a complex mixture of hundreds of substances. Diesel exhaust is a complex mixture of particles and gases produced when an engine burns diesel fuel. DPM is a concern because it causes lung cancer; many compounds found in diesel exhaust are carcinogenic. DPM includes the particle-phase constituents in diesel exhaust. Some short-term (acute) effects of diesel exhaust include eye, nose, throat, and lung irritation, and diesel exhaust can cause coughs, headaches, light-headedness, and nausea. DPM poses the greatest health risk among the TACs; due to their extremely small size, these particles can be inhaled and eventually trapped in the bronchial and alveolar regions of the lung.

Ambient Air Quality

The only California Ambient Air Monitoring Network monitoring station employed by CARB in the LCAB is the Lakeport-South Main Street station approximately 24 miles northwest of the project site. The Lakeport-South Main Street station measures levels of hourly ozone, eight-hour ozone, PM_{10}, and $PM_{2.5}$. **Table AQ-1** summarizes the most recent three years of data (2019 through 2021) from the Lakeport-South Main Street station. PM_{10} state standards and $PM_{2.5}$ national standards were exceeded in 2020 and 2021, likely due to wildfire events.

TABLE AQ-1 SUMMARY OF ANNUAL MONITORING DATA OF AMBIENT AIR QUALITY

Pollutant	Standard	2019	2020	2021
Ozone				
Maximum Concentration (1-hour/8-hour average)	ppm	0.060/0.055	0.080/0.063	0.075/0.055
Number of days State standard exceeded (1-hour/8-hour)	0.09/0.070	0/0	0/0	0/0
Number of days National standard exceeded (8-hour)	0.070	0	0	0
Fine Particulate Matter (PM_{10})				
Maximum Concentration (24-hour)	µg/m^3	21.9	**126.6**	**84.7**
Number of days State/National standard exceeded (24-hour measured)	50/150	0/0	**4**/0	**1**/0
Annual Average (State standard)	20	10.1	19.8	16.1
Fine Particulate Matter ($PM_{2.5}$)				
Maximum Concentration (24-hour)	µg/m^3	8.3	**111.5**	**64.4**
Number of days National standard exceeded (24-hour measured/estimated)	35	0/0	**4/23**	**1/6**
Annual Average (State/National standard)	12/12.0	3.1	9.3	6.3

NOTES:
ppm = parts per million, µg/m^3 = micrograms per cubic meter **bold values** exceeded the State and/or National standard

SOURCE: CARB, *iADAM: Air Quality Data Statistics*, https://www.arb.ca.gov/adam, Accessed February 23, 2023

Odors

Odors are generally regarded as an annoyance rather than a health hazard. Manifestations of a person's reaction to odors can range from psychological (e.g., irritation, anger, or anxiety) to

physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache). The ability to detect odors varies among the population and overall is quite subjective. People may have different reactions to the same odor. An odor that is offensive to one person may be perfectly acceptable to another (e.g., coffee roaster). An unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. Known as odor fatigue, a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity. The occurrence and severity of odor impacts depend on the nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of receptors. Odor impacts should be considered for any proposed new odor sources located near existing receptors, as well as any new sensitive receptors located near existing odor sources.[2]

Sensitive Receptors

Sensitive receptors are defined as facilities or land uses that include members of the population who are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of these sensitive receptors are residences, schools, hospitals, and daycare centers. CARB has identified the following groups of individuals as the most likely to be affected by air pollution: the elderly over 65, children under 14, athletes, and persons with cardiovascular and chronic respiratory diseases such as asthma, emphysema, and bronchitis. The nearest residential structure is approximately 1,500 feet northeast of the project site, and the nearest residential property line is approximately 200 feet east of the project site.

AIR QUALITY REGULATORY SETTING

Ambient Air Quality Standards

Regulation of air pollutants is achieved through both national and state ambient air quality standards (AAQS) and emissions limits for individual sources. Regulations implementing the federal Clean Air Act (CAA) and its subsequent amendments established national ambient air quality standards (NAAQS) for the six criteria pollutants. California has adopted more stringent California ambient air quality standards (CAAQS) for most of the criteria air pollutants. In addition, California has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. Because of the meteorological conditions in the state, there is considerable difference between state and federal standards in California.

The AAQS are intended to protect the public health and welfare, and they incorporate an adequate margin of safety. They are designed to protect those segments of the public most susceptible to respiratory distress, known as sensitive receptors, including asthmatics, the very young, elderly, people weak from other illness or disease, or persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollution levels somewhat above the ambient air quality standards before adverse health effects are observed.

Under amendments to the federal CAA, U.S. Environmental Protection Agency (U.S. EPA) has classified air basins or portions thereof, as either “attainment” or “nonattainment” for each criteria

[2] Bay Area Air Quality Management District (BAAQMD). 2017. *California Environmental Quality Act Air Quality Guidelines*. May 2017.

air pollutant, based on whether the NAAQS have been achieved. The California CAA, which is patterned after the federal CAA, also requires areas to be designated as "attainment" or "nonattainment" for the CAAQS. Thus, areas in California have two sets of attainment / nonattainment designations: one set with respect to the NAAQS and one set with respect to the CAAQS. As shown in **Table AQ-2**, LCAB is "attainment" or "unclassified" with respect to the NAAQS and CAAQS.

California Air Resources Board

CARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementation of the California CAA. CARB has primary responsibility in California to develop and implement air pollution control plans designed to achieve and maintain the NAAQS. Collectively, all regional air pollution control plans or air quality management plans to achieve the NAAQS throughout the state constitute the state implementation plan (SIP). As California's air quality management agency, CARB regulates mobile emission sources and oversees the activities of county air pollution control districts and regional air quality management districts. CARB regulates local air quality indirectly by using state standards and vehicle emission standards, conducting research activities, and carrying out planning and coordinating activities. CARB also provides land use guidance, as it relates to air quality, including criteria for siting schools and other sensitive land uses.

Tanner Air Toxics Act & Air Toxics "Hot Spots" Information & Assessment Act

CARB's statewide comprehensive air toxics program was established in 1983 with Assembly Bill (AB) 1807, the Toxic Air Contaminant Identification and Control Act (Tanner Air Toxics Act of 1983). AB 1807 created California's program to reduce exposure to air toxics and sets forth a formal procedure for CARB to designate substances as TACs. Once a TAC is identified, CARB adopts an airborne toxics control measure (ATCM) for sources that emit designated TACs. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure to below that threshold. If there is no safe threshold, the measure must incorporate toxics best available control technology to minimize emissions.

CARB also administers the State's mobile source emissions control program and oversees air quality programs established by state statute, such as AB 2588, the Air Toxics "Hot Spots" Information and Assessment Act of 1987. Under AB 2588, TAC emissions from individual facilities are quantified and prioritized by the air quality management district or air pollution control district. High priority facilities are required to perform a health risk assessment (HRA) and, if specific thresholds are exceeded, required to communicate the results to the public in the form of notices and public meetings. In September 1992, the "Hot Spots" Act was amended by Senate Bill (SB) 1731, which required facilities that pose a significant health risk to the community to reduce their risk through a risk management plan.

TABLE AQ-2 AMBIENT AIR QUALITY STANDARDS AND LCAB ATTAINMENT STATUS

Pollutant	Averaging Time	CAAQS	LCAB CAAQS Attainment Status	NAAQS	LCAB NAAQS Attainment Status	Major Pollutant Sources
Ozone	8 hour	0.070 ppm	Attainment	0.070 ppm	Unclassified/Attainment	Formed when ROG and NOx react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial/ industrial mobile equipment.
	1 hour	0.09 ppm	Attainment	---	N/A	
Carbon Monoxide (CO)	8 hour	9.0 ppm	Attainment	9 ppm	Unclassified/Attainment	Internal combustion engines, primarily gasoline-powered motor vehicles
	1 Hour	20 ppm	Attainment	35 ppm	Unclassified/Attainment	
Nitrogen Dioxide (NO_2)	Annual Average	0.030 ppm	Attainment	0.053 ppm	Unclassified/Attainment	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads
	1 Hour	0.18 ppm	Attainment	0.100 ppm	Unclassified/Attainment	
Sulfur Dioxide (SO_2)	Annual Average	---	N/A	0.030 ppm	Unclassified/Attainment	Fuel combustion, chemical plants, sulfur recovery plants and metal processing
	24 Hour	0.04 ppm	Attainment	0.14 ppm	Unclassified/Attainment	
	1 Hour	0.25 ppm	Attainment	0.075 ppm	Unclassified/Attainment	
Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 $\mu g/m^3$	Attainment	---	N/A	Dust- and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays)
	24 hour	50 $\mu g/m^3$	Attainment	150 $\mu g/m^3$	Unclassified/Attainment	
Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 $\mu g/m^3$	Attainment	12 $\mu g/m^3$	Unclassified/Attainment	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; also, formed from photochemical reactions of other pollutants, including NOx, sulfur oxides, and organics.
	24 hour	---	N/A	35 $\mu g/m^3$	Unclassified/Attainment	
Lead	Calendar Quarter	---	N/A	1.5 $\mu g/m^3$	Unclassified/Attainment	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.
	30 Day Average	1.5 $\mu g/m^3$	Attainment	---	N/A	

NOTE: ppm = parts per million; and $\mu g/m^3$ = micrograms per cubic meter

SOURCE: CARB, 2019. Maps of State and Federal Area Designations. https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations, Accessed February 23, 2023.

Lake County Air Quality Management District

The LCAQMD attains and maintains county air quality conditions through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of the LCAQMD includes adoption, and enforcement of rules and regulations concerning sources of air pollution, and issuance of permits for stationary sources of air pollution. LCAQMD Rules and Regulations includes rules and regulations required and recommended for all projects. Project proponents are responsible for compliance with the adopted LCAQMD rules and regulations. A reproduction of the key LCAQMD rules and regulations which are applicable to construction and operation of the project may include but are not limited to the following:

LCAQMD Rules and Regulations, Chapter II Prohibitions and Standards

Article I-Visible Emissions: A person shall not discharge into the atmosphere from any single source of emission whatsoever any air contaminant for a period or periods aggregating more than three minutes in any one hour which is as dark or darker in shade as that designated as number 1 on the Ringelmann Chart, as published by the United States Bureau of Mines.

Article II-Particulate Matter Emissions: A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause to have a natural tendency to cause injury or damage to business or property.

Article III-Geothermal Operations

Section 421: Sulfur Emissions

A. A geothermal well operation may not emit total sulfur compounds expressed as hydrogen sulfide in excess of one hundred and fifty (150) ppm by weight unless:

1. The developer has installed an operable control system capable of achieving a seventy-five percent (75%) or greater reduction in hydrogen sulfide emission, or

2. The developer documents that it is engaged in an active program of research and development of technology for abating hydrogen sulfide emissions from geothermal well drilling acceptable to the Air Pollution Control Officer, and

3. The emissions from such operation do not cause the one-hour ambient air standard for hydrogen sulfide to be exceeded.

The Air Pollution Control Officer may waive the requirements of this Section 421 provided that the developer installs and maintains an approved hydrogen sulfide ambient air monitoring system in the prevailing downwind direction and provided that the ambient air standard is not exceeded. In no case may the Air Pollution Control Officer waive the requirements of this Section if total sulfur compounds expressed as hydrogen sulfide exceed one thousand (1,000) ppm by weight.

B. No geothermal well operation shall emit total sulfur expressed as hydrogen sulfide in excess of twenty-four (24) pounds/day during the lowest bleed rate consistent with keeping the well potentially productive unless monitoring evidence is being and has been collected and convinces the Air Pollution Control Officer that the incremental sulfur emissions by wells of various developers are not likely to cause a violation or make a measurable contribution to an existing violation of the ambient air standard.

Section 421.1: Geothermal Wells Particulate Emissions

A. All geothermal well operations shall abide by Rule 411 of the Rules and Regulations of the Air Quality Management District except that during the air drilling phase of the operation, the particulate emission rate may reach a level of one hundred (100) lbs/hr for a time period not to exceed sixteen (16) days.

B. In no case may the ambient particulate air standard be exceeded or caused to be exceeded during any phase of the geothermal well operation.

Section 421.2: Geothermal Power Plant Operations

A. Power Plants

1. All geothermal power plants for which an Authority to Construct permit is initially issued before January 1, 1981 shall emit no more than one hundred and seventy-five (175) grams of hydrogen sulfide per gross megawatt hour.

2. All geothermal power plants for which an Authority to Construct permit is initially issued on or after January 1, 1981 shall emit no more than fifty (50) grams of hydrogen sulfide per gross megawatt hour.

3. All geothermal power plants shall, by January 1, 1990, emit no more than fifty (50) grams of hydrogen sulfide per gross megawatt hour.

B. Steam Transmission Lines

1. Effective January 1, 1980, the allowable rate of hydrogen sulfide emissions from steam transmission lines during a power plant outage shall be as defined in the following graphics (Tables 2, 3A, and 3B of the regulation) for scheduled outages and unscheduled outages for all geothermal power plants and steam transmission lines operating in the LCAQMD. Time limitations are noted in minutes and begin when the generating unit is first off line, or venting of more than nine percent (9%) of normal, full, unabated steam flow of a unit occurs. Emission limitations to be reached by a noted time are given as the maximum allowable percent of full flow unabated hydrogen sulfide content of steam to the generating unit. In the event of an unscheduled outage, a decision as to the expected total time of the outage is to be made within ninety (90) minutes and entered into an appropriate log maintained at the site and readily accessible by the LCAQMD staff. For a scheduled outage, the expected down time shall be entered into this same log prior to initiating the outage. For the purposes of Section 421.2 B, two or more single generating unit power plants interconnected and capable on a continuous basis of shunting fifty percent (50%) of full steam flow of the larger of the units to other power plant(s) within thirty (30) minutes after initiation of an outage shall be considered a dual unit power plant.

This Regulation does not supersede or repeal any other rules or regulations of the LCAQMD and is intended to supplement other rules concerning the subject matter.

2. Effective January 1, 1985, hydrogen sulfide emissions shall be reduced to ten percent (10%) of unabated full steam flow within fifteen (15) minutes of initial outage. This applies to dual and single unit power plants whether a scheduled or unscheduled outage occurs.

Section 422: Geothermal Well Venting. No geothermal well operator shall intentionally exhaust into the atmosphere any well in excess of five (5) percent of full venting capacity without first notifying the Air Pollution Control Officer at least twenty-four (24) hours in advance of the proposed action, except:

A. Operations during the exploratory phase under an Authority to Construct.

B. When abatement equipment proven effective is used in removing air contaminants for which there is an ambient air standard.

C. In cases where wells are being vented full open for purposes of testing the chemical and/or physical properties of the effluent.

D. In cases where the Air Pollution Control Officer requests chemical or physical tests to be performed on the well contents.

TABLE 2 SCHEDULED POWER PLANT OUTAGES

	Outages Less Than 360 Minutes		Outages Greater Than 360 Minutes		
Elapsed Time (Minutes)	15	360	15	90	240
Dual Units with one Unit Operative	*10% within 15 minutes		*10% within 15 minutes and until startup is initiated		
Single Units Capable of Shunting 35% of Full Steam Flow	*35% within 15 minutes	Back On Line or Hydrogen Sulfide Reduced to 10% of Full Unabated Hydrogen Sulfide Steam Flow Until Startup is Initiated	*35% within 15 minutes		10% within 240 minutes & until startup is initiated
Single Units without the Capability to Shunt 35% of Full Steam Flow	*35% within 15 minutes		*35% within 15 minutes	10% within 90 minutes & until startup is initiated	
Dual Units with both Units Down Simultaneously & Capable of Shunting Full Steam Flow	*40% within 15 minutes		*40% within 15 minutes		10% within 240 minutes & until startup is initiated
Dual Units with Both Units Down Simultaneously & No Capability to Shunt Steam	*40% within 15 minutes		*40% within 15 minutes	10% within 90 minutes & until startup is initiated	

* The necessity for occasional venting in excess of limits specified under an upset in coordinating well throttling and power plant startup or shut down is acknowledged (refer to Article II, Section 510 of LCAQMD Rules and Regulations).

TABLE 3A UNSCHEDULED POWER PLANT OUTAGES

					Decision as entered in log < 420 minutes	
Elapsed Time (Minutes)	15	30	60	90	90	420
Dual Units with one Unit Operative	90%	50%	35%	10%	10% continued	Back on Line or Hydrogen Sulfide Reduced to 10% of Full Unabated Hydrogen Sulfide Steam Flow Rate Until Startup Initiated
Single Units Capable of Shunting 35% of Full Steam Flow	90%	50%	35%	Enter into Log Expected Duration of Outage	35% Continued as at 60 Minutes Until Startup Initiated	
Single Units without the Capability to Shunt 35% of Full Steam Flow	90%	50%	35%			
Dual Units with both Units Down Simultaneously & Capable of Shunting Full Steam Flow	90%	50%	40%			
Dual Units with Both Units Down Simultaneously & No Capability to Shunt Steam	90%	50%	40%			

*The necessity for occasional venting in excess of limits specified under an upset in coordinating well throttling and power plant startup or shut down is acknowledged (refer to Article II, Section 510 of LCAQMD Rules and Regulations).

TABLE 3B UNSCHEDULED POWER PLANT OUTAGES

No decision or decision as entered into log is greater than 420 minutes		
Elapsed Time (Minutes)	150	300
Dual Units with one Unit Operative	10% continued as at 90 minutes until startup is initiated	
Single Units Capable of Shunting 35% of Full Steam Flow	10% within 150 minutes and until startup is initiated	
Single Units without the Capability to Shunt 35% of Full Steam Flow	10% within 150 minutes and until startup is initiated	
Dual Units with both Units Down Simultaneously & Capable of Shunting Full Steam Flow	Continue at 60 minutes unabated Hydrogen Sulfide steam flow rate	10% within 300 minutes and until startup is initiated
Dual Units with Both Units Down Simultaneously & no Capability to Shunt Steam	10% within 150 minutes and until startup is initiated	

*The necessity for occasional venting in excess of limits specified under an upset in coordinating well throttling and power plant startup or shutdown is acknowledged (refer to Article II, Section 510 of LCAQMD Rules and Regulations)

Article IV-Other Emissions or Contaminants

Section 430: General No person shall discharge, or permit to be discharged from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to cause injury or damage or have natural tendency to cause injury or damage to business or property (Health and Safety Code Section 41700). This does not apply to odors emanating from agricultural operations in the growing of crops or raising of animals (Health and Safety Code Section 41705). Any discharge of air contaminants which will cause the ambient air quality to exceed those amounts listed in the Table of Standards, applicable state-wide, as shown in the California Administrative Code, Title 17, Section 70200, off premises shall be a violation of this Section. Section 70200 of the California Administrative Code is hereby adopted and made a part of this Regulation as though fully set forth herein.

Section 440: New Source Performance Standards (NSPS) All new sources of air contaminants or modifications to existing sources shall comply with the rules, standards, criteria and requirements of Part 60, Chapter 1, Title 40, Code of Federal Regulations (40 CFR 60), as herein last amended which are adopted by reference and made a part of these Rules and Regulations. For the purpose of this Rule, the word "Administrator" as used in these federal new source performance standards shall mean the Air Pollution Control Officer of the District. Category types subject to NSPS are as given in Table 4 of the regulation.

Section 450: National Emissions Standards for Hazardous Air Pollutants (NESHAPS) The provisions of Part(s) 61 and 63, Chapter 1, Title 40, Code of Federal Regulations as herein last amended are adopted by reference and made a part of these Rules and Regulations. For the purposes of this Rule, the word "Administrator" as used in these national emission standards for hazardous air pollutants shall mean the Air Pollution Control Officer of the District. Category types subject to NESHAPS are as given in Table 5 of the regulation. EPA approved State ATCM's shall be considered District enforceable in lieu of the applicable NESHAP.

Section 467: Asbestos Control Measure. The purpose of the rule is to control emissions of asbestos to the atmosphere and provide appropriate waste handling and disposal procedures. Part III – Demolition, Renovation, and Removal lists administrative requirements, demolition/renovation/removal procedures, waste disposal procedures, waste disposal sites, and monitoring and recordkeeping procedures for controlling asbestos emissions during demolition activities.

LCAQMD Rules and Regulations, Chapter IV, Permits

Article I-Authority to Construct

Section 600: A written Authority to Construct shall be required to construct, erect, alter or replace any equipment which may cause, potentially cause, reduce, control or eliminate the issuance of air contaminants. A single Authority to Construct may be issued for all components of an integrated system or process. Plans and specifications drawn in accordance with acceptable engineering practices shall be required before issuance of an Authority to Construct.

Section 608: Notwithstanding Sections 602, 604 and 605 C of the District's rules, the Air Pollution Control Officer shall issue an Authority to Construct or other required documents to

any geothermal power plant development project (power plants, production wells and geothermal fluid transmission lines) which meets the following prescriptive criteria and utilizes the best available control technology:

A. Power plants and geothermal fluid transmission lines must limit on a continuous basis the hydrogen sulfide emission rate to no more than five (5.0) pounds per hour (2.3 kilograms per hour) per one million (1,000,000) pounds per hour of steam flow received;

B. The proposed power plant must be located such that not more than one permitted geothermal power plant (within the District) is closer than six-tenths (0.6) mile and no populated areas (as defined in Chapter 21 of the Lake County Code, Article XXV, Section 21-73.6a(1)) are within one (1.0) mile of the proposed location;

C. Geothermal development wells must limit the hydrogen sulfide emission rate on a continuous basis during air drilling, clean-out, initial testing and reworking to no more than five (5.0) pounds per hour (2.3 kilograms per hour);

D. Wells on stand-by vent shall be located no closer than one half (0.5) mile from a populated area (as defined in Chapter 21 of the Lake County Code, Article XXV, Section 21-73.6a(1)), and emissions shall be no greater than an average of one (1) pound per hour per well based on the number of completed wells for the associated power plant's steamfield;

E. In the judgement of the Air Pollution Control Officer, the facility must be able to readily show compliance with all other rules and regulations limiting emissions of emittants other than hydrogen sulfide; and

F. No individual property owner or legal resident within a one (1) mile radius of the proposed power plant site or one half (0.5) mile from an associated drilling pad makes a request for a New Source Review of the Project under Chapter IV, Article I of the LCAQMD Rules and Regulations.

The LCAQMD shall make proper public notice and reasonable attempts to notify affected parties (in writing) of the intent to issue permits under Rule 608, thirty (30) days prior to such permits being issued. The notice shall include a statement that affected parties may request a detailed New Source Review of the proposed power plant. Permit issuance after the 30 days notice pursuant to this Rule shall be final.

Section 609: Geothermal Stacking Emissions. The power plant operator and the steam supplier shall jointly, or if the same entity singularly, develop a proposed written plan to limit geothermal steam stacking emissions (as defined in Section 227.5). The proposed plan incorporating the Best Available Control Technology, shall be submitted with the power plant Application for Certification or development project Authority to Construct(s) prior to the District considering the application(s) complete for District permitting or preparation of a Determination of Compliance purposes. The plan shall: (a) identify the specific technology(ies) proposed to control said emissions; and (b) provide operating procedures for the emissions control system(s), clearly specifying the respective duties of the power plant operator and steam supplier. Upon approval by the Air Pollution Control Officer, the plan shall be incorporated in the Authority to Construct(s), the Determination of Compliance and Permit(s) to Operate for the power plant and geothermal fluid transmission line.

See Article I of the regulation for other sections related to Authority to Construct.

Article II-Permit to Operate

Section 610: A Permit to Operate may be required to operate any article, machine, equipment or other contrivance which causes or may cause the issuance of an air contaminant.

See Article II of the regulation for other sections related to Permit to Operate.

Article V-Source Emissions Testing

Section 655: Performance Plan. Compliance with the specified emission(s) limitation(s) resulting from these Rules and Regulations may be established through a protocol or performance plan acceptable to the District. The primary purpose of the performance plan is to facilitate a method of determining compliance, while recognizing that there are variations in process factors (e.g., steam quality) beyond the operator's control which affect emissions, and that continuous source emissions monitoring is not practicable.

See Article V of the regulation for other sections related to Performance Plans.

Lake County General Plan

The Lake County General Plan Health & Safety Element contains goals, policies, and implementation measures designed to protect the public health, safety, and welfare of the community. The Lake County General Plan Geothermal Resources Element establishes the goals, policies and implementation measures that will be used by the County regarding the promotion, protection, use, and education pertaining to geothermal resources that are present in the County. The following presents the policies relevant to air quality that are applicable to the project:

Policy HS-3.1: Monitoring of Point and Area Sources. New and existing point sources of air pollution should be monitored for compliance with County, State, and Federal air quality regulations and standards.

Policy HS-3.2: Best Available Air Pollution Control Technologies. The County shall require the use of the best available air pollution control technologies to maintain healthful air quality and high visibility standards, along with continuing compliance with State and Federal Ambient Air Quality Standards.

Policy HS-3.4: Paving or Treatment of Roadways for Reduced Air Emissions. As unpaved roads are a major source of the County's particulate emissions, the County should require that all new roads and driveways for new projects that are in close proximity to adjacent residences or the public be paved or treated to reduce dust generation where feasible. Unpaved roads, driveways and parking areas should be considered for surfacing improvements when permits are granted for expanded use.

Policy HS-3.10: Dust Suppression During Construction. The County shall require dust-suppression measures for grading activities, and asbestos dust hazard mitigation plans for projects located in Naturally Occurring Asbestos Areas.

Policy HS-3.11: Asbestos Inspection During Construction. The County shall require that all projects requiring a grading permit or a building permit that would result in earth disturbance, in areas likely to contain naturally occurring asbestos, utilize approved asbestos dust mitigation measures as required by the LCAQMD, CARB and the Lake County Community Development Department.

Policy GR-2.13: Air Quality Monitoring Programs. The County shall promote the continued use of air quality monitoring programs, such as The Geysers Air Monitoring Program, to develop and maintain the capacity to rapidly assess ambient air quality and detect air pollution events.

Policy GR-2.14: Best Available Control technology (BACT) Air Quality Measures for Geothermal Operations. Geothermal operations shall be planned and carried out using the BACT consistent with the requirements of the LCAQMD. Appropriate operating practices shall be used to minimize emissions, avoid vegetation damage and increased fog or haze conditions, prevent nuisance odors, and control dust.

Policy GR-2.15: Minimization of Air Emissions. Wherever practical, steamfields and power plants shall be intertied and equipped with automated supervisory control systems or other design measures to minimize air emissions during events initiated as a result of a forced outage, scheduled outage, startup, or curtailment. Steamfields shall only be connected and operated with power plants incorporating BACT as determined by the LCAQMD.

Policy GR-2.16: Retrofitting of Existing Power Plants to Reduce Environmental Impacts. The County shall strongly encourage the retrofitting of older power plants with the best reasonably available air pollution control technology and other technologies that can reduce overall environmental impacts.

GHG EMISSIONS SETTING

GHG EMISSIONS ENVIRONMENTAL SETTING

Global Climate Change

Climate is defined as the average statistics of weather, which include temperature, precipitation, and seasonal patterns such as storms and wind, in a particular region. Global climate change refers to the long term and irrevocable shift in these weather-related patterns. Using ice cores and geological records, baseline temperature and carbon dioxide (CO_2) data extends back to previous ice ages thousands of years ago. Over the last 10,000 years, the rate of temperature change has typically been incremental, with warming and cooling occurring over the course of thousands of years. However, scientists have observed an unprecedented increase in the rate of warming over the past 150 years, roughly coinciding with the global industrial revolution, which has resulted in substantial increases in GHG emissions into the atmosphere. The anticipated impacts of climate change in California range from water shortages to inundation from sea level rise. Transportation systems contribute to climate change primarily through the emissions of certain GHGs (CO_2, methane (CH_4), and nitrous oxide (N_2O)) from nonrenewable energy (primarily gasoline and diesel fuels) used to operate passenger, commercial and transit vehicles. Land use changes contribute to climate change through construction and operational use of electricity and natural gas, and waste production.

The Intergovernmental Panel on Climate Change (IPCC) has reached consensus that human-caused emissions of GHGs in excess of natural ambient concentrations are responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increases in global average surface temperature from 1951 to 2010 were caused by the anthropogenic increase in GHG concentrations and other anthropogenic forces together. The IPCC predicts that the global mean surface temperature increase by the end of the 21st century (2081– 2100) relative to 1986–2005, could range from 0.5 to 8.7 degrees Fahrenheit. Additionally, the IPCC projects that global mean sea level rise will continue during the 21st century, highly likely at a faster rate than observed from 1971 to 2010. For the period 2081–2100 relative to 1986–2005, the rise will likely range from 10 to 32 inches.[3]

Greenhouse Gases

Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse does. The accumulation of GHGs has been implicated as the driving force for global climate change. The six primary GHGs are:

- carbon dioxide (CO_2), emitted when solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products are burned;
- methane (CH_4), produced through the anaerobic decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, incomplete fossil fuel combustion, and water and wastewater treatment;
- nitrous oxide (N_2O), typically generated because of soil cultivation practices, particularly the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning;
- hydrofluorocarbons (HFCs), primarily used as refrigerants;
- perfluorocarbons (PFCs), originally introduced as alternatives to ozone depleting substances and typically emitted as by-products of industrial and manufacturing processes; and
- sulfur hexafluoride (SF_6), primarily used in electrical transmission and distribution.

Although there are other contributors to global climate change, these six GHGs are identified by the U.S. EPA as threatening the public health and welfare of current and future generations. GHGs have varying potential to trap heat in the atmosphere, known as global warming potential (GWP), and atmospheric lifetimes. GWP reflects how long GHGs remain in the atmosphere, on average, and how intensely they absorb energy. Gases with a higher GWP absorb more energy

[3] Intergovernmental Panel on Climate Change (IPCC). 2013. *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. 2013.

per pound than gases with a lower GWP, and thus contribute more to warming Earth. For example, one ton of CH_4 has the same contribution to the greenhouse effect as approximately 28 tons of CO_2; hence, CH_4 has a 100-year GWP of 28 while CO_2 has a GWP of 1. GWP ranges from 1 (for CO_2) to 23,500 (for SF_6).

In emissions inventories, GHG emissions are typically reported in terms of pounds or metric tons of CO_2 equivalents (CO_2e). CO_2e are calculated as the product of the mass emitted of a given GHG and its specific GWP. While CH_4 and N_2O have much higher GWP than CO_2, CO_2 is emitted in such vastly higher quantities that it accounts for the majority of GHG emissions in CO_2e.

Regional GHG Emissions Estimates

In 2021, the United States emitted about 5,594 million metric tons of CO_2e. Emissions increased from 2020 to 2021 by 6.8 percent (after accounting for sequestration from the land sector). The increase in total GHG emissions was driven largely by an increase in CO_2 emissions from fossil fuel combustion. In 2021, CO_2 emissions from fossil fuel combustion increased by 7.0 percent relative to the previous year. This increase in fossil fuel consumption emissions was due primarily to economic activity rebounding after the COVID-19 pandemic. GHG emissions in 2021 (after accounting for sequestration from the land sector) were 16.3 percent below 2005 levels.[4]

In 2020, California emitted approximately 369.2 million metric tons of CO_2e, about 35 million metric tons of CO_2e lower than 2019 levels and about 62 million metric tons of CO_2e below the 2020 GHG Limit of 431 million metric tons of CO_2e established by Assembly Bill (AB) 32. The 2019 to 2020 decrease in emissions is likely due in large part to the impacts of the COVID-19 pandemic. Economic recovery from the pandemic may result in emissions increases over the next few years. As such, the total 2020 reported emissions are likely an anomaly, and any near-term increases in annual emissions should be considered in the context of the pandemic. The transportation sector showed the largest decline in emissions of 27 million metric tons of CO_2e (16 percent) compared to 2019. This decrease was most likely from light duty vehicles after shelter-in-place orders were enacted in response to the COVID-19 pandemic. Industrial sector emissions dropped 7 million metric tons of CO_2e (9 percent) compared to 2019. The decrease is driven by lower emissions from both the refining sector and the oil and gas production sector. Electricity sector emissions remained at a similar level as in 2019 despite a 44 percent decrease in in-state hydropower generation (due to below average precipitation levels), which was more than compensated for by a 10 percent growth in in-state solar generation and cleaner imported electricity incentivized by California's clean energy policies.[5]

[4] U.S. Environmental Protection Agency, Draft *Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2021*, EPA 430-D-23-001. 2023.

[5] California Air Resources Board (CARB), California Greenhouse Gas Emissions for 2000 to 2020 Trends of Emissions and Other Indicators, October 26, 2022.

GHG EMISSIONS REGULATORY SETTING

Federal

The U.S. Supreme Court in Massachusetts et al. v. Environmental Protection Agency et al. ([2007] 549 U.S. 05-1120) held that the U.S. EPA has the authority to regulate motor-vehicle GHG emissions under the federal Clean Air Act. The U.S. EPA issued a Final Rule for mandatory reporting of GHG emissions in October 2009. This Final Rule applies to fossil fuel suppliers, industrial gas suppliers, direct GHG emitters, and manufacturers of heavy-duty and off-road vehicles and vehicle engines and requires annual reporting of emissions. In 2012, the U.S. EPA issued a Final Rule that establishes the GHG permitting thresholds that determine when Clean Air Act permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities.

In 2014, the U.S. Supreme Court in Utility Air Regulatory Group v. EPA (134 S. Ct. 2427 [2014]) held that the U.S. EPA may not treat GHGs as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. The Court also held that PSD permits that are otherwise required (based on emissions of other pollutants) may continue to require limitations on GHG emissions based on the application of BACT.

Greenhouse Gas Emissions and Fuel Efficiency

In September 2011, U.S. EPA, in coordination with the National Highway Traffic Safety Administration (NHTSA), adopted fuel consumption and CO_2 emission standards to reduce GHG emissions of heavy-duty vehicles. These Phase 1 federal standards apply to model year 2014 and newer heavy-duty trucks, tractors, pick-up trucks, vans, and vocational vehicles. The category of specialized vocational vehicles includes delivery trucks, emergency vehicles, and refuse trucks such as the "packer" garbage collection trucks used to transport solid waste to transfer stations and landfills. The Phase 1 regulations do not include standards regarding the trailers pulled by these vehicles for improving aerodynamics and fuel efficiency.

In 2016, working together with NHTSA and CARB, U.S. EPA implemented the next phase of federal GHG emissions and fuel-efficiency standards for medium- and heavy-duty vehicles and associated trailers. These federal Phase 2 standards build on the improvements in engine and vehicle efficiency required by the Phase 1 emission standards and aim to achieve further GHG reductions for 2018 and later model year heavy-duty vehicles. The progressively more stringent federal Phase 2 standards are more technology-driven than the Phase 1 standards, in that they require manufacturers to improve existing technologies or develop new technologies for heavy-duty trucks, tractors, and vocational vehicles to achieve the stricter standards. The Phase 2 federal standards were jointly adopted by the U.S. EPA and NHTSA on October 25, 2016. California subsequently enacted its own Phase 2 standards for GHG emissions, which are discussed in further detail below.

State

Assembly Bill 1493

Assembly Bill (AB) 1493 (2002), California's Advanced Clean Cars program (referred to as "Pavley"), requires CARB to develop and adopt regulations to achieve "the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." On June 30, 2009, the U.S. EPA granted the waiver of Clean Air Act preemption to California for its GHG emission standards for motor vehicles beginning with the 2009 model year. Pavley I regulates model years from 2009 to 2016 and Pavley II, which is now referred to as "LEV (Low Emission Vehicle) III GHG" regulates model years from 2017 to 2025. The Advanced Clean Cars program coordinates the goals of the Low Emissions Vehicles (LEV), Zero Emissions Vehicles (ZEV), and Clean Fuels Outlet programs, and would provide major reductions in GHG emissions.

Executive Order S-3-05

Governor Schwarzenegger established Executive Order S-3-05 in 2005, in recognition of California's vulnerability to the effects of climate change. Executive Order S-3-05 set forth a series of target dates by which statewide emissions of GHG would be progressively reduced, as follows:

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels; and
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

The executive order directed the Secretary of the California EPA (CalEPA) to coordinate a multi-agency effort to reduce GHG emissions to the target levels. The Secretary will also submit biannual reports to the governor and California Legislature describing the progress made toward the emissions targets, the impacts of global climate change on California's resources, and mitigation and adaptation plans to combat these impacts. To comply with the executive order, the Secretary of CalEPA created the California Climate Action Team, made up of members from various state agencies and commissions. The team released its first report in March 2006. The report proposed to achieve the targets by building on the voluntary actions of California businesses, local governments, and communities and through state incentive and regulatory programs.

Assembly Bill 32 (California Global Warming Solutions Act of 2006)

California passed the California Global Warming Solutions Act of 2006 (AB 32; California Health and Safety Code Division 25.5, Sections 38500 - 38599). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and establishes a cap on statewide GHG emissions. AB 32 required that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction is accomplished by enforcing a statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from

stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires CARB to adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrived at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state reduces GHG emissions enough to meet the cap. AB 32 also includes guidance on instituting emissions reductions in an economically efficient manner, along with conditions to ensure that businesses and consumers are not unfairly affected by the reductions. Using these criteria to reduce statewide GHG emissions to 1990 levels by 2020 would represent an approximate 25 to 30 percent reduction in current emissions levels. However, CARB has discretionary authority to seek greater reductions in more significant and growing GHG sectors, such as transportation, as compared to other sectors that are not anticipated to significantly increase emissions. Under AB 32, CARB must adopt regulations to achieve reductions in GHG to meet the 1990 emissions cap by 2020.

Climate Change Scoping Plan

AB 32 required CARB to develop a Scoping Plan that describes the approach California will take to reduce GHG to achieve the goal of reducing emissions to 1990 levels by 2020. The Scoping Plan was first approved by CARB in 2008 and must be updated every five years. The initial AB 32 Scoping Plan contains the main strategies California will use to reduce the GHGs that cause climate change. The initial Scoping Plan has a range of GHG reduction actions which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB 32 program implementation fee regulation to fund the program. In August 2011, the initial Scoping Plan was approved by CARB.

The 2013 Scoping Plan Update builds upon the initial Scoping Plan with new strategies and recommendations. The 2013 Update identifies opportunities to leverage existing and new funds to further drive GHG emission reductions through strategic planning and targeted low carbon investments. The 2013 Update defines CARB climate change priorities for the next five years and sets the groundwork to reach California's long-term climate goals set forth in Executive Orders S-3-05 and B-16-2012. The 2013 Update highlights California progress toward meeting the near-term 2020 GHG emission reduction goals defined in the initial Scoping Plan. In the 2013 Update, nine key focus areas were identified (energy, transportation, agriculture, water, waste management, and natural and working lands), along with short-lived climate pollutants, green buildings, and the cap-and-trade program.

On May 22, 2014, the First Update to the Climate Change Scoping Plan was approved by the Board, along with the finalized environmental documents. On November 30, 2017, the Second Update to the Climate Change Scoping Plan was approved by the CARB. On December 15, 2022, the CARB adopted its Final 2022 Scoping Plan for Achieving Carbon Neutrality (Final Scoping Plan). Consistent with this statutory direction, the Final Scoping Plan, which was released on November 16, 2022, lays out how California can reduce anthropogenic GHG emissions by 85%

below 1990 levels and achieve carbon neutrality by 2045. In the Final Scoping Plan, CARB acknowledges that meeting these new ambitious targets will require decarbonizing the electricity sector on a rapid — but technically feasible — timescale. Decarbonizing the electricity sector depends on both increasing energy efficiency and deploying renewable and zero carbon resources, including solar, wind, energy storage, geothermal, biomass, and hydroelectric power on a massive scale and at an unprecedented pace. Overall, the Final Scoping Plan further strengthens the state's commitments to take bold actions to address the climate crisis. CARB states that the Final Scoping Plan represents the most aggressive approach to reach carbon neutrality in the world.[6]

Low Carbon Fuel Standard

Under the Climate Change Scoping Plan, the CARB identified the low carbon fuel standard (LCFS) as one of the nine discrete early action measures to reduce California's GHG emissions. The LCFS is designed to decrease the carbon intensity of California's transportation fuel pool and provide an increasing range of low-carbon and renewable alternatives, which reduce petroleum dependency and achieve air quality benefits.

In 2018, the CARB approved amendments to the regulation, which included strengthening and smoothing the carbon intensity benchmarks through 2030 in-line with California's 2030 GHG emission reduction target enacted through SB 32, adding new crediting opportunities to promote zero emission vehicle adoption, alternative jet fuel, carbon capture and sequestration, and advanced technologies to achieve deep decarbonization in the transportation sector.

The LCFS standards are expressed in terms of the "carbon intensity" (CI) of gasoline and diesel fuel and their respective substitutes. The program is based on the principle that each fuel has "life cycle" GHG emissions and the life cycle assessment examines the GHG emissions associated with the production, transportation, and use of a given fuel. The life cycle assessment includes direct emissions associated with producing, transporting, and using the fuels, as well as significant indirect effects on GHG emissions, such as changes in land use for some biofuels. The carbon intensity scores assessed for each fuel are compared to a declining CI benchmark for each year. Low carbon fuels below the benchmark generate credits, while fuels above the CI benchmark generate deficits. Credits and deficits are denominated in metric tons of GHG emissions. Providers of transportation fuels must demonstrate that the mix of fuels they supply for use in California meets the LCFS carbon intensity standards, or benchmarks, for each annual compliance period. A deficit generator meets its compliance obligation by ensuring that the credits it earns or otherwise acquires from another party is equal to, or greater than, the deficits it has incurred.

Senate Bill 97

Senate Bill (SB) 97, signed in August 2007, acknowledges that climate change is an environmental issue that requires analysis in California Environmental Quality Act (CEQA) documents. In March 2010, the California Resources Agency (Resources Agency) adopted

[6] Latham & Watkins LLP, *CARB Adopts Final 2022 Scoping Plan*, December 19, 2022.

amendments to the State *CEQA Guidelines* for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and climate change impacts.

Senate Bill 375

SB 375, signed in August 2008, enhances the State's ability to reach AB 32 goals by directing CARB to develop regional GHG emission reduction targets to be achieved from passenger vehicles by 2020 and 2035. In addition, SB 375 directs each of the State's 18 major Metropolitan Planning Organizations (MPOs) to prepare a "sustainable communities strategy" (SCS) that contains a growth strategy to meet these emission targets for inclusion in the Regional Transportation Plan (RTP). On March 22, 2018, CARB adopted updated regional targets for reducing GHG emissions from 2005 levels by 2020 and 2035.

Executive Order No. B-30-15

On April 29, 2015, Executive Order No. B-30-15 was issued to establish a California GHG reduction target of 40 percent below 1990 levels by 2030. Executive Order No. B-30-15 sets a new, interim, 2030 reduction goal intended to provide a smooth transition to the existing ultimate 2050 reduction goal set by Executive Order No. S-3-05 (signed by Governor Schwarzenegger in June 2005). It is designed so State agencies do not fall behind the pace of reductions necessary to reach the existing 2050 reduction goal. Executive Order No. B-30-15 orders "All State agencies with jurisdiction over sources of GHG emissions shall implement measures, pursuant to statutory authority, to achieve reductions of GHG emissions to meet the 2030 and 2050 targets." The Executive Order also states that "CARB shall update the Climate Change Scoping Plan to express the 2030 target in terms of million metric tons of carbon dioxide equivalent."

Senate Bill 32

On September 8, 2016, the governor signed Senate Bill 32 (SB 32) into law, extending AB 32 by requiring the State to further reduce GHGs to 40 percent below 1990 levels by 2030 (the other provisions of AB 32 remain unchanged). On December 14, 2017, CARB adopted the 2017 Scoping Plan, which provides a framework for achieving the 2030 target. The 2017 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program, as well as implementation of recently adopted policies and policies, such as SB 350 and SB 1383 (see below). The 2017 Scoping Plan also puts an increased emphasis on innovation, adoption of existing technology, and strategic investment to support its strategies. As with the 2013 Scoping Plan Update, the 2017 Scoping Plan does not provide project-level thresholds for land use development. Instead, it recommends that local governments adopt policies and locally-appropriate quantitative thresholds consistent with a statewide per capita goal of 6 metric tons of CO_2e by 2030 and 2 metric tons of CO_2e by 2050. As stated in the 2017 Scoping Plan, these goals may be appropriate for plan-level analyses (city, county, subregional, or regional level), but not for specific individual projects because they include all emissions sectors in the State.

Senate Bill 100

Adopted on September 10, 2018, SB 100 supports the reduction of GHG emissions from the electricity sector by accelerating the state's Renewables Portfolio Standard Program, which was last updated by SB X 1-2 in 2011. SB 100 requires electricity providers to increase procurement from eligible renewable energy resources to 33 percent of total retail sales by 2020, 60 percent by 2030, and 100 percent by 2045.

Executive Order B-55-18

On September 10, 2018, the governor issued Executive Order B-55-18, which established a new statewide goal of achieving carbon neutrality by 2045 and maintaining net negative emissions thereafter. This goal is in addition to the existing statewide GHG reduction targets established by SB 375, SB 32, SB 1383, and SB 100.

California Environmental Quality Act

Pursuant to the requirements of SB 97, the Resources Agency has adopted amendments to the *CEQA Guidelines* for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted *CEQA Guidelines* provide general regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts. To date, a variety of air districts have adopted quantitative significance thresholds for GHGs.

Assembly Bill 341

In 2011, the legislature established a 75 percent statewide solid waste recycling rate goal by 2020 with its passage of AB 341 (Chesbro, Chapter 476, Statutes of 2011). AB 341 directed CalRecycle to develop a strategy to achieve this 75 percent recycling goal. In response, CalRecycle developed the 75 Percent Strategy which includes five strategies and three additional focus areas for its pursuit to achieve the recycling goal. Strategies include moving organics out of the landfill; expanding the recycling/manufacturing infrastructure; exploring new models for state and local funding of materials management program; promoting state procurement of postconsumer recycled content products; and promoting extended producer responsibility. CalRecycle has provided updates to this strategy along with supporting documentation as recently as 2017, which tracks progress towards this goal and summarizes co-benefits from implementation of the 75 Percent Strategy.

Senate Bill 1383

Adopted in September 2016, SB 1383 requires CARB to approve and begin implementing a comprehensive strategy to reduce emissions of short-lived climate pollutants. The bill requires the strategy to achieve the following reduction targets by 2030:

- Methane – 40 percent below 2013 levels
- Hydrofluorocarbons – 40 percent below 2013 levels

- Anthropogenic black carbon – 50 percent below 2013 levels

SB 1383 also requires the California Department of Resources Recycling and Recovery (CalRecycle), in consultation with the CARB, to adopt regulations that achieve specified targets for reducing organic waste in landfills.

California Phase 2 Standards Medium- and Heavy-Duty Engines and Vehicles

After the U.S. EPA enacted its Phase 2 Standards for medium- and heavy-duty engines, as discussed in the federal regulatory setting above, California enacted its own Phase 2 standards for GHG emissions that align closely with the federal Phase 2 standards except for minor differences. California's Phase 2 standards were officially approved by CARB in February 2018, with the California Office of Administrative Law giving its final approval in February 2019. The California Phase 2 standards became effective April 1, 2019. Reductions in GHGs from California's Phase 2 standards are recognized in CARB's 2017 Scoping Plan

ATTACHMENT A – Construction Emissions

Mayacma Geothermal Project

Construction Air Quality Assumptions and Calculations

March 2023

Air Emission Calculation Methodology

Construction emissions were estimated for off-road equipment, on-road trucks for material delivery and equipment hauling, and worker commute trips with the California Emissions Estimator Model[1] (CalEEMod) Version 2020.4.0. The CalEEMod is a statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and greenhouse gas (GHG) emissions associated with both construction and operations from a variety of land use projects. The model quantifies direct emissions from construction and operational activities (including off-road equipment and on-road vehicle use), as well as indirect emissions, such as GHG emissions from energy use, solid waste disposal, and water use/wastewater disposal.

The CalEEMod construction emissions inventory includes an estimation of criteria pollutant emissions such as carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOC) as reactive organic gases (ROG), particulate matter less than 10 micrometers (coarse or PM_{10}), and particulate matter less than 2.5 micrometers (fine or $PM_{2.5}$), as well as GHG emissions. CalEEMod also estimates GHG emissions including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), and CO_2 equivalent (CO_2e) emissions.[2]

Construction Emissions Assumptions

Initial well testing and well plug removal and clean out will be performed during 2023 prior to project construction. The project demolition phase is estimated to last up to 8 weeks and project construction is anticipated to last 8 months. It is anticipated that construction will commence in early 2024. An average of 15 workers will be on site daily during construction with a maximum of up to 30 workers per day during peak construction. Construction will be conducted during daytime hours. The construction schedule is based on a single-shift, 7am to 7 pm, Monday through Saturday workweek. Approximately 630 haul truck trips are expected during project demolition and 1,748 haul truck trips are expected to occur during project construction. Approximately 324 vendor truck trips would also occur during project construction. **Table 1: Construction Schedule** presents the construction schedule by phase. **Table 2: Construction Vehicle Trips By Phase** presents the worker, vendor, and haul truck trips by phase and the corresponding trip lengths assumed.

[1] California Air Pollution Control Officers Association (CAPCOA). 2021. *California Emissions Estimator Model User's Guide Version 2020.4.0.* May 2021. http://www.caleemod.com/

[2] The unit "CO_2e" represents an amount of a GHG whose atmospheric impact has been standardized to that of one unit mass of CO_2, based on the global warming potential (GWP) of the gas.

Table 1: Construction Schedule

Construction Phase Description	Start	End	Working Days
Well Testing	03/15/2023	03/25/2023	10
Well Plug Removal and Clean Out	05/01/2023	05/11/2023	10
Staging and Mobilization	01/01/2024	01/05/2024	5
Cooling Tower Demolition	01/08/2024	02/26/2024	45
Foundation Construction	01/09/2024	02/26/2024	42
Process Installation	03/07/2024	07/24/2024	120
Commissioning	07/12/2024	08/21/2024	35

Table 2: Average Daily Construction Vehicle Trips (One-Way Trips) By Phase

Construction Phase Description	Worker Trips	Vendor Trips	Haul Truck Trips	Worker Trip Length	Vendor Trip Length	Haul Truck Trip Length
Well Testing	10	10	1	16.8	20.0	20.0
Well Plug Removal and Clean Out	30	10	3	16.8	20.0	20.0
Staging and Mobilization	8	0	4	16.8	N/A	20.0
Cooling Tower Demolition[1]	10	0	14	16.8	N/A	300.0
Foundation Construction	20	2	4	16.8	20.0	20.0
Process Installation[2]	50	2	13	16.8	100.0	100.0
Commissioning	8	0	0	16.8	N/A	20.0

Note:

1. Cooling tower demolition assumes material would be disposed at Kettleman Hills Hazardous Waste Facility.
2. Process Equipment Installation assumes specialized equipment will be imported from the Port of Oakland.

Table 3: Well Plug Removal and Clean Out Construction Equipment Assumptions presents the construction equipment assumptions for Well Plug Removal and Clean Out. **Table 4: Cooling Tower Demolition Construction Equipment Assumptions** presents the construction equipment assumptions for Cooling Tower Demolition. **Table 5: Foundation Construction Equipment Assumptions** presents the construction equipment assumptions for Foundation Construction. **Table 6: Process Installation Construction Equipment Assumptions** presents the construction equipment assumptions for Process Installation. No equipment usage would be required for staging and mobilization, equipment and materials would only be delivered to the site. No heavy equipment is assumed to be required for well testing or commissioning.

Table 3: Well Plug Removal and Clean Out Construction Equipment Assumptions

Equipment Type	Amount	Daily Usage (hours)	Horsepower	Load Factor
Drill Rig Diesel Engine	2	24	221	0.50
Forklift	1	12	89	0.20
Generator	1	24	84	0.74
Light Tower	2	12	6	0.82
Water Truck	1	4	402	0.38

Table 4: Cooling Tower Demolition Construction Equipment Assumptions

Equipment Type	Amount	Daily Usage (hours)	Horsepower	Load Factor
Crane	1	4	231	0.29
Tractors/Loaders/Backhoes	2	4	97	0.37
Aerial Lift	1	8	63	0.31
Concrete/Industrial Saws	1	8	81	0.73
Excavators	3	8	158	0.38

Table 5: Foundation Construction Equipment Assumptions

Equipment Type	Amount	Daily Usage (hours)	Horsepower	Load Factor
Concrete Pump Truck (Off Highway Truck)	1	8	402	0.38
Pier Drilling Rig	1	4	221	0.50
Skid Steer Loader	1	4	65	0.37

Table 6: Process Installation Construction Equipment Assumptions

Equipment Type	Amount	Daily Usage (hours)	Horsepower	Load Factor
Aerial Lift	2	4	63	0.31
Crane	2	4	231	0.29
Forklift	1	4	89	0.20
Telehandler	1	4	65	0.37
Tractors/Loaders/Backhoes	1	4	97	0.37
Welders	2	4	46	0.45

Significance Thresholds

The project site is located within the Lake County Air Basin (LCAB) and is under the jurisdiction of the Lake County Air Quality Management District (LCAQMD). Lake County is currently designated as attainment or unclassified for all federal and state ambient air quality standards. As the LCAQMD does not have an attainment plan or recommended thresholds of significance for use in CEQA, LCAQMD refers to the Bay Area Air Quality Management District (BAAQMD)'s CEQA Guidelines to evaluate a project's potential air quality impacts. According to BAAQMD's CEQA Guidelines, the project would result in a significant impact to air quality if it would result in average daily construction exhaust emissions of 54 pounds per day of ROG, NO_x, or $PM_{2.5}$ or 82 pounds per day of PM_{10}. BAAQMD considers fugitive dust emissions to be significant unless best management practices (BMPs) for fugitive dust emissions are implemented. BAAQMD has not adopted a GHG emissions significance threshold because GHG emissions from construction represent a very small portion of a project's lifetime GHG emissions.[3]

[3] BAAQMD. CEQA Thresholds and Guidelines Update. Frequently Asked Questions, 4. Will There be a Threshold for Construction-Related Emissions? https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines

Emissions Inventory

The BAAQMD CEQA Air Quality Guidelines recommend quantification of construction-related exhaust emissions and comparison of those emissions to significance thresholds. **Table 7: Average Daily Construction Emissions (Pounds)** provides the estimated short-term construction emissions that would be associated with the project and compares those emissions to the BAAQMD's thresholds of significance for construction exhaust emissions. As the construction phases (i.e., cooling tower demolition, foundation construction, etc.) are sequential, the average daily construction period emissions (i.e., total construction period emissions divided by the number of construction days) were compared to the BAAQMD significance thresholds. All construction-related air quality emissions would be below the BAAQMD significance thresholds.

Table 7: Average Daily Construction Emissions (Pounds)

Source	ROG	NOx	PM_{10}[1]	$PM_{2.5}$[1]
Average Daily Construction	1.65	25.82	0.56	0.53
Significance Threshold	54	54	82	54
Threshold Exceeded?	No	No	No	No

Note: The BAAQMD construction significance thresholds for PM_{10} and $PM_{2.5}$ apply to exhaust emissions only.

As noted previously, the BAAQMD considers fugitive dust emissions impacts to be significant unless BMPs for fugitive dust are implemented. Therefore, the following basic construction mitigation measures recommended for all proposed projects from BAAQMD's CEQA Guidelines shall be implemented during project construction:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- A publicly visible sign shall be posted with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action with 48 hours. The LCAQMD's phone number shall also be visible to ensure compliance with applicable regulations.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

GHG Emissions and Energy Use

Project construction would generate approximately 867 metric tons of CO_2e. Using standard fuel conversion rates, project construction would require approximately 81,300 gallons of diesel fuel and 4,600 gallons of gasoline.[4]

[4] U.S. Energy Information Administration, Carbon Dioxide Emissions Coefficients, February 2, 2016. https://www.eia.gov/environment/emissions/co2_vol_mass.php

Attachments

CalEEMod Version 2020.4.0 Emissions Output

- Annual Emissions Inventory (33 pages)

Mayacma Geothermal Project Construction - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mayacma Geothermal Project Construction

Lake County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	7.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	67
Climate Zone	1			**Operational Year**	2024
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Approximately 7 acre site Existing Geothermal Plant Footprint

Construction Phase - OME Data Request Responses

Off-road Equipment - OME Data Request Response

Off-road Equipment - OME Data Request Response

Off-road Equipment - OME Data Request Reponse

Off-road Equipment - OME Data Request Response

Off-road Equipment - No equipment use - equipment delivery only. Aerial lift added for zero hours of use to add vehicle trips for this phase.

Off-road Equipment - OME data request response. Signal boards corresond to light towers.

Trips and VMT - OME Data Request Reponse.

Grading -

Off-road Equipment - No equipment use. Aerial lift added for zero hours of use to add vehicle trips for this phase.

Mayacma Geothermal Project Construction - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Off-road Equipment - No equipment needed, aerial lift added at zero hours to generate vehicle trips.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	42.00
tblConstructionPhase	NumDays	230.00	120.00
tblConstructionPhase	NumDays	20.00	45.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	10.00	35.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblLandUse	LotAcreage	0.00	7.00
tblOffRoadEquipment	HorsePower	63.00	0.00
tblOffRoadEquipment	HorsePower	63.00	0.00
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.31	0.00
tblOffRoadEquipment	LoadFactor	0.31	0.00
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType	Rollers	Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType	Rubber Tired Dozers	Aerial Lifts
tblOffRoadEquipment	OffRoadEquipmentType	Rubber Tired Dozers	Aerial Lifts
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType	Welders	Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	HaulingTripLength	20.00	300.00
tblTripsAndVMT	HaulingTripLength	20.00	100.00
tblTripsAndVMT	HaulingTripNumber	0.00	20.00
tblTripsAndVMT	HaulingTripNumber	0.00	630.00
tblTripsAndVMT	HaulingTripNumber	0.00	30.00
tblTripsAndVMT	HaulingTripNumber	0.00	168.00
tblTripsAndVMT	HaulingTripNumber	0.00	1,560.00
tblTripsAndVMT	HaulingTripNumber	0.00	10.00
tblTripsAndVMT	VendorTripLength	6.60	20.00
tblTripsAndVMT	VendorTripLength	6.60	20.00
tblTripsAndVMT	VendorTripLength	6.60	100.00
tblTripsAndVMT	VendorTripLength	6.60	20.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	3.00	8.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblTripsAndVMT	WorkerTripNumber	25.00	10.00
tblTripsAndVMT	WorkerTripNumber	18.00	30.00
tblTripsAndVMT	WorkerTripNumber	0.00	20.00
tblTripsAndVMT	WorkerTripNumber	0.00	50.00
tblTripsAndVMT	WorkerTripNumber	3.00	10.00
tblTripsAndVMT	WorkerTripNumber	3.00	8.00

2.0 Emissions Summary

Mayacma Geothermal Project Construction - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0162	0.1440	0.1525	5.3000e-004	4.5800e-003	5.0300e-003	9.6000e-003	1.2600e-003	4.8000e-003	6.0600e-003	0.0000	46.8416	46.8416	9.8700e-003	1.0800e-003	47.4113
2024	0.1688	2.7482	1.4236	8.4800e-003	0.2047	0.0577	0.2624	0.0560	0.0540	0.1099	0.0000	791.5276	791.5276	0.0596	0.0887	819.4534
Maximum	**0.1688**	**2.7482**	**1.4236**	**8.4800e-003**	**0.2047**	**0.0577**	**0.2624**	**0.0560**	**0.0540**	**0.1099**	**0.0000**	**791.5276**	**791.5276**	**0.0596**	**0.0887**	**819.4534**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0162	0.1440	0.1525	5.3000e-004	4.5800e-003	5.0300e-003	9.6000e-003	1.2600e-003	4.8000e-003	6.0600e-003	0.0000	46.8415	46.8415	9.8700e-003	1.0800e-003	47.4112
2024	0.1688	2.7482	1.4236	8.4800e-003	0.2047	0.0577	0.2624	0.0560	0.0540	0.1099	0.0000	791.5274	791.5274	0.0596	0.0887	819.4532
Maximum	**0.1688**	**2.7482**	**1.4236**	**8.4800e-003**	**0.2047**	**0.0577**	**0.2624**	**0.0560**	**0.0540**	**0.1099**	**0.0000**	**791.5274**	**791.5274**	**0.0596**	**0.0887**	**819.4532**

Mayacma Geothermal Project Construction - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**3-1-2023**	**5-31-2023**	0.1504	0.1504
4	**12-1-2023**	**2-29-2024**	1.5696	1.5696
5	**3-1-2024**	**5-31-2024**	0.7848	0.7848
6	**6-1-2024**	**8-31-2024**	0.4936	0.4936
		Highest	1.5696	1.5696

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Staging and Mobilization	Site Preparation	1/1/2024	1/5/2024	6	5	
2	Cooling Tower Demolition	Demolition	1/8/2024	2/28/2024	6	45	
3	Foundation Construction	Building Construction	1/9/2024	2/26/2024	6	42	

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

4	Well Testing	Site Preparation	3/15/2023	3/25/2023	6	10	
5	Process Equipment Installation	Building Construction	3/7/2024	7/24/2024	6	120	
6	Well Plug Removal and Clean Out	Trenching	5/1/2023	5/11/2023	6	10	
7	Commissioning	Site Preparation	7/12/2024	8/21/2024	6	35	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Staging and Mobilization	Aerial Lifts	1	0.00	63	0.31
Staging and Mobilization	Rubber Tired Dozers	0	0.00	247	0.40
Staging and Mobilization	Tractors/Loaders/Backhoes	0	0.00	97	0.37
Cooling Tower Demolition	Aerial Lifts	1	8.00	63	0.31
Cooling Tower Demolition	Cranes	1	4.00	231	0.29
Cooling Tower Demolition	Tractors/Loaders/Backhoes	2	4.00	97	0.37
Foundation Construction	Off-Highway Trucks	1	8.00	402	0.38
Process Equipment Installation	Aerial Lifts	2	4.00	63	0.31
Process Equipment Installation	Cranes	2	4.00	231	0.29
Process Equipment Installation	Forklifts	1	4.00	89	0.20
Process Equipment Installation	Skid Steer Loaders	1	4.00	65	0.37
Process Equipment Installation	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Process Equipment Installation	Welders	2	4.00	46	0.45
Cooling Tower Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Cooling Tower Demolition	Excavators	3	8.00	158	0.38
Well Plug Removal and Clean Out	Bore/Drill Rigs	2	24.00	221	0.50

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Well Plug Removal and Clean Out	Forklifts	1	12.00	89	0.20
Well Plug Removal and Clean Out	Generator Sets	1	24.00	84	0.74
Well Plug Removal and Clean Out	Off-Highway Trucks	1	4.00	402	0.38
Well Plug Removal and Clean Out	Signal Boards	2	12.00	6	0.82
Cooling Tower Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Well Testing	Aerial Lifts	1	0.00	0	0.00
Commissioning	Aerial Lifts	1	0.00	0	0.00
Foundation Construction	Bore/Drill Rigs	1	4.00	221	0.50
Foundation Construction	Skid Steer Loaders	1	4.00	65	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Staging and Mobilization	1	8.00	0.00	20.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Cooling Tower Demolition	10	10.00	0.00	630.00	16.80	6.60	300.00	LD_Mix	HDT_Mix	HHDT
Foundation Construction	3	20.00	2.00	168.00	16.80	20.00	20.00	LD_Mix	HDT_Mix	HHDT
Process Equipment Installation	9	50.00	2.00	1,560.00	16.80	100.00	100.00	LD_Mix	HDT_Mix	HHDT
Well Testing	1	10.00	10.00	10.00	16.80	20.00	20.00	LD_Mix	HDT_Mix	HHDT
Well Plug Removal and Clean Out	7	30.00	10.00	30.00	16.80	20.00	20.00	LD_Mix	HDT_Mix	HHDT
Commissioning	1	8.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Mayacma Geothermal Project Construction - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Staging and Mobilization - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.0000e-005	1.9500e-003	2.7000e-004	1.0000e-005	1.7000e-004	1.0000e-005	1.8000e-004	5.0000e-005	1.0000e-005	6.0000e-005	0.0000	0.6182	0.6182	0.0000	1.0000e-004	0.6471
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6000e-004	1.0000e-004	1.0500e-003	0.0000	2.5000e-004	0.0000	2.5000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.2014	0.2014	1.0000e-005	1.0000e-005	0.2038
Total	**1.9000e-004**	**2.0500e-003**	**1.3200e-003**	**1.0000e-005**	**4.2000e-004**	**1.0000e-005**	**4.3000e-004**	**1.2000e-004**	**1.0000e-005**	**1.3000e-004**	**0.0000**	**0.8196**	**0.8196**	**1.0000e-005**	**1.1000e-004**	**0.8509**

Mayacma Geothermal Project Construction - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Staging and Mobilization - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.0000e-005	1.9500e-003	2.7000e-004	1.0000e-005	1.7000e-004	1.0000e-005	1.8000e-004	5.0000e-005	1.0000e-005	6.0000e-005	0.0000	0.6182	0.6182	0.0000	1.0000e-004	0.6471
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.6000e-004	1.0000e-004	1.0500e-003	0.0000	2.5000e-004	0.0000	2.5000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.2014	0.2014	1.0000e-005	1.0000e-005	0.2038
Total	**1.9000e-004**	**2.0500e-003**	**1.3200e-003**	**1.0000e-005**	**4.2000e-004**	**1.0000e-005**	**4.3000e-004**	**1.2000e-004**	**1.0000e-005**	**1.3000e-004**	**0.0000**	**0.8196**	**0.8196**	**1.0000e-005**	**1.1000e-004**	**0.8509**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.3 Cooling Tower Demolition - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0582	0.5536	0.5383	1.0500e-003		0.0249	0.0249		0.0232	0.0232	0.0000	91.6731	91.6731	0.0263	0.0000	92.3309
Total	**0.0582**	**0.5536**	**0.5383**	**1.0500e-003**		**0.0249**	**0.0249**		**0.0232**	**0.0232**	**0.0000**	**91.6731**	**91.6731**	**0.0263**	**0.0000**	**92.3309**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0101	0.8435	0.0795	2.9500e-003	0.0794	6.4500e-003	0.0859	0.0218	6.1700e-003	0.0280	0.0000	283.1184	283.1184	4.3000e-004	0.0445	296.3882
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.8100e-003	1.1600e-003	0.0118	2.0000e-005	2.7600e-003	2.0000e-005	2.7800e-003	7.3000e-004	2.0000e-005	7.5000e-004	0.0000	2.2659	2.2659	9.0000e-005	8.0000e-005	2.2929
Total	**0.0119**	**0.8446**	**0.0913**	**2.9700e-003**	**0.0822**	**6.4700e-003**	**0.0886**	**0.0225**	**6.1900e-003**	**0.0287**	**0.0000**	**285.3843**	**285.3843**	**5.2000e-004**	**0.0446**	**298.6810**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.3 Cooling Tower Demolition - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0582	0.5536	0.5383	1.0500e-003		0.0249	0.0249		0.0232	0.0232	0.0000	91.6730	91.6730	0.0263	0.0000	92.3308
Total	**0.0582**	**0.5536**	**0.5383**	**1.0500e-003**		**0.0249**	**0.0249**		**0.0232**	**0.0232**	**0.0000**	**91.6730**	**91.6730**	**0.0263**	**0.0000**	**92.3308**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0101	0.8435	0.0795	2.9500e-003	0.0794	6.4500e-003	0.0859	0.0218	6.1700e-003	0.0280	0.0000	283.1184	283.1184	4.3000e-004	0.0445	296.3882
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.8100e-003	1.1600e-003	0.0118	2.0000e-005	2.7600e-003	2.0000e-005	2.7800e-003	7.3000e-004	2.0000e-005	7.5000e-004	0.0000	2.2659	2.2659	9.0000e-005	8.0000e-005	2.2929
Total	**0.0119**	**0.8446**	**0.0913**	**2.9700e-003**	**0.0822**	**6.4700e-003**	**0.0886**	**0.0225**	**6.1900e-003**	**0.0287**	**0.0000**	**285.3843**	**285.3843**	**5.2000e-004**	**0.0446**	**298.6810**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.4 Foundation Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0133	0.0986	0.1042	4.0000e-004		3.4600e-003	3.4600e-003		3.1800e-003	3.1800e-003	0.0000	35.0765	35.0765	0.0113	0.0000	35.3601
Total	**0.0133**	**0.0986**	**0.1042**	**4.0000e-004**		**3.4600e-003**	**3.4600e-003**		**3.1800e-003**	**3.1800e-003**	**0.0000**	**35.0765**	**35.0765**	**0.0113**	**0.0000**	**35.3601**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.4000e-004	0.0164	2.2900e-003	5.0000e-005	1.4100e-003	1.2000e-004	1.5300e-003	3.9000e-004	1.1000e-004	5.0000e-004	0.0000	5.1925	5.1925	1.0000e-005	8.2000e-004	5.4359
Vendor	1.7000e-004	6.2500e-003	1.1300e-003	2.0000e-005	7.5000e-004	4.0000e-005	7.9000e-004	2.2000e-004	4.0000e-005	2.6000e-004	0.0000	2.2990	2.2990	1.0000e-005	3.3000e-004	2.3986
Worker	3.3800e-003	2.1700e-003	0.0221	5.0000e-005	5.1500e-003	3.0000e-005	5.1800e-003	1.3700e-003	3.0000e-005	1.4000e-003	0.0000	4.2297	4.2297	1.6000e-004	1.6000e-004	4.2800
Total	**3.7900e-003**	**0.0248**	**0.0255**	**1.2000e-004**	**7.3100e-003**	**1.9000e-004**	**7.5000e-003**	**1.9800e-003**	**1.8000e-004**	**2.1600e-003**	**0.0000**	**11.7211**	**11.7211**	**1.8000e-004**	**1.3100e-003**	**12.1145**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.4 Foundation Construction - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0133	0.0986	0.1042	4.0000e-004		3.4600e-003	3.4600e-003		3.1800e-003	3.1800e-003	0.0000	35.0765	35.0765	0.0113	0.0000	35.3601
Total	**0.0133**	**0.0986**	**0.1042**	**4.0000e-004**		**3.4600e-003**	**3.4600e-003**		**3.1800e-003**	**3.1800e-003**	**0.0000**	**35.0765**	**35.0765**	**0.0113**	**0.0000**	**35.3601**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.4000e-004	0.0164	2.2900e-003	5.0000e-005	1.4100e-003	1.2000e-004	1.5300e-003	3.9000e-004	1.1000e-004	5.0000e-004	0.0000	5.1925	5.1925	1.0000e-005	8.2000e-004	5.4359
Vendor	1.7000e-004	6.2500e-003	1.1300e-003	2.0000e-005	7.5000e-004	4.0000e-005	7.9000e-004	2.2000e-004	4.0000e-005	2.6000e-004	0.0000	2.2990	2.2990	1.0000e-005	3.3000e-004	2.3986
Worker	3.3800e-003	2.1700e-003	0.0221	5.0000e-005	5.1500e-003	3.0000e-005	5.1800e-003	1.3700e-003	3.0000e-005	1.4000e-003	0.0000	4.2297	4.2297	1.6000e-004	1.6000e-004	4.2800
Total	**3.7900e-003**	**0.0248**	**0.0255**	**1.2000e-004**	**7.3100e-003**	**1.9000e-004**	**7.5000e-003**	**1.9800e-003**	**1.8000e-004**	**2.1600e-003**	**0.0000**	**11.7211**	**11.7211**	**1.8000e-004**	**1.3100e-003**	**12.1145**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.5 Well Testing - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	1.0100e-003	1.4000e-004	0.0000	8.0000e-005	1.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.3133	0.3133	0.0000	5.0000e-005	0.3280
Vendor	2.3000e-004	7.6600e-003	1.4500e-003	3.0000e-005	8.9000e-004	5.0000e-005	9.4000e-004	2.6000e-004	5.0000e-005	3.1000e-004	0.0000	2.7688	2.7688	1.0000e-005	4.0000e-004	2.8890
Worker	4.3000e-004	2.9000e-004	2.9200e-003	1.0000e-005	6.1000e-004	0.0000	6.2000e-004	1.6000e-004	0.0000	1.7000e-004	0.0000	0.5196	0.5196	2.0000e-005	2.0000e-005	0.5262
Total	**6.8000e-004**	**8.9600e-003**	**4.5100e-003**	**4.0000e-005**	**1.5800e-003**	**6.0000e-005**	**1.6500e-003**	**4.4000e-004**	**6.0000e-005**	**5.1000e-004**	**0.0000**	**3.6017**	**3.6017**	**3.0000e-005**	**4.7000e-004**	**3.7432**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.5 Well Testing - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	1.0100e-003	1.4000e-004	0.0000	8.0000e-005	1.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.3133	0.3133	0.0000	5.0000e-005	0.3280
Vendor	2.3000e-004	7.6600e-003	1.4500e-003	3.0000e-005	8.9000e-004	5.0000e-005	9.4000e-004	2.6000e-004	5.0000e-005	3.1000e-004	0.0000	2.7688	2.7688	1.0000e-005	4.0000e-004	2.8890
Worker	4.3000e-004	2.9000e-004	2.9200e-003	1.0000e-005	6.1000e-004	0.0000	6.2000e-004	1.6000e-004	0.0000	1.7000e-004	0.0000	0.5196	0.5196	2.0000e-005	2.0000e-005	0.5262
Total	**6.8000e-004**	**8.9600e-003**	**4.5100e-003**	**4.0000e-005**	**1.5800e-003**	**6.0000e-005**	**1.6500e-003**	**4.4000e-004**	**6.0000e-005**	**5.1000e-004**	**0.0000**	**3.6017**	**3.6017**	**3.0000e-005**	**4.7000e-004**	**3.7432**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.6 Process Equipment Installation - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0451	0.4193	0.4145	8.0000e-004		0.0165	0.0165		0.0154	0.0154	0.0000	68.2392	68.2392	0.0196	0.0000	68.7285
Total	**0.0451**	**0.4193**	**0.4145**	**8.0000e-004**		**0.0165**	**0.0165**		**0.0154**	**0.0154**	**0.0000**	**68.2392**	**68.2392**	**0.0196**	**0.0000**	**68.7285**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	8.7400e-003	0.7052	0.0714	2.4400e-003	0.0656	5.3300e-003	0.0709	0.0180	5.1000e-003	0.0231	0.0000	234.7414	234.7414	3.8000e-004	0.0369	245.7441
Vendor	2.1600e-003	0.0839	0.0121	3.4000e-004	0.0107	5.7000e-004	0.0113	3.0900e-003	5.4000e-004	3.6400e-003	0.0000	32.2505	32.2505	8.0000e-005	4.6700e-003	33.6455
Worker	0.0242	0.0155	0.1576	3.3000e-004	0.0368	2.4000e-004	0.0370	9.7900e-003	2.2000e-004	0.0100	0.0000	30.2120	30.2120	1.1600e-003	1.1100e-003	30.5713
Total	**0.0351**	**0.8046**	**0.2411**	**3.1100e-003**	**0.1131**	**6.1400e-003**	**0.1192**	**0.0309**	**5.8600e-003**	**0.0368**	**0.0000**	**297.2039**	**297.2039**	**1.6200e-003**	**0.0427**	**309.9609**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.6 Process Equipment Installation - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0451	0.4193	0.4145	8.0000e-004		0.0165	0.0165		0.0154	0.0154	0.0000	68.2391	68.2391	0.0196	0.0000	68.7284
Total	**0.0451**	**0.4193**	**0.4145**	**8.0000e-004**		**0.0165**	**0.0165**		**0.0154**	**0.0154**	**0.0000**	**68.2391**	**68.2391**	**0.0196**	**0.0000**	**68.7284**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	8.7400e-003	0.7052	0.0714	2.4400e-003	0.0656	5.3300e-003	0.0709	0.0180	5.1000e-003	0.0231	0.0000	234.7414	234.7414	3.8000e-004	0.0369	245.7441
Vendor	2.1600e-003	0.0839	0.0121	3.4000e-004	0.0107	5.7000e-004	0.0113	3.0900e-003	5.4000e-004	3.6400e-003	0.0000	32.2505	32.2505	8.0000e-005	4.6700e-003	33.6455
Worker	0.0242	0.0155	0.1576	3.3000e-004	0.0368	2.4000e-004	0.0370	9.7900e-003	2.2000e-004	0.0100	0.0000	30.2120	30.2120	1.1600e-003	1.1100e-003	30.5713
Total	**0.0351**	**0.8046**	**0.2411**	**3.1100e-003**	**0.1131**	**6.1400e-003**	**0.1192**	**0.0309**	**5.8600e-003**	**0.0368**	**0.0000**	**297.2039**	**297.2039**	**1.6200e-003**	**0.0427**	**309.9609**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.7 Well Plug Removal and Clean Out - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0139	0.1234	0.1374	4.4000e-004		4.8800e-003	4.8800e-003		4.6600e-003	4.6600e-003	0.0000	37.9723	37.9723	9.7600e-003	0.0000	38.2164
Total	**0.0139**	**0.1234**	**0.1374**	**4.4000e-004**		**4.8800e-003**	**4.8800e-003**		**4.6600e-003**	**4.6600e-003**	**0.0000**	**37.9723**	**37.9723**	**9.7600e-003**	**0.0000**	**38.2164**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.0000e-005	3.0200e-003	4.1000e-004	1.0000e-005	2.5000e-004	2.0000e-005	2.7000e-004	7.0000e-005	2.0000e-005	9.0000e-005	0.0000	0.9399	0.9399	0.0000	1.5000e-004	0.9840
Vendor	2.3000e-004	7.6600e-003	1.4500e-003	3.0000e-005	8.9000e-004	5.0000e-005	9.4000e-004	2.6000e-004	5.0000e-005	3.1000e-004	0.0000	2.7688	2.7688	1.0000e-005	4.0000e-004	2.8890
Worker	1.3000e-003	8.8000e-004	8.7700e-003	2.0000e-005	1.8400e-003	1.0000e-005	1.8500e-003	4.9000e-004	1.0000e-005	5.0000e-004	0.0000	1.5588	1.5588	7.0000e-005	6.0000e-005	1.5786
Total	**1.5800e-003**	**0.0116**	**0.0106**	**6.0000e-005**	**2.9800e-003**	**8.0000e-005**	**3.0600e-003**	**8.2000e-004**	**8.0000e-005**	**9.0000e-004**	**0.0000**	**5.2675**	**5.2675**	**8.0000e-005**	**6.1000e-004**	**5.4516**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.7 Well Plug Removal and Clean Out - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0139	0.1234	0.1374	4.4000e-004		4.8800e-003	4.8800e-003		4.6600e-003	4.6600e-003	0.0000	37.9722	37.9722	9.7600e-003	0.0000	38.2164
Total	**0.0139**	**0.1234**	**0.1374**	**4.4000e-004**		**4.8800e-003**	**4.8800e-003**		**4.6600e-003**	**4.6600e-003**	**0.0000**	**37.9722**	**37.9722**	**9.7600e-003**	**0.0000**	**38.2164**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.0000e-005	3.0200e-003	4.1000e-004	1.0000e-005	2.5000e-004	2.0000e-005	2.7000e-004	7.0000e-005	2.0000e-005	9.0000e-005	0.0000	0.9399	0.9399	0.0000	1.5000e-004	0.9840
Vendor	2.3000e-004	7.6600e-003	1.4500e-003	3.0000e-005	8.9000e-004	5.0000e-005	9.4000e-004	2.6000e-004	5.0000e-005	3.1000e-004	0.0000	2.7688	2.7688	1.0000e-005	4.0000e-004	2.8890
Worker	1.3000e-003	8.8000e-004	8.7700e-003	2.0000e-005	1.8400e-003	1.0000e-005	1.8500e-003	4.9000e-004	1.0000e-005	5.0000e-004	0.0000	1.5588	1.5588	7.0000e-005	6.0000e-005	1.5786
Total	**1.5800e-003**	**0.0116**	**0.0106**	**6.0000e-005**	**2.9800e-003**	**8.0000e-005**	**3.0600e-003**	**8.2000e-004**	**8.0000e-005**	**9.0000e-004**	**0.0000**	**5.2675**	**5.2675**	**8.0000e-005**	**6.1000e-004**	**5.4516**

Mayacma Geothermal Project Construction - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.8 Commissioning - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1300e-003	7.2000e-004	7.3500e-003	2.0000e-005	1.7200e-003	1.0000e-005	1.7300e-003	4.6000e-004	1.0000e-005	4.7000e-004	0.0000	1.4099	1.4099	5.0000e-005	5.0000e-005	1.4267
Total	**1.1300e-003**	**7.2000e-004**	**7.3500e-003**	**2.0000e-005**	**1.7200e-003**	**1.0000e-005**	**1.7300e-003**	**4.6000e-004**	**1.0000e-005**	**4.7000e-004**	**0.0000**	**1.4099**	**1.4099**	**5.0000e-005**	**5.0000e-005**	**1.4267**

Mayacma Geothermal Project Construction - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.8 Commissioning - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1300e-003	7.2000e-004	7.3500e-003	2.0000e-005	1.7200e-003	1.0000e-005	1.7300e-003	4.6000e-004	1.0000e-005	4.7000e-004	0.0000	1.4099	1.4099	5.0000e-005	5.0000e-005	1.4267
Total	**1.1300e-003**	**7.2000e-004**	**7.3500e-003**	**2.0000e-005**	**1.7200e-003**	**1.0000e-005**	**1.7300e-003**	**4.6000e-004**	**1.0000e-005**	**4.7000e-004**	**0.0000**	**1.4099**	**1.4099**	**5.0000e-005**	**5.0000e-005**	**1.4267**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.464659	0.064863	0.191817	0.155973	0.051760	0.009603	0.008536	0.006240	0.000416	0.000000	0.037661	0.001217	0.007255

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Mayacma Geothermal Project Construction - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

Mayacma Geothermal Project Construction - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

ATTACHMENT B – Operational Emissions

Mayacma Geothermal Process Emissions

622 lbs/hr NCG at Outlet | 2 outlets = | 1244 lb/hr | 564.78 kg/hr

Operational Hours Per Year | 8322 (95% of the time operational) | Assumes Methane GWP of 28 for Metric Tons/Year Emissions

GHGs	kg/hr	lbs/hr	tons/hr	tons/day	tons/year	metric tons/year
CO2	494.85	1090.96	0.55	13.09	4539.48	4118.15
Methane	17.25	38.02	0.02	0.46	158.21	4018.69
CO2e						**8137 metric tons of CO2e**

	Pollutant	kg/hr	lbs/hr	lbs/day	tons/day	tons/year			
	H2S	27.84	61.38	1473.13	0.74	255.40	Uncontrolled		
stretford	H2S	0.31	0.68	16.35	0.01	2.83	Controlled	98.89% Abatement	LCAPCD, DOC, DWR/Bottle Rock Geothermal Power Plant, 1980.
reactive catalyst	H2S	0.01	0.02	0.38	0.00	0.07	Controlled	99.97% Abatement	Abatement Percentage Based on Purification Solutions, 2022.

Pollutant	kg/hr	lbs/hr	lbs/day	tons/day	tons/year
NH3	6.64	14.64	351.44	0.18	60.93

Note: The remaining gas is made up of nitrogen and hydrogen.

Historical Chemisty Database (Sep 2007 - Dec 2014)

Dry Gas Gases	Average Volume %	Molar Mass	Weight	Average Weight %	Flow Rate lb/hr	Flow Rate tons/year	Flow Rate Metric Tons
Carbon Dioxide	64.00	44.01	28.17	0.877	1090.96	4539.480	4118.149
Hydrogen Sulfide	4.65	34.08	1.58	0.049	61.38	255.404	231.698
Ammonia	2.22	17.03	0.38	0.012	14.64	60.932	55.276
Nitrogen	2.09	28.01	0.59	0.018	22.67	94.348	85.591
Methane	6.12	16.04	0.98	0.031	38.02	158.209	143.525
Hydrogen	20.86	2.02	0.42	0.013	16.32	67.911	61.608
			32.12	1	1244		
			AMW				

Mayacma Geothermal GHG Emissions

8.836 MW gross (total not reducing for parasitic load) and 7.256MW net (to the grid) or 60,384 MWh/year assuming 95% capacity factor.

Source	CO2 emissions (g/kWh)
Amended BRPP	68
Geothermal California Average	107
Geothermal US Average	122
Natural Gas	480
Oil	660
Coal	900

Note: CO2 emissions only, does not take into account other GHGs

Source: Energy Sector Management Assistance Program, Greenhouse Gases From Geothermal Production, April 2016.

Amended BRPP

Source	CO2e (metric tons/year)
Geothermal Process	8,137
Mobile Sources	96
	8,233

Existing 55 MW BRPP Speculative Emissions

Assume 50 MW Net

50 MW X 8322 hours/year = 416100 MWh/year

107 g/kWh = .107 metric tons/MWh

44522.7 metric tons of CO2/year

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mayacma Geothermal Mobile Sources Operations Only

Lake County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Heavy Industry	1.00	1000sqft	0.02	1,000.00	0
General Light Industry	1.00	1000sqft	0.02	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	67
Climate Zone	1			**Operational Year**	2025
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - operations only

Off-road Equipment - operations only

Architectural Coating - operations only

Vehicle Trips - Light Industry refers to employee trips (4 round trips per day 365 days per year at a round trip distance of 33.6 miles).
Heavy Industry refers to truck trips (2 vendor truck and 2 haul truck round trips per day 365 days per year at a roudn trip distance of 40 miles).

Fleet Mix - General Heavy Industry refers to trucks (assumed half medium heavy duty [vendors] and half heavy heavy duty [haul trucks]).
General Light Industry refers to employees (assumed to be the ratios of LDA, LDT1, LDT2, and MCY).

Energy Use - mobile sources only

Water And Wastewater - mobile sources only

Solid Waste - mobile sources only

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Nonresidential_Exterior	1,000.00	0.00
tblArchitecturalCoating	ConstArea_Nonresidential_Interior	3,000.00	0.00
tblConstructionPhase	NumDays	5.00	1.00
tblConstructionPhase	PhaseEndDate	3/14/2023	3/8/2023
tblEnergyUse	LightingElect	1.81	0.00
tblEnergyUse	LightingElect	1.81	0.00
tblEnergyUse	NT24E	1.85	0.00
tblEnergyUse	NT24E	1.85	0.00
tblEnergyUse	NT24NG	0.31	0.00
tblEnergyUse	NT24NG	0.31	0.00
tblEnergyUse	T24E	0.56	0.00
tblEnergyUse	T24E	0.56	0.00
tblEnergyUse	T24NG	3.17	0.00
tblEnergyUse	T24NG	3.17	0.00
tblFleetMix	HHD	6.3910e-003	0.50
tblFleetMix	HHD	6.3910e-003	0.00
tblFleetMix	LDA	0.47	0.00
tblFleetMix	LDA	0.47	0.62
tblFleetMix	LDT1	0.06	0.00
tblFleetMix	LDT1	0.06	0.08
tblFleetMix	LDT2	0.19	0.00
tblFleetMix	LDT2	0.19	0.25
tblFleetMix	LHD1	0.05	0.00
tblFleetMix	LHD1	0.05	0.00
tblFleetMix	LHD2	9.1950e-003	0.00
tblFleetMix	LHD2	9.1950e-003	0.00
tblFleetMix	MCY	0.04	0.00

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblFleetMix	MCY	0.04	0.00
tblFleetMix	MDV	0.15	0.00
tblFleetMix	MDV	0.15	0.05
tblFleetMix	MH	6.6760e-003	0.00
tblFleetMix	MH	6.6760e-003	0.00
tblFleetMix	MHD	8.7110e-003	0.50
tblFleetMix	MHD	8.7110e-003	0.00
tblFleetMix	OBUS	4.0800e-004	0.00
tblFleetMix	OBUS	4.0800e-004	0.00
tblFleetMix	SBUS	1.2030e-003	0.00
tblFleetMix	SBUS	1.2030e-003	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblSolidWaste	SolidWasteGenerationRate	1.24	0.00
tblSolidWaste	SolidWasteGenerationRate	1.24	0.00
tblVehicleTrips	CC_TL	6.60	0.00
tblVehicleTrips	CC_TL	6.60	0.00
tblVehicleTrips	CC_TTP	28.00	0.00
tblVehicleTrips	CC_TTP	28.00	0.00
tblVehicleTrips	CNW_TL	6.60	0.00
tblVehicleTrips	CNW_TL	6.60	0.00
tblVehicleTrips	CNW_TTP	13.00	0.00
tblVehicleTrips	CNW_TTP	13.00	0.00
tblVehicleTrips	CW_TL	14.70	20.00
tblVehicleTrips	CW_TL	14.70	16.80
tblVehicleTrips	CW_TTP	59.00	100.00
tblVehicleTrips	CW_TTP	59.00	100.00
tblVehicleTrips	DV_TP	5.00	0.00

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblVehicleTrips	DV_TP	5.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PR_TP	92.00	100.00
tblVehicleTrips	PR_TP	92.00	100.00
tblVehicleTrips	ST_TR	6.42	8.00
tblVehicleTrips	ST_TR	1.99	8.00
tblVehicleTrips	SU_TR	5.09	8.00
tblVehicleTrips	SU_TR	5.00	8.00
tblVehicleTrips	WD_TR	3.93	8.00
tblVehicleTrips	WD_TR	4.96	8.00
tblWater	IndoorWaterUseRate	231,250.00	0.00
tblWater	IndoorWaterUseRate	231,250.00	0.00

2.0 Emissions Summary

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0101	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	7.3900e-003	0.2152	0.0975	9.7000e-004	0.0438	1.4300e-003	0.0453	0.0123	1.3700e-003	0.0136	0.0000	92.1394	92.1394	6.5000e-004	0.0118	95.6667
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0175**	**0.2152**	**0.0975**	**9.7000e-004**	**0.0438**	**1.4300e-003**	**0.0453**	**0.0123**	**1.3700e-003**	**0.0136**	**0.0000**	**92.1394**	**92.1394**	**6.5000e-004**	**0.0118**	**95.6667**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0101	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	7.3900e-003	0.2152	0.0975	9.7000e-004	0.0438	1.4300e-003	0.0453	0.0123	1.3700e-003	0.0136	0.0000	92.1394	92.1394	6.5000e-004	0.0118	95.6667
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0175**	**0.2152**	**0.0975**	**9.7000e-004**	**0.0438**	**1.4300e-003**	**0.0453**	**0.0123**	**1.3700e-003**	**0.0136**	**0.0000**	**92.1394**	**92.1394**	**6.5000e-004**	**0.0118**	**95.6667**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	3/8/2023	3/8/2023	5	1	

Acres of Grading (Site Preparation Phase): 0

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	0	0.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	0	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	7.3900e-003	0.2152	0.0975	9.7000e-004	0.0438	1.4300e-003	0.0453	0.0123	1.3700e-003	0.0136	0.0000	92.1394	92.1394	6.5000e-004	0.0118	95.6667
Unmitigated	7.3900e-003	0.2152	0.0975	9.7000e-004	0.0438	1.4300e-003	0.0453	0.0123	1.3700e-003	0.0136	0.0000	92.1394	92.1394	6.5000e-004	0.0118	95.6667

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Heavy Industry	8.00	8.00	8.00	58,240	58,240
General Light Industry	8.00	8.00	8.00	48,922	48,922
Total	16.00	16.00	16.00	107,162	107,162

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Heavy Industry	20.00	0.00	0.00	100.00	0.00	0.00	100	0	0
General Light Industry	16.80	0.00	0.00	100.00	0.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Heavy Industry	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.500000	0.500000	0.000000	0.000000	0.000000	0.000000	0.000000
General Light Industry	0.617560	0.082673	0.251190	0.048577	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0101	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Unmitigated	0.0101	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.3200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	7.8100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Total	**0.0101**	**0.0000**	**2.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**4.0000e-005**	**4.0000e-005**	**0.0000**	**0.0000**	**4.0000e-005**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.3200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	7.8100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Total	**0.0101**	**0.0000**	**2.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**4.0000e-005**	**4.0000e-005**	**0.0000**	**0.0000**	**4.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Heavy Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
General Light Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Heavy Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
General Light Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000
General Light Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mayacma Geothermal Mobile Sources Operations Only

Lake County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Heavy Industry	1.00	1000sqft	0.02	1,000.00	0
General Light Industry	1.00	1000sqft	0.02	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	67
Climate Zone	1			**Operational Year**	2025
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - operations only

Off-road Equipment - operations only

Architectural Coating - operations only

Vehicle Trips - Light Industry refers to employee trips (4 round trips per day 365 days per year at a round trip distance of 33.6 miles).
Heavy Industry refers to truck trips (2 vendor truck and 2 haul truck round trips per day 365 days per year at a roudn trip distance of 40 miles).

Fleet Mix - General Heavy Industry refers to trucks (assumed half medium heavy duty [vendors] and half heavy heavy duty [haul trucks]).
General Light Industry refers to employees (assumed to be the ratios of LDA, LDT1, LDT2, and MCY).

Energy Use - mobile sources only

Water And Wastewater - mobile sources only

Solid Waste - mobile sources only

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Nonresidential_Exterior	1,000.00	0.00
tblArchitecturalCoating	ConstArea_Nonresidential_Interior	3,000.00	0.00
tblConstructionPhase	NumDays	5.00	1.00
tblConstructionPhase	PhaseEndDate	3/14/2023	3/8/2023
tblEnergyUse	LightingElect	1.81	0.00
tblEnergyUse	LightingElect	1.81	0.00
tblEnergyUse	NT24E	1.85	0.00
tblEnergyUse	NT24E	1.85	0.00
tblEnergyUse	NT24NG	0.31	0.00
tblEnergyUse	NT24NG	0.31	0.00
tblEnergyUse	T24E	0.56	0.00
tblEnergyUse	T24E	0.56	0.00
tblEnergyUse	T24NG	3.17	0.00
tblEnergyUse	T24NG	3.17	0.00
tblFleetMix	HHD	6.3910e-003	0.50
tblFleetMix	HHD	6.3910e-003	0.00
tblFleetMix	LDA	0.47	0.00
tblFleetMix	LDA	0.47	0.62
tblFleetMix	LDT1	0.06	0.00
tblFleetMix	LDT1	0.06	0.08
tblFleetMix	LDT2	0.19	0.00
tblFleetMix	LDT2	0.19	0.25
tblFleetMix	LHD1	0.05	0.00
tblFleetMix	LHD1	0.05	0.00
tblFleetMix	LHD2	9.1950e-003	0.00
tblFleetMix	LHD2	9.1950e-003	0.00
tblFleetMix	MCY	0.04	0.00

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblFleetMix	MCY	0.04	0.00
tblFleetMix	MDV	0.15	0.00
tblFleetMix	MDV	0.15	0.05
tblFleetMix	MH	6.6760e-003	0.00
tblFleetMix	MH	6.6760e-003	0.00
tblFleetMix	MHD	8.7110e-003	0.50
tblFleetMix	MHD	8.7110e-003	0.00
tblFleetMix	OBUS	4.0800e-004	0.00
tblFleetMix	OBUS	4.0800e-004	0.00
tblFleetMix	SBUS	1.2030e-003	0.00
tblFleetMix	SBUS	1.2030e-003	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	UsageHours	6.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblSolidWaste	SolidWasteGenerationRate	1.24	0.00
tblSolidWaste	SolidWasteGenerationRate	1.24	0.00
tblVehicleTrips	CC_TL	6.60	0.00
tblVehicleTrips	CC_TL	6.60	0.00
tblVehicleTrips	CC_TTP	28.00	0.00
tblVehicleTrips	CC_TTP	28.00	0.00
tblVehicleTrips	CNW_TL	6.60	0.00
tblVehicleTrips	CNW_TL	6.60	0.00
tblVehicleTrips	CNW_TTP	13.00	0.00
tblVehicleTrips	CNW_TTP	13.00	0.00
tblVehicleTrips	CW_TL	14.70	20.00
tblVehicleTrips	CW_TL	14.70	16.80
tblVehicleTrips	CW_TTP	59.00	100.00
tblVehicleTrips	CW_TTP	59.00	100.00
tblVehicleTrips	DV_TP	5.00	0.00

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblVehicleTrips	DV_TP	5.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PR_TP	92.00	100.00
tblVehicleTrips	PR_TP	92.00	100.00
tblVehicleTrips	ST_TR	6.42	8.00
tblVehicleTrips	ST_TR	1.99	8.00
tblVehicleTrips	SU_TR	5.09	8.00
tblVehicleTrips	SU_TR	5.00	8.00
tblVehicleTrips	WD_TR	3.93	8.00
tblVehicleTrips	WD_TR	4.96	8.00
tblWater	IndoorWaterUseRate	231,250.00	0.00
tblWater	IndoorWaterUseRate	231,250.00	0.00

2.0 Emissions Summary

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0555	0.0000	2.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		4.4000e-004	4.4000e-004	0.0000		4.7000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0480	1.1456	0.5506	5.3600e-003	0.2497	7.8900e-003	0.2576	0.0695	7.5300e-003	0.0770		561.7101	561.7101	3.8200e-003	0.0712	583.0198
Total	**0.1035**	**1.1456**	**0.5508**	**5.3600e-003**	**0.2497**	**7.8900e-003**	**0.2576**	**0.0695**	**7.5300e-003**	**0.0770**		**561.7105**	**561.7105**	**3.8200e-003**	**0.0712**	**583.0203**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0555	0.0000	2.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		4.4000e-004	4.4000e-004	0.0000		4.7000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0480	1.1456	0.5506	5.3600e-003	0.2497	7.8900e-003	0.2576	0.0695	7.5300e-003	0.0770		561.7101	561.7101	3.8200e-003	0.0712	583.0198
Total	**0.1035**	**1.1456**	**0.5508**	**5.3600e-003**	**0.2497**	**7.8900e-003**	**0.2576**	**0.0695**	**7.5300e-003**	**0.0770**		**561.7105**	**561.7105**	**3.8200e-003**	**0.0712**	**583.0203**

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	3/8/2023	3/8/2023	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	0	0.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	0	0.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Architectural Coating - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0480	1.1456	0.5506	5.3600e-003	0.2497	7.8900e-003	0.2576	0.0695	7.5300e-003	0.0770		561.7101	561.7101	3.8200e-003	0.0712	583.0198
Unmitigated	0.0480	1.1456	0.5506	5.3600e-003	0.2497	7.8900e-003	0.2576	0.0695	7.5300e-003	0.0770		561.7101	561.7101	3.8200e-003	0.0712	583.0198

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Heavy Industry	8.00	8.00	8.00	58,240	58,240
General Light Industry	8.00	8.00	8.00	48,922	48,922
Total	16.00	16.00	16.00	107,162	107,162

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Heavy Industry	20.00	0.00	0.00	100.00	0.00	0.00	100	0	0
General Light Industry	16.80	0.00	0.00	100.00	0.00	0.00	100	0	0

4.4 Fleet Mix

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Heavy Industry	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.500000	0.500000	0.000000	0.000000	0.000000	0.000000	0.000000
General Light Industry	0.617560	0.082673	0.251190	0.048577	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
General Light Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0555	0.0000	2.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		4.4000e-004	4.4000e-004	0.0000		4.7000e-004
Unmitigated	0.0555	0.0000	2.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		4.4000e-004	4.4000e-004	0.0000		4.7000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0127					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0428					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.0000e-005	0.0000	2.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		4.4000e-004	4.4000e-004	0.0000		4.7000e-004
Total	**0.0555**	**0.0000**	**2.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**4.4000e-004**	**4.4000e-004**	**0.0000**		**4.7000e-004**

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0127					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0428					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.0000e-005	0.0000	2.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		4.4000e-004	4.4000e-004	0.0000		4.7000e-004
Total	**0.0555**	**0.0000**	**2.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**4.4000e-004**	**4.4000e-004**	**0.0000**		**4.7000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

Mayacma Geothermal Mobile Sources Operations Only - Lake County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix C – Biological Resources Technical Report

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Biological Evaluation Report

Mayacma Geothermal Project
Lake County, California

Prepared for:

Panorama Environmental
1722 J Street, Suite 218
Sacramento, CA 95811
Contact: Susanne Heim | 650/340-4803

Prepared by:

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March 2023
J-576

Table of Contents

Figures, Tables, and Appendices

1.0 INTRODUCTION

This report presents the methods and results of a biological habitat evaluation conducted by Vollmar Natural Lands Consulting, Inc. (VNLC) for the Mayacma Geothermal Project (Project). The report is prepared on behalf of Panorama Environmental, Inc., which also contributed Project documentation and guidance. The Project site is located at an existing power plant site off of High Valley Road, approximately 9.5 miles southwest of the City of Clearlake, Lake County, California (**Figure 1**). The proposed Project entails rebuilding a modern geothermal power plant—the Mayacma Geothermal Power Plant—within the development footprint of the older Bottle Rock Geothermal Power Plant. The Project includes many associated tasks, including the installation of a pipeline that will span from the new facility to a separate site northwest of the plant, where the pipeline will deliver steam to be injected into a well, sending steam and condensed water back to the underground geothermal field. The pipeline will be installed along an existing pipeline with support structures that will be used for the new pipe. The well would be installed within an area that was likewise historically leveled and paved and consists of remnant infrastructure. As part of the permitting process, the California Energy Commission requires a survey of sensitive biological resources within 1,000 feet of the Project site. The buffer area forms the project study area, amounting to a total of 122-acres.

This habitat evaluation was conducted to identify and characterize existing conditions within the study area, as well as to assess the potential for special-status species, sensitive habitats, and jurisdictional features to occur in the area. All work associated with the power plant and injection well would be within existing developed areas, and thus resulting in only noise-related impacts.

1.1 Special-status Species Potentially Affected

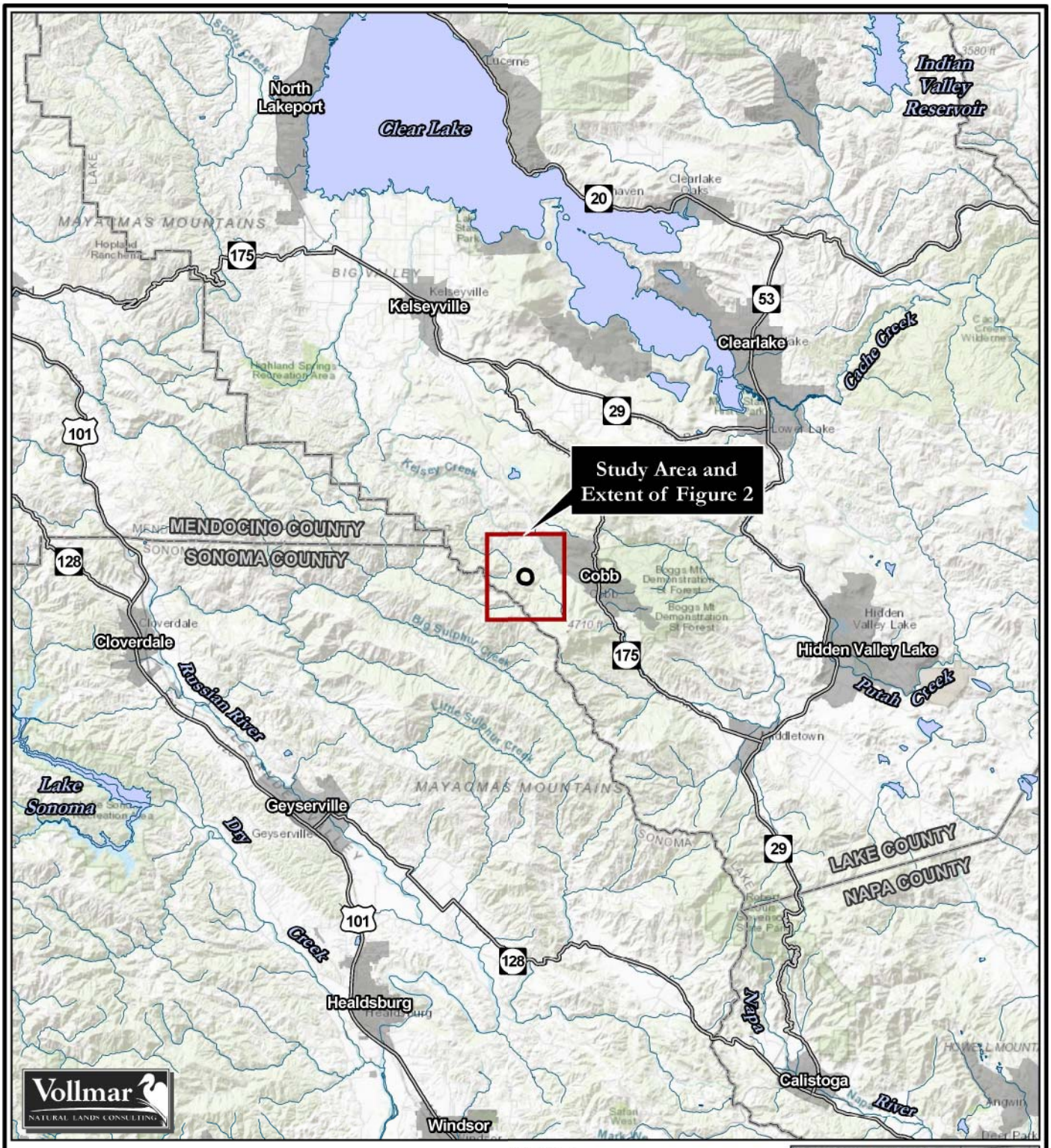
Based on habitat requirements and occurrence distributions, there are a total of ten special-status wildlife species with some potential to occur within the immediate proximity of the study area. These include:

- Two federally or state listed species: Northern Spotted Owl (*Strix occidentalis caurina*) and monarch butterfly (*Danaus plexippus plexippus* pop. 1); and
- Eight non-listed special-status species: foothill yellow-legged frog (FYLF) (*Rana boylii*) Northwest/North Coast clade, red-bellied newt (*Taricha rivularis*), Purple Martin (*Progne subis*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), hoary bat (*Lasiurus cinereus*), long-eared myotis (*Myotis evotis*), and fringed myotis (*Myotis thysanodes*).

In addition, there are 17 special-status plant taxa with potential to occur in the study area, as discussed in **Section 4.2.4**. Additional information about these and all other special-status species known from the project area is provided in **Appendix B**.

1.2 Critical Habitat

The study area is not located within any designated critical habitat. The closest critical habitat is for slender Orcutt grass (*Orcuttia tenuis*), located approximately 2.5 miles to the north, and Northern Spotted Owl, located approximately 2.8 miles to the southeast. There is no suitable habitat for slender Orcutt grass within the study area, and its presence is not further addressed in this report. Northern spotted owl is discussed in detail in **Section 4.2.1.**



Vollmar NATURAL LANDS CONSULTING

Legend

- River or Stream
- Highway
- County Boundary
- Study Area*
- Water Body
- Urban Area

* 1,000-foot buffer around project site

Data Sources: Panorama Environmental, 2023
ESRI, 2023 | GAP, 1998 | DWR, 2001
USGS, various | USHUD, 2018
GIS/Cartography by: Kristen Chinn, Feb. 2023
Map File: Vicinity_576_A-P_2023-0222.mxd

FIGURE 1
Regional Vicinity Map

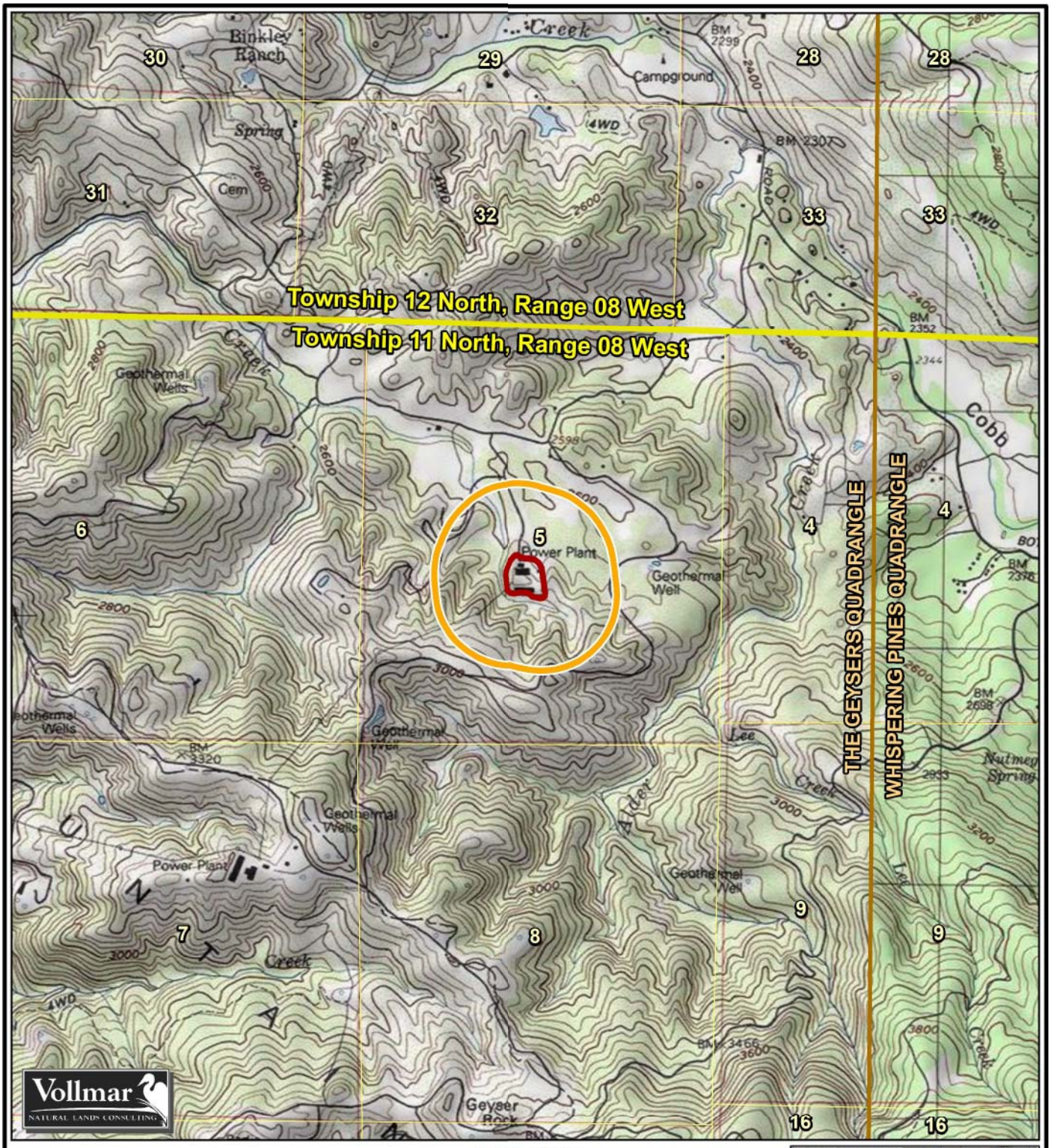
Mayacma Geothermal Project
Lake County, CA

N
W E
S

1:316,800
(1 in = 5 mi at letter layout)

0 2.5 5 10 Km

0 2.5 5 10 Mi



Legend

- Project Site (primary disturbance area)
- Study Area (project site 1,000-ft buffer)
- Quadrangle Boundary
- Township or Range Boundary
- Section Boundary*

* See map labels

Data Sources: Panorama Environmental, 2023
ESRI, 2023 | GAP, 1998 | DWR, 2001
USGS, various | USHUD, 2018
GIS/Cartography by: Kristen Chinn, Feb. 2023
Map File: DRG_576_A-P_2023-0328.mxd

FIGURE 2
USGS Topographic Map

Mayacma Geothermal Project
Lake County, CA

N
W E
S

1:24,000
(1 in = 2,000 ft at letter layout)

0 125 250 500 Meters

0 500 1,000 2,000 Feet

1.3 Potential Impacts to Additional Resources

The study area encompasses potentially jurisdictional aquatic habitats that are associated with Cow Creek and its tributaries, including wetland and riparian vegetation as well as unvegetated channel below the ordinary high water mark (OHWM). The wetlands appeared to be limited to small, localized portions of Cow Creek below the tops of banks and were not mapped during the field survey, as the survey was reconnaissance in nature and did not involve investigations of the three parameters required to classify and map wetlands. However, the very limited riparian habitat within the study area was mapped since this only requires identification of plant species.

2.0 PROJECT LOCATION

The study area is located off of High Valley Road, approximately one mile west of Cobb, a census-designated place in Lake County near the Sonoma County border. The closest major city is Clearlake, which is approximately 9.5 miles northeast of the study area. As indicated above, the study area consists of the Mayacma Geothermal Power Plant and a 1,000-foot buffer around it, as well as a pipeline alignment from the power plant to the well site to the northwest, which is not expected to involve direct impacts to natural habitats. It is mapped on "The Geysers" 7.5' U.S. Geological Survey (USGS) topographic quadrangle, within Section 5 of Township 11 North, Range 08 West (**Figure 2**). The project centroid is at 122.7681° west and 38.8348° north. Aside from the power plant and associated roads and other utilities, the study area encompasses a variety of mostly natural and relatively intact habitats, in the form of woodland, chaparral, coniferous forest, grassland, and stream habitats. Habitats within the study area are described in detail within **Section 4.1.4** below.

3.0 METHODS

3.1 Preliminary Review and Field Preparation

Prior to the site survey, VNLC ecologists delineated the study area and reviewed the latest version of the California Natural Diversity Database (CNDDB) to identify special-status plants and wildlife observations in the project vicinity. The study area was digitized using maps of the project site and pipeline alignment. The boundaries were included on maps and then loaded on to GPS units for navigation in the field.

The project ecologists compiled and reviewed the U.S. Fish and Wildlife Service (USFWS) Information Planning and Consultation System (IPaC) for the project area. Additionally, a nine-quad search for rare and listed plant species was conducted through the California Native Plant Society (CNPS) online "Inventory of Rare and Endangered Plants." Specifically, the search centered on The Geysers quadrangle and included all eight surrounding quadrangles. The list provides information pertaining to the special-status plants known from the region, including preferred habitat, elevation range, and blooming period. The list was used to help determine the potential for special-status plants to occur in the study area. Ecologists also reviewed site aerial imagery, the formal project description, and general regional conditions prior to the site visit. This information guided the development of field survey strategies for those special-status species with potential to occur in the study area.

3.2 Targeted Sensitive Biological Resources

Special-status animal species targeted and analyzed in this report include those listed by the USFWS or California Department of Fish and Wildlife (CDFW) as threatened or endangered, as well as those proposed for listing or that are candidates for listing as threatened or endangered. The listing of "Endangered, Rare, or Threatened" is defined in Section 15380 of the *State of California Environmental Quality Act* (*CEQA*) *Guidelines*. Section 15380(b) states that a species of animal or plant is "endangered" when its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors. A species is "rare" when either "(A) although not presently threatened with extinction, the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or (B) the species is likely to become endangered within the foreseeable future throughout all or a portion of its range and may be considered 'threatened' as that term is used in the Federal Endangered Species Act" (ESA).

Animal species may also be designated as "Species of Special Concern" or "Fully Protected" by the CDFW. Although these species have no legal status under the California Endangered Species Act (CESA), the CDFW recommends their protection as their populations are generally declining and they could be listed as threatened or endangered (under CESA) in the future. "Fully Protected" species generally may not be harmed ("taken") or possessed at any time. The CDFW may only authorize take for necessary scientific research and may authorize live capture and relocation of "fully protected" birds to protect livestock.

Birds may be designated by the USFWS as "Birds of Conservation Concern." Although these species have no legal status under ESA, the USFWS recommends their protection as their populations are generally declining, and they could be listed as threatened or endangered (under ESA) in the future.

Special-status plants include species that are designated rare, threatened, or endangered as well as candidate species for listing by the USFWS. Special-status plants also include species considered rare or endangered under the conditions of Section 15380 of the CEQA Guidelines, such as those plant species identified by the CNPS as California Rare Plant Rank (CRPR) 1A, 1B, and 2 in the Inventory of Rare and Endangered Vascular Plants of California by the CNPS. Finally, special-status plants may include other species that are considered sensitive or of special concern due to limited distribution or lack of adequate information to permit listing or rejection for state or federal status, such as those included as CRPR 3 or 4 in the CNPS Inventory.

For the purposes of this report, 'sensitive plant communities' include those designated as such by the CDFW in the CNDDB (CDFW 2023). Plant communities ranked in the Manual of California Vegetation (MCV) were considered but not formally documented in the field due to the relatively large study area, inaccessibility of portions of the area, and reconnaissance nature of the field survey (i.e., the specific relative percent cover of dominant plants was not determined). In addition, wetland and riparian habitats, regardless of constituent plant species, are considered sensitive. Streams, impounded water bodies, and interconnecting or adjacent wetlands and drainages are subject to the jurisdiction of the United States Army Corps of Engineers (ACOE) under Section 404 of the Federal Clean Water Act (CWA). The CDFW also generally has

jurisdiction over drainages and adjacent aquatic resources, together with other aquatic features that provide an existing fish and wildlife resource pursuant to Sections 1602-1603 of the California Fish and Game Code. The CDFW asserts jurisdiction to the outer edge of vegetation (i.e., the tree dripline) associated with a riparian corridor, or to the top of the stream bank, whichever is further. The Regional Water Quality Control Board (RWQCB) also generally has jurisdiction over surface waters, including streams and wetlands. Any grading, excavation, or filling of jurisdictional drainage corridors or wetlands would require federal and/or state permits (e.g., Section 404 and/or 401 permits) and will require mitigation.

Figure 3 below shows the distribution of special-status wildlife species documented within the CNDDB in the surrounding area. These and other special-status wildlife species known from the project region are identified in **Appendix B**, along with their regulatory status, habitat requirements, and an evaluation of their potential to occur within the study area.

3.3 Field Survey

VNLC Senior Ecologist Jake Schweitzer and VNLC Wildlife Biologist Linnea Neuhaus conducted a site survey on February 10, 2023. Mr. Schweitzer and Ms. Neuhaus traversed all accessible portions of study area on foot to gain visual coverage of all habitat types present. Dominant plant species within each habitat type were recorded, along with common wildlife species, general conditions (e.g., level of disturbance), and notable habitat features. A search was conducted for sensitive habitats (e.g., riparian) and habitat potential for special-status species, such as nesting potential, burrows, and aquatic features. The search also involved looking for early-blooming special-status plants known from the vicinity of the study area, such as manzanita (*Arctostaphylos*) species. It should be noted that significant portions of the study area were inaccessible due to impenetrable shrubland habitats, and these areas were not directly investigated in the field.

A combination of GPS points and lines was recorded along the edges of drainage features, with points recorded where satellite reception was degraded (e.g., under the densest tree canopies). Riparian vegetation extended beyond the bank tops at only one localized portion of the study area. Some of the channel edges within more difficult areas to survey due to GPS reception were refined using 1x1 meter resolution USGS Light Detection and Ranging (LiDAR) data. Photographs detailing representative site conditions were also recorded throughout the site, which are presented in **Appendix A**.

Mayacma Geothermal Power Plant Study Area

Slender Orcutt Grass Critical Habitat

Northern Spotted Owl Critical Habitat

red-bellied newt
Townsend's big-eared bat
Bolander's horkelia
Boggs Lake hedge-hyssop
Burke's goldfields
marsh checkerbloom
few-flowered navarretia
Lake County stonecrop
California red-legged frog
Raiche's manzanita
oval-leaved viburnum
many-flowered navarretia
Ricksecker's water scavenger beetle
California linderiella
obscure bumble bee
glandular western flax
slender Orcutt grass
northern spotted owl
purple martin
legenere
watershield
Bolander's horkelia
Hall's harmonia
two-carpellate western flax
Clear Lake pyrg
California satintail
Loch Lomond button-celery
pallid bat
hoary bat
Townsend's big-eared bat
fringed myotis
long-eared myotis
western red bat
Brandegee's eriastrum
three-fingered morning-glory
Geysers panicum
steelhead - central California coast DPS
Rincon Ridge ceanothus
Baker's navarretia
Colusa layia
Lee Creek
COBB MOUNTAIN
Calistoga ceanothus
western bumble bee
Sonoma beardtongue
Lake County stonecrop
Rincon Ridge ceanothus
dimorphic snapdragon
Greene's narrow-leaved daisy
Hoffman's bristly jewelflower
Freed's jewelflower
Snow Mountain buckwheat
MAYACMAS MOUNTAINS
LAKE COUNTY
MENDOCINO COUNTY
SONOMA COUNTY

Data Sources: CNDDB, 07/2022 | GAP, 1998
USFWS, 2005 | Panorama, 2023 | VNLC, 2023
GIS/Cartography by: Jake Schweitzer, Feb. 2023
Map File: CNDDB_576_B-P_2023-0222.mxd

Vollmar NATURAL LANDS CONSULTING

Legend

- Socrates Mine Jewelflower
- Cobb Mountain Lupine
- Konocti Manzanita
- Other CNDDB Special-Status Plant (see map label)
- California Giant Salamander
- Foothill Yellow-legged Frog
- Other CNDDB Special-Status Animal (see map label)
- Steelhead Designated Critical Habitat
- Designated Critical Habitat
- County Boundary
- Study Area (~120 acres)

FIGURE 3
Regional Biological Resources

Mayacma Geothermal Project
Lake County, California

N W E S

1:63,360
(1 in = 1 mi at tabloid layout)

0 0.5 1 2 Km

0 0.5 1 2 Mi

4.0 RESULTS

4.1 Existing Conditions

The study area is located in the Mayacamas Mountains, approximately one air mile west of the Town of Cobb. Land use in the region consists primarily of agriculture in the form of vineyards, along with conserved lands and rural residential housing. There is also tourism in the region, as evidenced by the presence of outdoor recreation areas and a number of bed and breakfast establishments.

4.1.1 Climate

The climate in the region is characterized as "Mediterranean," with cool, wet winters and warm, fairly dry summers as well as high inter- and intra-annual variability in precipitation. Mean annual precipitation and temperature in the vicinity of the study area are 52.6 inches and 58.7 degrees Fahrenheit (F), respectively (PRISM 2023). More than 98 percent of annual precipitation occurs during the "wet season," which extends from October to May. Precipitation occurs primarily as rain, but snow is not uncommon on the higher peaks in the area and, according to the property manager (pers. comm.) occasionally falls within the study area.

The 2022-2023 wet season (with data available from October 2022 to January 2023 due to the date of this report) experienced higher than average precipitation and slightly lower than average temperatures for the same time period (historical range from October to January). Specifically, precipitation was 140 percent of normal (41.3 versus 29.5 inches), and mean temperatures were 99 percent of normal (51.4 versus 51.8 degrees F) (ibid). Moreover, the timing of the precipitation was highly erratic, with October and November receiving less than average precipitation, December receiving higher than average precipitation, and January receiving significantly higher than average precipitation (25.2 versus 10.1 inches of precipitation just in January).

4.1.2 Topography

As the study area is located in the Mayacamas Mountains, elevation range and topographic variations are highly variable. Elevation within the study area ranges from approximately 2,582 to 2,982 feet (787 to 909 meters) above sea level, with elevation rising generally from north to south (USGS 1997). Slope ranges from nearly flat within the power plant itself and grassland habitat in the northeast portion of the site, to over 149 percent (56 degrees) within the cismontane woodland and chaparral habitats in the west, south, and southeastern portions of the study area. Moderately steep hill slopes rise adjacent to the western and southern edges of the power plant. The average slope across the study area is notably steep, at approximately 35 percent (over 19°) (ibid).

4.1.3 Substrates

A total of four soil units are mapped within the study area, as shown on **Figure 4** below. All of the soil units feature surface textures of gravelly loam or loam, and are therefore generally well drained to somewhat excessively drained, indicating that they may be prone to erosion (USDA-NRCS 2023). The pH rating for the soils indicates that all of the rated units are moderately acidic to neutral, ranging from 5.5 to 7.3. The primary characteristics related to the soil materials and their relationship to plant growth are presented in **Table 1** below. The total percent cover of each

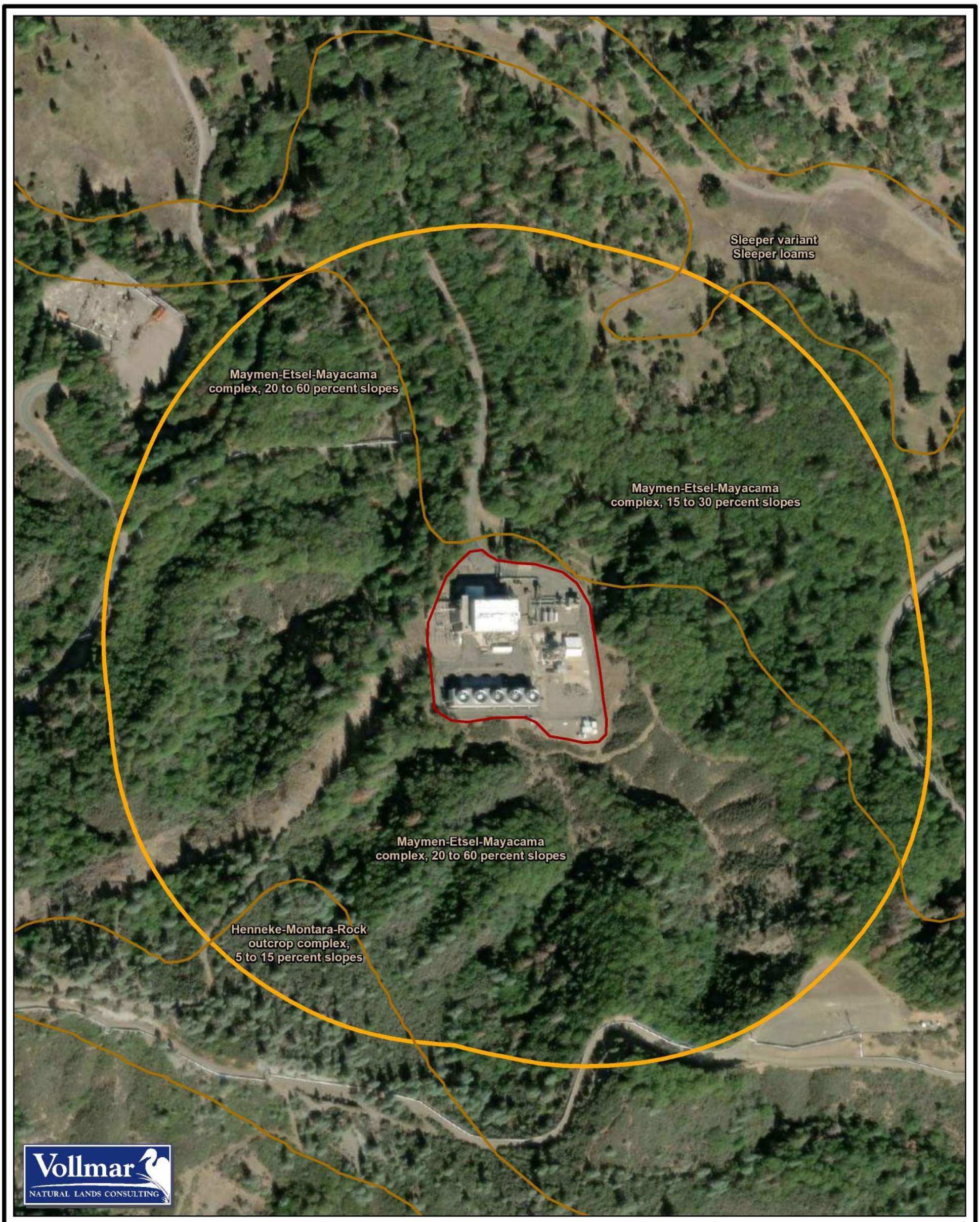


FIGURE 4
Local Site Map and Soil Units

Mayacma Geothermal Project
Lake County, California

Legend

- Road
- Project Site (primary disturbance area)
- Study Area (project site 1,000-ft buffer, 122 acres)
- Soil Unit Boundary

N
W E
S

1:3,600
(1 inch = 300 feet at tabloid layout)

0 75 150 Meters

0 150 300 600 Feet

Data Sources: VNLC, 2023 | Panorama, 2023
USDA SSURGO Data | 2022 | USGS 10m DEMs
Gap, 1998 | ESRI Aerial Imagery
GIS/Cartography by: Jake Schweitzer, March 2023
Map File: Site_576_B-P_2023-0328.mxd

unit within the study area is also provided. Note that the majority of the study area is mapped as a single soil series, namely Maymen-Etsel-Mayacama complex, which is mapped over 96.2 percent of the area. This soil type is derived from sandstone and shale rocks, which are not known to support a particularly large number of special-status plants. Similarly, the sleeper variant sleeper-loam, which is derived from sedimentary rock, is a common substrate with low to average potential to support unique flora. In contrast, the Henneke-Montara-Rock outcrop complex is derived from serpentinite, a highly unique substrate.

Serpentinite rock is an "ophiolite," which is broadly defined as a section of the earth's oceanic crust and/or the underlying upper mantle that has been uplifted and emplaced within continental crust (Alexander et al. 2007). In contrast to more strictly continental crust (i.e., rocks from much shallower depths in the earth's crust, far above the mantle), which is relatively high in silicates such as quartz and feldspar, ophiolites are composed of higher concentrations of minerals such as olivine, chromite, and pyroxene. Referred to as *mafic* (a term derived by contracting "magnesium" and "ferric'—iron), or *ultramafic* for materials with even higher concentrations of these minerals (up to 90 percent), ophiolites include sedimentary, igneous, and metamorphic rocks, but all are relatively low in minerals more associated with continental materials. Most plant taxa, having evolved on soils derived from continental materials, are adapted to minerals with higher concentrations of elements such as potassium and calcium, as well as elements such as nitrogen that are associated with the atmosphere. Far fewer plants have adapted to oceanic and mantle minerals that are high in magnesium, iron, and nickel, and relatively low in such elements as potassium and calcium (Kruckeberg 1984). Thus, soils derived from ultramafic rocks such as serpentinite generally support relatively few—often uniquely-adapted—plants. The Calflora website lists 338 of California's 2,403 special-status plants as having an affinity for serpentine substrates (2023). That amounts to 14 percent of all special-status plants, despite the rock covering less than one percent of the state.

Table 1. Characteristics of Soil Units Mapped within the Study Area

Soil Unit Name and Percent of the Study Area	Parent Material	Surface Texture*	pH*	Drainage
Henneke-Montara-Rock outcrop complex, 10 to 50 percent slopes, MLRA 15 (2.8%)	Residuum weathered from serpentinite	Gravelly loam	7.3	Well drained
Maymen-Etsel-Mayacama complex, 15 to 30 percent slopes (30.1%)	Residuum weathered from sandstone and shale	Gravelly loam	5.5	Somewhat excessively drained
Maymen-Etsel-Mayacama complex, 20 to 60 percent slopes (66.1%)	Colluvium derived from sandstone and shale	Gravelly loam	6.2	Somewhat excessively drained
Sleeper variant-Sleeper loams, 5 to 15 percent slopes (1.0%)	Residuum weathered from sedimentary rock	Loam	6.7	Well drained

Source: U.S. Department of Agriculture Natural Resources Conservation Service, SoilWeb website, 2023.
*Dominant condition. Values for surface texture, pH and organic matter correspond to the top 24 inches.

4.1.4 Habitats

The study area encompasses a notable variety of habitats, especially for a 122-acre site. There are five broadly defined natural plant communities, as classified in the system used by the CNPS for analyzing special-special plant habitat types. The diversity is largely the result of the rugged topography of the area, which provides a range of micro-habitats related to slope and aspect and,

in turn, soil characteristics (e.g., thickness). In general, herbaceous habitats such as grasslands occupy gentler slopes with thicker soils, while shrublands, typically featuring shrubs with a very high root to shoot (i.e., above ground trunk and branches) ratio, occupy the steepest slopes. Forest and woodlands cloak the intermediate hillslopes. Most of these broad habitat types consist of a variety of plant communities—for example "Chaparral" consists of at least three or four plant communities that would be classified as different alliances and associations in the MCV (CNPS 2023a), depending on the percent cover of the various shrub species. However, these are mapped as CNPS classes because the primary purpose of this report is to describe habitat types known to support special-status plants and animals, as defined in the CNPS habitat analysis system as well as most habitat analysis for special-status animals. Aside from the mapped plant communities, there are aquatic habitats in the form of a seasonal stream and ephemeral drainages. These do not support extensive or notably distinct vegetation, but do serve as habitat elements with potential to provide at least marginal habitat for special-status plants and animals. These features are described in detail in **Section 4.3.1** below.

In addition to the natural habitats, there are anthropogenic habitats, in the form of the power plant and associated cleared and leveled areas as well as a powerline corridor that is managed to prevent the growth of tall vegetation. The pipeline alignment follows an existing pipeline, which primarily runs along existing roads, but there are also localized areas of natural habitats along the alignment where heavy equipment may need temporary access. The developed power plant areas feature very low plant cover, with only a few scattered, highly adaptable herbaceous weeds, while the powerline corridor features grasses and forbs and low-growing shrubs among the stumps of cut trees. Among the most common plants along the corridor are what appear to be planted stands of native bunchgrass species, most notably California fescue (*Festuca californica*), which competes with invasive weeds and sprouts of the cut trees and shrubs. Neither of these anthropogenic habitats are likely to support sensitive biological resources, and thus are not further discussed in this section, though they are mapped on **Figure 5** below.

Cismontane Woodland

Covering 76.4 acres, Cismontane Woodland encompasses 62.7 percent of the study area. It is present on all slopes and aspects within and surrounding the study area, but is most prevalent on moderate slopes—it is sparse or absent along the steepest slopes and within extensive flatlands (**Figure 5**). The CNPS defines this habitat as follows: "Trees deciduous or evergreen, forming an open canopy. Broadleaved trees, especially oaks, dominate, although conifers may be present as canopy emergents. The understory may be open and herbaceous or closed and shrubby. This type occurs on a variety of sites in lowland California" (CNPS 2023b). The habitat as it occurs in the study area is dominated by evergreen hardwood trees, but also features some deciduous hardwoods and several conifer species. The hardwoods include canyon live oak (*Quercus chrysolepis*) along the upper slopes, black oak (*Q. kelloggii*) along the lower slopes, and California bay (*Umbellularia californica*) and Pacific madrone (*Arbutus menziesii*) in between. In general, Cismontane Woodland in the area forms a mosaic of each of these species alternating as dominant trees. Douglas fir (*Pseudotsuga menziesii*) is the most common conifer species, followed by ponderosa pine (*P. ponderosa*) and foothill pine (*Pinus sabiniana*). There are also a few sugar pines (*P. lambertiana*), a species that is uncommon in the Coast Ranges. The understory shrub and vine stratum within the Cismontane Woodland consists primarily of common manzanita (*Arctostaphylos manzanita* ssp. *manzanita*), scrub oak (*Quercus berber-*

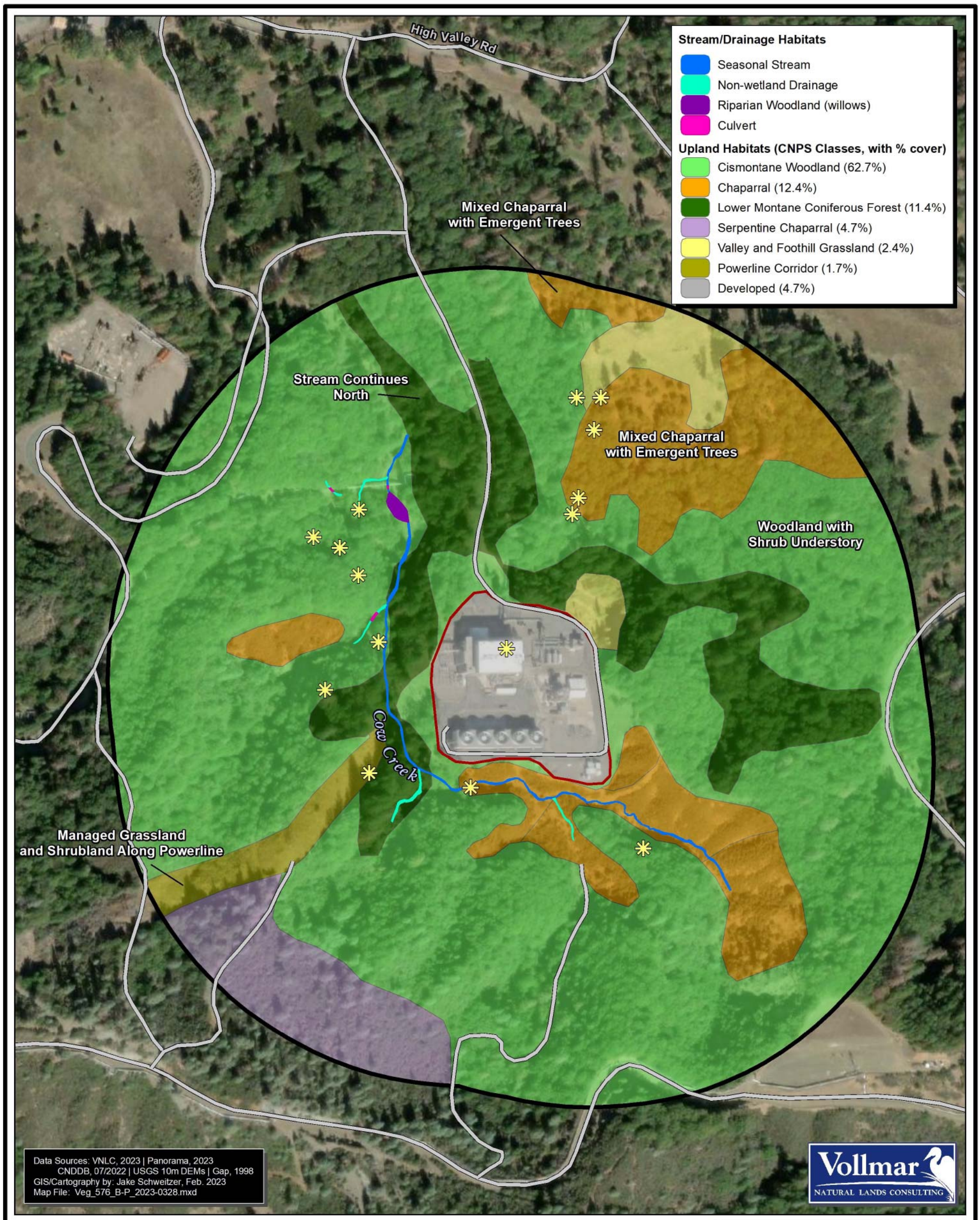


FIGURE 5
Local Biological Resources

Mayacma Geothermal Project
Lake County, California

Legend

- Bird Nest (observed 02/10/2023)*
- Road
- Project Site (~6 acres)
- Project Site 1,000-ft Buffer* (~120 ac, incl. project site)**

* All presumed to be inactive at time of survey

** Part of study area

Note: Wetland habitats are scattered along Cow Creek but are small and localized. Riparian trees occur only as scattered indiviudals except where mapped. A formal wetland delineation was not conducted in the study area.

N
W E
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1:3,600
(1 inch = 300 feet at tabloid layout)

0 75 150 Meters

Feet
0 150 300 600

-idifolia), and birch leaf mountain mahogany (*Cercocarpus betuloides*). While all of the most common trees and shrubs are native to California and the region, the herb layer consisted of a mix of native and exotic species. The most common natives observed include California fescue, California fuchsia (*Epilobium canum*), white-flowered hawkweed (*Hieracium albiflorum*), and California milkwort (*Rhinotropis californica*), and these are interspersed with the exotic dogtail grass (*Cynosurus echinatus*), tall sock destroyer (*Torilis arvensis*), orchard grass (*Dactylis glomeratum*), and ripgut brome (*Bromus diandrus*), most of which are more common within the more open habitats.

Chaparral

Chaparral is in a distant second place among the most widespread habitat types within the study area. It occupies 20.9 acres, amounting to 17.1 percent of the study area, primarily along the steepest slopes and where soils are notably shallow and/or rocky and sterile (**Figure 5**). The CNPS (2023b) defines this habitat as follows:

"Impenetrably dense, evergreen, leathery-leaved shrubs that are active in winter, dormant in summer, and adapted to frequent fires either through resprouting or seed carry-over. There is a characteristic florula (i.e., small flora) of fire-following annuals and short-lived perennials. Mature stands may exceed 3-4 meters in height. It occurs on diverse substrates, many of which support distinctive suites of edaphic indicators. Chaparral may be successional to coniferous forest or oak woodland, as tree seedlings can sometimes be found beneath the shrub canopy."

The 22.3 acres includes areas mapped as "Serpentine Chaparral," which accounts for just under five percent of the study area (5.7 acres). As indicated above, serpentine soils are known to support a notable number of special-status plants, and so this habitat is mapped separately among the several incarnations of chaparral habitats. The serpentine area is located at the southwestern edge of the study area and extends southwestward well beyond the site. As expected, the area consists of a conspicuous diversity of shrubs and herbs that are generally absent from the rest of the study area. The most common shrub species observed include leather oak (*Quercus durata*), Jepson's ceanothus (*Ceanothus jepsonii*), and toyon (*Heteromeles arbutifolia*), while herb species consisted of coyote mint (*Monardella villosa*), wooly sunflower (*Eriophyllum lanatum*), California fescue, and soap plant (*Chlorogalum pomeridianum*). All of these are native species, and many of them are associated with serpentine soils, if not restricted to such substrates. In addition, scattered throughout the serpentine habitat are foothill pine trees, a species that is common on serpentine soils throughout much of California, but also commonly occurs on non-serpentine soils. There are relatively few tree species that commonly occur on serpentine soils.

The remaining Chaparral habitat within the study area, occurring on non-serpentine sandstone and shale soils, consist of two broad groups, including what the California Department of Forestry and Fire Protection plant community data classifies as Chamise-Redshank Chaparral and Mixed Chaparral. As its name suggests, the former is dominated by chamise (*Adenostoma fasciculatum*) and/or redshank (*A. sparsifolium*), with chamise being more dominant in northern California and redshank being more dominant in southern portions of the state. Chamise is clearly dominant within onsite Chaparral occurring along the steepest slopes and most sterile, gravelly sandstone soils, such as in the southeastern part of the study area. Associated species include buckbrush (*Ceanothus cuneatus*), scrub oak, common manzanita, and chaparral pea

(*Pickeringia montana*). No herbs were found to commonly occur in the habitat, but there may be a slightly higher cover during the spring or summer season, when annual species are more likely to be present. The Mixed Chaparral includes the same shrub species, but in more equal covers rather than a majority of chamise. Naked buckwheat (*Eriogonum nudum*) and incipient annual grasses were found growing under the shrubs in this habitat. The soils supporting this diversity were found to be less gravelly and with more organic content, enabling the more diverse mosaic of plants.

There are currently no planned project activities within the onsite Chaparral habitat, so no impacts to Chaparral plants are anticipated. However, in the event that project plans shift to include work within Chaparral, the habitat should be carefully surveyed for special-status plant

Lower Montane Coniferous Forest

This habitat covers approximately 13.9 acres (11.4%) of the study area, along two winding, somewhat linear corridors that converge north of the power plant (**Figure 5**). This habitat is defined by the CNPS as follows (2023b): "Open to dense stands of conifers found at lower and middle elevations in the mountains. Broadleaved trees may be present in the understory. Dense chaparral shrubs may also occur, especially in seral stands. The upper limit of lower montane coniferous forests more-or-less coincides with the elevation of maximum annual precipitation." This describes the onsite habitat quite accurately, as it is at "lower to middle elevation in the mountains" (i.e., roughly 2,500 to 3,000 feet in the Mayacamas), includes broadleaved trees, including most of those listed as occurring in Cismontane Woodland, and also includes stands of Chaparral shrubs. While most of the habitat is relatively shady, there are several areas where the canopy is open enough to support species that require at least modest sun exposure. The most common conifer in this habitat is Douglas fir, followed by ponderosa pine, foothill pine, and sugar pine, as well as a few California nutmeg trees (*Torreya californica*). Among all of these conifers, only the Douglas fir and ponderosa pines form substantial stands. As with all habitats other than Chaparral, common manzanita is the most prevalent shrub species, and the most common herbs seen during the February 2023 survey, included wood fern (*Dryopteris arguta*), western sword fern (*Polystichum munitum*), and bedstraw species (*Galium* spp.) within more shaded habitats, and dogtail grass and common chickweed (*Stellaria media*) within open habitats.

Valley and Foothill Grassland

Encompassing only 2.9 acres (2.4%) this is the most limited and localized natural habitat within the study area. This habitat is defined by the CNPS as follows: "Introduced, annual Mediterranean grasses and native herbs. On most sites the native bunch grass species, such as needle grass, have been largely or entirely supplanted. Stands rich in natives usually found on unusual substrates, such as serpentinite or somewhat alkaline soils." This generally applies to the onsite grasslands, though no native forb species were observed, perhaps as a result of the timeframe of the survey, in February. Two stands are present northwest of the power plant (**Figure 5**), one of which, adjacent to the power plant, appears to have been planted with orchard grass. The only other species observed in that area are dogtail grass as well as a few emergent ponderosa pines and birch leaf mountain mahogany. The northern grassland is naturally occurring and slightly more diverse, but still dominated by exotic species such as medusahead (*Elymus caput-medusae*), yellow star-thistle (*Centaurea solstitialis*), broadleaf filaree (*Erodium botrys*), and various clover species (*Trifolium* spp.). The prevalence of these weedy species is

largely the result of a lack of any management in the areas—generally some form of grazing, mowing, or burning is required to give native plant species an opportunity to thrive within California's cismontane grasslands (author's observation). The only native species observed in the Valley and Foothill Grasslands are scattered trees and shrubs, including the ponderosa pine and birch leaf mountain mahogany in the southern grassland, as well as valley oak (*Quercus lobata*), ponderosa pine, foothill pine, and black oak in the northern grassland.

4.2 Special-status Species

Based on habitat requirements, there are ten special-status animal species and 17 special-status plant taxa with some potential to occur within the study area. These include two state or federally listed animal species and eight non-listed special-status animal species, as well as multiple birds that fall under the Migratory Bird Treaty Act (MBTA). All of the special-status plants with potential to occur are CRPR taxa with no federal or state listing. **Figure 3** shows the distribution of special-status animal and plant species that are documented in the local region, and all special-status taxa are listed in **Appendix B**, along with their regulatory status, habitat requirements, and an evaluation of their potential to occur in the study area. These animal and plant taxa are described in more detail below.

4.2.1 Listed Animal Species

Northern Spotted Owl (*Strix occidentalis caurina*) – Federal Threatened, State Threatened
The Northern Spotted Owl is listed as Federal and State Threatened. The breeding range of the Northern Spotted Owl extends from Southwestern British Columbia south through California's Northern Coast Ranges to Marin County (CDFW 2016). Northern Spotted Owls usually nest in tree or snag cavities, or in the broken top of large trees. Other nesting sites include caves or crevices within cliffs. They require mature forests with large old trees, snags, multiple canopy layers and downed woody debris. Northern Spotted Owls are not migratory, though some individuals may move down-slope in the winter (Zeiner and Laudenslayer 1990). This species primarily hunts at night, but is also known to forage during the day. In California their diet primarily consists of dusky-footed woodrats, and in smaller proportions rabbits, hares, small to medium sized birds, bats, insects, and small rodents such as mice, voles, shrews, and gophers (CDFW 2016).

The main threats to the species are competition from Barred Owls (*Strix varia*) and habitat loss due to timber harvesting, land conversion, wildfires, loss of old-growth forest, marijuana cultivation, and climate change. Barred Owls displace Northern Spotted Owls by disrupting their nesting and competing with them for food and territory (USFWS 2011, CDFW 2016).

Cismontane woodland and coniferous forest habitats within the study area may provide suitable habitat for this species, and it has been documented within 4 miles. Designated critical habitat is present around Cobb Mountain, approximately 2.8 miles from the study area.

Monarch Butterfly (*Danaus plexippus plexippus* pop. 1 [overwintering population]) – Federal Candidate
Monarch butterfly is a Federal Candidate Endangered species. Adult monarch butterflies feature bright orange wings with black margins and venation. A double row of white spots runs parallel to the black border on the upside of the wing. Monarchs breed on milkweed host plants

(*Asclepias* sp.). Larvae feed exclusively on milkweed and enter pupation between 9 and 18 days old. Adult monarchs emerge after 6 to 14 days. Most adult butterflies live two to five weeks, while overwintering adults may live six to nine months. Overwintering adult monarchs migrate over 2,000 miles to overwintering sites, a journey lasting over two months. The cohort of overwintering adults breeds at the overwintering sites in early spring (February-March) and undertakes a return migration to the summer breeding grounds (USFWS 2020).

Overwintering habitat is characterized by a set of microclimatic conditions including dappled sunlight, high humidity, fresh water and an absence of freezing temperatures or high winds. Preferred trees include blue gum (*Eucalyptus globulus*), Monterey pine (*Pinus radiata*), and Monterey cypress (*Cupressus macrocarpa*) (Xerces 2016).

The western monarch population is estimated to have declined precipitously to 97% below historical abundance between the 1980s and the mid-2010s (Pelton et. al 2019). The current overwintering population of approximately 30,000 individuals may be susceptible to probable extinction due to stochastic events. Major causes of decline include loss of quality breeding and foraging habitat, insecticide application, and changes in habitat availability due to climate change (USFWS 2020).

The study area may provide spring and summer breeding and foraging habitat for western monarch; however, the study area is outside of the known overwintering range of this species.

4.2.2 Non-listed Special-status Animal Species

Foothill Yellow-legged Frog (*Rana boylii*) Northwest/North Coast Clade – Species of Special Concern

The foothill yellow-legged frog (FYLF) Northwest/North Coast Clade is listed as a CDFW Species of Special Concern. This species' aquatic habitat includes partly shaded, low gradient ephemeral and permanent streams, rivers, and adjacent moist terrestrial habitats (Hayes et al. 2016). FYLF prefer partly shaded, shallow streams and riffles with a rocky substrate that is at least cobble-sized. They occur in streams and rivers in woodland, chaparral, and forest habitats (Stebbins 2012). Breeding occurs between mid-March to early June after high water of streams subsides (Stebbins 2012).

Historically, FYLF ranged from Oregon south along the coast ranges down to the San Gabriel Mountains, and south along the foothills of the western side of the Sierra Nevada to the Tehachapi Mountains. FYLF has disappeared from up to 45 percent of its overall range in California, and 66 percent of its range in the California Sierra. The healthiest FYLF populations in California are located along the north coast and in the northern Sierra Nevada. The few remaining populations in the southern Sierra Nevada, specifically those south of I-80, are nearly extinct (Stebbins and McGinnis 2012). Frogs in this area have been largely affected by poorly timed reservoir water release, which can wash away eggs and larvae or retard their development (Kupferberg et al. 2012). Additionally, changes to flow regimes and downstream habitat alteration resulting from hydroelectric power generation and other water management projects have greatly impacted FYLF's dependence on riverine environments (ibid). FYLF are also susceptible to other environmental impacts including loss of habitat, predation by non-native

species such as American bullfrogs and crayfish, and air-borne pesticides (Davidson et al. 2002, Ashton et al. 1998).

Cow Creek within the study area provides low to moderately suitable dispersal habitat for FYLF, although breeding habitat quality is marginal within the study area. There are several documentations of the species in the watershed, including a recent documentation within 1.25 miles of the study area. The species is most likely to occur within the stream habitats in pools and sunny areas with gravel substrate.

Red-bellied Newt (*Taricha rivularis*) – Species of Special Concern
The red-bellied newt is a CDFW Species of Special Concern. Endemic to California, it is found in woodlands and redwood forests in coastal northern California. Red-bellied newts spend the dry season underground in terrestrial habitat, foraging in moist habitats under woody debris, rocks, and in animal burrows for arthropods, worms, and snails. They may migrate a mile or more to and from rapid-flowing, permanent streams during fall and winter rains where they breed and lay eggs in rocky substrate (Marangio 1988).

Cow Creek provides marginally suitable habitat, though the creek and tributaries are likely too small and seasonal for this species within the study area. However, red-bellied newts may make overland migrations or utilize the drainages in the study area to migrate through to other more suitable habitat in the vicinity. VNLC staff have documented red-bellied newts near Cobb Mountain in recent years. Due to their documented presence in the vicinity and potential for migration, red-bellied newts could be present in the study area.

Purple Martin (*Progne subis*) – Species of Special Concern
Purple Martin is a CDFW Species of Special Concern. This bird species is found in a variety of wooded, low-elevation habitats throughout California such as valley foothill and montane hardwood, valley foothill and montane hardwood-conifer, riparian, and coniferous habitats. Purple Martin inhabits open forests, woodlands, and riparian areas during the breeding season, and open habitats such as grassland, wet meadow, and fresh emergent wetland during migration (Green 1988). They commonly nest in old woodpecker cavities in tall, old, isolated trees near a body of water (Dawson 1923). Purple Martin has been eliminated from much of its previous range in California in recent decades due to loss of riparian habitat, removal of snags, and competition with other birds (Remsen 1978).

Trees and snags within the study area provide suitable nesting habitat for Purple Martin, and woodpecker cavities were documented during the field survey.

Pallid Bat (*Antrozous pallidus*) – Species of Special Concern, WBWG High Priority
Pallid bat is a CDFW Species of Special Concern, and is designated as "high" priority by the Western Bat Working Group (WBWG). Pallid bats range from southern British Columbia through the western U.S. to Mexico (Weber 2009). This species is found in low elevations throughout California in a wide variety of habitats including grasslands, shrublands, woodlands, and forests (Harris 1998d). Pallid bat is most commonly found in open dry habitats with rocky areas for roosting (Weber 2009). They roost in caves, crevices, mines, cliffs, and hollow trees. This species forages for insects and arachnids over open ground. Pallid bats mate from late October to February, with young born from April to July. Pallid bat is very sensitive to

disturbance of their roosting sites, which are important for conserving energy and juvenile growth (Harris 1998d).

Large trees and buildings within the study area may provide suitable day and night roosting habitat, and coniferous forest and cismontane woodland provide foraging habitat for pallid bat. The nearest pallid bat occurrence is documented within approximately 3.8 miles of the study area.

Townsend's Big-eared Bat (*Corynorhinus townsendii*) – Species of Special Concern, WBWG High Priority

Townsend's big-eared bat is a CDFW Species of Special Concern, and is designated as "high" priority by the WBWG. This species is found in nearly all habitats except subalpine and alpine habitats throughout California (Harris 1988e). They roost in large cavities such as caves, mines, tunnels, buildings, or other human-made structures, and sometimes large hollows of trees (Gruver and Keinath 2006). They are generally found in dry uplands, but also occur in mesic habitats such as coniferous and deciduous forest (Kunz and Martin 1982). Townsend's big-eared bat is extremely sensitive to disturbance of roosting sites (Gruver and Keinath 2006). Breeding occurs in the fall or winter seasons.

Large trees and buildings within the study area may provide suitable day and night roosting habitat, and coniferous forest and cismontane woodland provide foraging habitat for Townsend's big-eared bat. The nearest occurrence is documented within approximately 3.8 miles of the study area.

Hoary Bat (*Lasiurus cinereus*) – WBWG Medium Priority

Hoary bat is designated as "medium" priority by the WBWG. It is the most widespread North American bat, and can be found in almost all areas of California. This species winters along the coast and in southern California. They breed and roost in woodlands and forests with medium to large-sized trees with dense foliage, and can be found in foothills, deserts, mountains, lowlands, and coastal valleys during their migration. Hoary bat requires a source of water nearby, and prefers open habitats, with access to open areas for foraging and trees for cover. They mate in autumn, with young born from May through July (Harris 1998b).

Trees within the study area may provide suitable day and night roosting habitat, and coniferous forest, cismontane woodland, and grassland provide foraging habitat for hoary bat. The nearest occurrence is documented within approximately 3.8 miles of the study area.

Long-eared Myotis (*Myotis evotis*) – WBWG Medium Priority

Long-eared myotis is designated as "medium" priority by the WBWG. This species can be found throughout California, except for in the Central Valley and hot deserts, from sea level up to 9,000 feet in elevation (Harris 1988c). It is found in a variety of habitats, including shrublands, sage, chaparral, and agriculture areas, but usually seems to prefer coniferous woodlands and forests. Long-eared myotis roosts in buildings, crevices, hollow trees, caves, mines, cliff crevices, rocky outcrops, and spaces under tree bark, and sometimes under bridges (Bogan et al. 2005).

Trees within the study area may provide suitable day and night roosting habitat, and coniferous forest, cismontane woodland, and grassland provide foraging habitat for hoary bat. The nearest occurrence is documented within approximately 3.8 miles of the study area.

Fringed Myotis (*Myotis thysanodes*) – WBWG High Priority
In California, this species is widespread, occurring in most places except the Central Valley and Colorado and Mojave Deserts. Fringed myotis can be found in a wide range of habitats, most commonly pinyon-juniper, valley foothill hardwood, and hardwood-conifer habitats between 4,000 to 7,000 feet. Fringed myotis roosts in caves, mines, buildings, and crevices. The species forages in open habitats, streams, lakes, ponds, and early successional areas, requiring access to water. Fringed myotis is easily disturbed at roosting sites (Harris 1988a).

Trees within the study area may provide suitable day and night roosting habitat, and coniferous forest, cismontane woodland, and grassland provide foraging habitat for hoary bat. The nearest occurrence is documented within approximately 3.8 miles of the study area.

4.2.3 Migratory and Nesting Birds

The Migratory Bird Treaty Act (16 U.S.C. 704) and the California Fish and Game Code (Section 3503) prohibits the take of migratory birds, or disturbance to the active nests of most native birds. In addition to the special-status birds listed in **Section 4.2.1**, a number of additional migratory birds have potential to occur within the immediate vicinity of the project area. These include Allen's Hummingbird (*Selasphorus sasin*), Black-chinned Sparrow (*Spizella atrogularis*), Bullock's Oriole (*Icterus bullockii*), California thrasher (*Toxostoma redivivum*), Nuttall's Woodpecker (*Picoides nuttalli*), Oak Titmouse (*Baeolophus inornatus*), Golden Eagle (*Aquila chrysaetos*), Olive-sided Flycatcher (*Contopus cooperi*), and Wrentit (*Chamaea fasciata*).

Multiple bird species were observed within or adjacent to the study area during the field visit, including Common Raven (*Corvus corax*), Chestnut-backed Chickadee (*Poecile rufescens*), California towhee (*Melozone crissalis*), Dark-eyed Junco (*Junco hyemalis*), Steller's Jay (*Cyanocitta stelleri*), Hutton's Vireo (*Vireo huttoni*), Acorn Woodpecker (*Melanerpes formicivorus*), Anna's Hummingbird (*Calypte anna*), Oak Titmouse, Black Phoebe (*Sayornis nigricans*), Brown Creeper (*Certhia americana*), Nuttall's Woodpecker (*Dryobates nuttallii*), Gold-crowned Sparrow (*Zonotrichia atricapilla*), and Northern Flicker (*Colaptes auratus*). Bird habitat within or immediately adjacent to the study area includes woodland and forested habitat, riparian vegetation, shrublands, artificial perches (power poles, fences), and nest boxes.

4.2.4 Special-status Plants

The study area encompasses a range of natural habitats with potential to support special-status plants. As **Table 2** in **Appendix B** shows, there are 17 plant taxa known from the vicinity of the study area that occur within habitat types present in the study area, and that occur within the elevation range of the study area (2,582 to 2,984 feet). These are shaded in gray in the plant table, indicating that they are the most likely to occur. There are additional special-status plant taxa known from the nine USGS quadrangles that surround the study area and that also occur within the onsite habitat types, but these are considered less likely to occur in the study area because they either do not occur within the elevation range of the study area or are not

documented within the local vicinity—they have not been found within approximately five to ten air miles of the study area.

Chaparral

The Chaparral habitats within the study area have the highest potential to support special-status plants, because the largest number of taxa known from the region are associated with this habitat, and also because it is the least disturbed habitat within the study area. In fact, all 17 of the special-status plants with the highest potential to occur in the study area are at least occasionally, if not primarily, associated with Chaparral. Additionally, all forms of Chaparral in the study area are dominated by native plant species, and no noxious weeds or other highly competitive exotic species were noted within the habitat. Given the special properties of serpentine soils, the Serpentine Chaparral in particular has high potential to support special-status plants. Eight of the 17 special-status plants with the highest potential to occur in the study area are associated with serpentine soils as a microhabitat. Moreover, the onsite habitat is in better than average condition and supports a notable diversity of native plants.

Cismontane Woodland

Nine of the 17 special-status plants with the highest potential to occur in the study area are associated with Cismontane Woodland (**Table 2**, **Appendix B**). Given the particular species, and the fact that all of these are also associated with Chaparral (and in some cases other more open habitats, such as grasslands), it is likely that the more open, sunny woodlands are most likely to support such species. These areas support a moderate cover of exotic plants, including several invasive species, indicating that the habitat is somewhat disturbed and that there is competition from native plants. Thus, the onsite Cismontane Woodland habitats may be considered to have low-to-moderate potential to support special-status plants.

Lower Montane Coniferous Forest

Five of the 17 special-status plants with the highest potential to occur in the study area are associated with Lower Montane Coniferous Forest. As with those associated with Cismontane Woodland (see above), these plant taxa are likely to be more associated with relatively open, sunny habitats within this forest habitat, since they are also associated with more open habitats such as Chaparral and Valley and Foothill Grassland. The level of disturbance in such microhabitats is relatively low, but Lower Montane Coniferous Forest is more likely to support special-status plants where the substrate is more unique, as when the parent rock is volcanic (author's observation). Given the lack of such substrates in the study area, the likelihood of special-status plants being present is reduced and may be considered low-to-moderate.

Valley and Foothill Grassland

Only two special-status plants with the highest potential to occur in the study area are associated with Valley and Foothill Grassland, and these are primarily found on serpentine soils. Due to the lack of serpentine soils among the onsite grasslands, as well as the fact that the grasslands are dominated by exotic, mostly invasive plant species, the potential for special-status to occur in this habitat is very low.

Drainage Corridors

There are no other habitats within the study area that have potential to support special-status plants. The Cow Creek stream corridor supports very limited, localized wetland plants, including a small stand of riparian vegetation (in the form of willow trees). However, there are no seep or spring habitats outside the drainages that would support Meadow and Seep species, and the riparian vegetation is so limited—and such a generalized habitat—that it is unlikely to support special-status plants. Moreover, there are no such species that occur within these habitats that are also known to occur in the vicinity and that fall within the elevation range of the study area.

4.3 Protected Habitats

4.3.1 Wetlands or Waters of the U.S. and State of California

The primary drainage that conveys water from and through the study area is Cow Creek, which also features several small tributaries within the study area (**Figure 5**). Cow Creek is very narrow and likely seasonal, but does support plant species that indicate an extended hydroperiod, including giant chain fern (*Woodwardia fimbriata*) and scattered riparian and quasi-riparian tree species. The tree species include arroyo willow (*Salix lasiolepis*), alder (*Alnus rhombifolia*), and valley oak, though only arroyo willow forms a mappable stand. The stream's hydrology is likely augmented by a perennial spring that maintains saturated soils or subsurface flow, however, abundant water throughout the area complicated identification of springs during the time of the site survey. During the February site survey, the stream itself featured a steady flow of approximately three to eight inches of water along its length, though this was during a timeframe of recent precipitation. Portions of the stream exhibit well-defined bed and bank topography, but other portions may more aptly described as non-wetland swales. None of Cow Creek's tributaries featured clear bed and bank topography or a significant cover of wetland vegetation, despite the fact that all were flowing during the site survey—these are likely only ephemeral features. It should be noted that the site survey did not include a formal wetland delineation—it was reconnaissance in nature and did not involve detailed analysis of plant species cover or examination of soils or indicators of wetland hydrology. The purpose of the survey was to map the channel locations in order to help to develop avoidance and minimization measures, as well as to characterize the features as potential habitat for special-status species. In any case, Cow Creek flows northward into High Valley Creek, a blue line stream that flows northward into Kelsey Creek, which is the namesake stream of the regional watershed. In turn, Kelsey Creek flows northwestward, then north, eventually discharging into Clear Lake, a navigable Water that lies approximately 11.5 air miles north of the study area. Cow Creek is presumed to be jurisdictional at the state as well as the federal level, primarily along its tops of banks but also including the stand of riparian vegetation. However, the stream's ephemeral tributaries are likely jurisdictionally only under the RWQCB.

Despite the augmented hydrology, the tributaries and even the main stem provide limited habitat for special-status species, by virtue of being so narrow, shallow, and with limited habitat elements (i.e., few boulders, limited woody debris, etc.).

4.3.2 Sensitive Plant Communities

Aside from Cow Creek and its tributaries there are no sensitive habitats within the study area. Based on information compiled during the reconnaissance-level survey, none of the onsite

natural habitats would be classified as sensitive due to their species composition. All of the dominant plant species within all habitat types are relatively common in the region or otherwise common in California.

5.0 REFERENCES

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APPENDIX A

Representative Photographs of the Study Area (February 10, 2023)

Photo 1. Cismontane Woodland
Northeastern portion of the study area. Facing southeast

Photo 2. Chaparral dominated by chamise
Southeastern portion of the study area. Facing southeast

Photo 3. Serpentine Chaparral
Southwestern portion of the study area. Facing northeast

Photo 4. Valley and Foothill Grassland surrounded by Lower Montane Coniferous Forest
Northeastern portion of the study area. Facing north

Photo 5. Valley and Foothill Grassland
Northeastern portion of the study area. Facing north

Photo 5. Cow Creek (seasonal stream) with giant chain fern
Western portion of the study area near pipeline alignment. Facing North

Photo 6. Cow Creek with rocky substrate
Southern portion of the study area. Facing west

Photo 7. Cow Creek and Riparian habitat (willows)
Northwestern portion of the study area. Facing north

Photo 8. Ephemeral tributary of Cow Creek
Northwestern portion of the study area. Facing west

Photo 9. Bottle Rock Power Plant as viewed from powerline corridor
Southwestern portion of the study area. Facing southwest

Photo 10. Existing pipeline between power plant and northwestern terminus Northwestern portion of the study area. Facing west

Photo 11. Developed area and terminus of pipeline Northwestern of the study area. Facing north

APPENDIX B

Special-Status Animal and Plant Species Documented within the Project Region

Table 1. Special-status Animal Taxa Documented in the Vicinity of the Mayacma Geothermal Project, Lake County, California. Compiled by Vollmar Natural Lands Consulting, 2023.

Species highlighted in gray have potential to occur within the study area.

Common Name *Scientific Name*	**Status**[1]	**Description of Habitat Requirements**	**Potential to Occur in Study area**
Amphibians			
California giant salamander *Dicamptodon ensatus*	SSC	Permanent and semipermanent streams, often with shelter such as rocks, logs, or stones.	**Not Expected**. Suitable habitat is not present within the study area; Cow Creek and tributaries are too small and seasonal in the study area to provide suitable habitat.
Foothill yellow-legged frog *Rana boylii*	SSC (NW/North Coast Clade)	Rocky streams in a variety of habitats.	**Potential**. Cow Creek within the study area provides low-to-moderately suitable habitat for dispersal (but not breeding). There are a few pools, sunny areas, and some gravelly substrate. The species has been documented recently in CNDDB within 1.25 miles of the study area, with several other documentations in the watershed.
California red-legged frog *Rana draytonii*	FT, SSC	Quiet pools of freshwater streams, and occasionally ponds.	**Not Expected**. Suitable habitat is not present within the study area; Cow Creek and tributaries are too small and seasonal in the study area to provide suitable habitat. Closest known documentation is 2.75 miles from study area but is a historic collection from 1945. There are no nearby CNDDB documentations since 1960.
Red-bellied newt *Taricha rivularis*	SSC	Mainly redwood forest, but also found within other conifer and hardwood woodland habitats. Spends dry season underground and migrates to rapid, permanent streams for breeding.	**Low Potential**. Marginal suitable habitat is present within the study area; Cow Creek and tributaries are small and seasonal in the study area, but this species may make overland migrations or utilize drainages to migrate through to other more suitable stream habitats in the watershed. VNLC has personally documented the species around Cobb mountain in recent years.
Birds			
Purple Martin (nesting) *Progne subis*	SSC	Breed in mountain forests or Pacific lowlands, nesting in woodpecker holes in dead snags. Forage in a variety of open habitats.	**Potential.** Suitable nesting habitat is present within the study area. Several snags were observed and at least one woodpecker cavity was documented during the field survey.

Common Name *Scientific Name*	**Status**[1]	**Description of Habitat Requirements**	**Potential to Occur in Study area**
Northern Spotted Owl *Strix occidentalis caurina*	FT, ST	Dense blocks of mature, multi-layered forests of mixed conifer, redwood, and Douglas-fir habitat.	**Low Potential**. Mixed conifer and Douglas-fir forested habitat in the study area may provide suitable habitat for this species, though it is often associated with old-growth forest habitats. The species has been documented within 4 miles of the study area.
Fish			
Delta smelt *Hypomesus transpacificus*	FT, SE	Endemic to streams, rivers, estuaries in the upper reaches of the San Francisco Bay and Sacramento-San Joaquin Delta Estuary.	**Not Expected**. Study area is outside of known range for species.
Steelhead - central California coast DPS *Oncorhynchus mykiss irideus pop. 8*	FT	Streams, rivers, lakes, estuaries, and ocean in the San Francisco Bay and North Bay.	**Not Expected**. Outside of known range of DPS.
Insects			
Monarch butterfly – California overwintering population *Danaus plexippus plexippus* pop. 1	FC	Roosts in wind-protected tree groves with nectar and water nearby. Overwinters in tall trees in large groups during migration. Forages on showy nectar source flowers. Breeds on milkweed (*Asclepias* sp.) vegetation.	**Potential**. The study area is outside of the known overwintering range (generally within 1.5 miles of the coast) of this species. However, the study area may provide suitable spring/summer breeding and foraging habitat.
Mammals			
Pallid bat *Antrozous pallidus*	SSC, WBWG:H	Forages in a variety of habitats including shrub-steppe grasslands, oak savannah grasslands, open Ponderosa pine forests, talus slopes, gravel roads, lava flows, fruit orchards, and vineyards. Day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, trees, and various human structures such as bridges, barns, porches, bat boxes, and buildings.	**Potential**. Trees and buildings within the study area may provide suitable day and night roosts, and grassland, woodland, and forests provide suitable foraging habitat. No obvious roost locations were observed during the field survey, but they may still be present.
Townsend's big-eared bat *Corynorhinus townsendii*	SSC, WBWG:H	Roosts in caves, cliffs, rock ledges, and man-made structures. Found in a wide variety of habitats, except subalpine and alpine habitats.	**Potential**. Buildings and hollow trees within the study area may provide suitable day and night roosts, and grassland, woodland, and forests provide suitable foraging habitat. No obvious roost locations were observed during the field survey, but they may still be present.
Western red bat *Lasiurus frantzii*	SSC, WBWG: H	Strongly associated with riparian habitats, particularly mature stands of cottonwood/sycamore in the Central Valley and lower reaches of the large rivers that drain the Sierra Nevada.	**Not Expected**. The study area doesn't contain mature riparian habitat or large rivers or streams.

Common Name *Scientific Name*	Status[1]	Description of Habitat Requirements	Potential to Occur in Study area
Hoary bat *Lasiurus cinereus*	WBWG: M	Primarily deciduous and coniferous forests and woodlands, including areas altered by humans. Foraging habitat includes various open areas, including spaces over water and along riparian corridors.	**Potential**. Trees within the study area may provide suitable day and night roosts, and grassland, woodland, and forests provide suitable foraging habitat. No obvious roost locations were observed during the field survey, but they may still be present.
Long-eared myotis *Myotis evotis*	WBWG: M	Occurs in semiarid shrublands, sage, chaparral, and agricultural areas, but is usually associated with coniferous forests. Individuals roost under exfoliating tree bark, and in hollow trees, caves, mines, cliff crevices, sinkholes, and rocky outcrops on the ground. They also sometimes roost in buildings and under bridges.	**Potential**. Trees within the study area may provide suitable day and night roosts, and grassland, woodland, and forests provide suitable foraging habitat. No obvious roost locations were observed during the field survey, but they may still be present.
Fringed myotis *Myotis thysanodes*	WBWG: H	Optimal habitats are pinyon-juniper, valley foothill hardwood, and hardwood-conifer.	**Potential**. Trees within the study area may provide suitable day and night roosts, and grassland, woodland, and forests provide suitable foraging habitat. No obvious roost locations were observed during the field survey, but they may still be present.
Mollusks and Crustaceans			
Conservancy fairy shrimp *Branchinecta conservatio*	FE	Large, cool-water vernal pools with moderately turbid water.	**Not Expected**. Suitable habitat is not present within the study area.
California freshwater shrimp *Syncaris pacifica*	FE, SE	Small, perennial coastal streams at low elevation.	**Not Expected**. Study area is outside of known range of species (Marin, Napa, & Sonoma counties) and Cow Creek is likely too seasonal and high elevation to provide suitable habitat.
Reptiles			
Green sea turtle *Chelonia mydas*	FT	Open ocean, return to beaches to breed.	**Not Expected**. Suitable habitat is not present within the study area.

[1]Status: FT – Federal Threatened; FE – Federal Endangered; FC – Federal Candidate; ST – State Threatened; SE – State Endangered; SSC – CDFW Species of Special Concern; WBWG: Western Bat Working Group High ('H') or Medium ('M') Priority

Table 2. Special-status Plant Taxa Documented in the Vicinity of the Mayacma Geothermal Project, Lake County, California. Compiled by Vollmar Natural Lands Consulting, 2023.

Species highlighted in gray have the highest potential to occur within the Study Area, based on the habitat and distribution of taxon.

Scientific Name Common Name (Family)	Status[1] Federal/ State/CRPR	Habitat, Elevation, and Blooming Period[2]	Presence of Suitable Habitat within the Study Area
Amsinckia lunaris bent-flowered fiddleneck (Boraginaceae)	--/--/1B.2	Cismontane woodland, Coastal bluff scrub, Valley and foothill grassland; Microhabitat: none; 10-1,640 feet; March-June	Marginal suitable habitat is present
Antirrhinum subcordatum dimorphic snapdragon (Plantaginaceae)	--/--/4.3	Chaparral, Lower montane coniferous forest; Microhabitat: Serpentinite (sometimes); 605-2,625 feet; April-July	Suitable habitat is present
Antirrhinum virga twig-like snapdragon (Plantaginaceae)	--/--/4.3	Chaparral, Lower montane coniferous forest; Microhabitat: Openings, Rocky, Serpentinite (often); 330-6,610 feet; June-July	Suitable habitat is present but not documented in the vicinity
Arctostaphylos manzanita ssp. *elegans* Konocti manzanita (Ericaceae)	--/--/1B.3	Chaparral, Cismontane woodland, Lower montane coniferous forest; Microhabitat: Volcanic; 1,295-5,300 feet; (January) March-May (July)	Suitable habitat is present
Arctostaphylos stanfordiana ssp. *decumbens* Rincon Ridge manzanita (Ericaceae)	--/--/1B.1	Chaparral (rhyolitic), Cismontane woodland; Microhabitat: none; 245-1,215 feet; February-April (May)	Suitable is present but study area is above species elevation range
Arctostaphylos stanfordiana ssp. *raichei* Raiche's manzanita (Ericaceae)	--/--/1B.1	Chaparral, Lower montane coniferous forest (openings); Microhabitat: Rocky, Serpentinite (often); 1,475-3,395 feet; February-April	Suitable habitat is present
Asclepias solanoana serpentine milkweed (Apocynaceae)	--/--/4.2	Chaparral, Cismontane woodland, Lower montane coniferous forest; Microhabitat: Serpentinite; 755-6,105 feet; May-July (August)	Suitable habitat is present but not documented in the vicinity
Astragalus breweri Brewer's milk-vetch (Fabaceae)	--/--/4.2	Chaparral, Cismontane woodland, Meadows and seeps, Valley and foothill grassland (openings, often gravelly); Microhabitat: Serpentinite (often), Volcanic; 295-2,395 feet; April-June	Suitable is present but study area is above species elevation range
Astragalus clevelandii Cleveland's milk-vetch (Fabaceae)	--/--/4.3	Chaparral, Cismontane woodland, Riparian forest; Microhabitat: Seeps, Serpentinite; 655-4,920 feet; June-September	Suitable is present but study area is above species elevation range
Astragalus rattanii var. *jepsonianus* Jepson's milk-vetch (Fabaceae)	--/--/1B.2	Chaparral, Cismontane woodland, Valley and foothill grassland; Microhabitat: Serpentinite (often); 970-2,295 feet; March-June	Suitable is present but study area is above species elevation range
Azolla microphylla Mexican mosquito fern (Azollaceae)	--/--/4.2	Marshes and swamps (ponds, slow water); Microhabitat: none; 100-330 feet; August	No suitable habitat is present

Scientific Name **Common Name** **(Family)**	**Status[1]** **Federal/** **State/CRPR**	**Habitat, Elevation, and Blooming Period[2]**	**Presence of Suitable Habitat within the Study Area**
Brasenia schreberi watershield (Cabombaceae)	--/--/2B.3	Marshes and swamps (freshwater); Microhabitat: none; 0-7,220 feet; June-September	No suitable habitat is present
Brodiaea leptandra narrow-anthered brodiaea (Themidaceae)	--/--/1B.2	Broadleafed upland forest, Chaparral, Cismontane woodland, Lower montane coniferous forest, Valley and foothill grassland; Microhabitat: Volcanic; 360-3,000 feet; May-July	Suitable habitat is present but not documented in the vicinity
Calamagrostis ophitidis serpentine reed grass (Poaceae)	--/--/4.3	Chaparral (openings, often north-facing slopes), Lower montane coniferous forest, Meadows and seeps, Valley and foothill grassland; Microhabitat: Rocky, Serpentinite; 295-3,495 feet; April-July	Suitable habitat is present but not documented in the vicinity
Calochortus uniflorus pink star-tulip (Liliaceae)	--/--/4.2	Coastal prairie, Coastal scrub, Meadows and seeps, North Coast coniferous forest; Microhabitat: none; 35-3,510 feet; April-June	No suitable habitat is present
Calycadenia micrantha small-flowered calycadenia (Asteraceae)	--/--/1B.2	Chaparral, Meadows and seeps (volcanic), Valley and foothill grassland; Microhabitat: Roadsides, Rocky, Scree, Serpentinite (sometimes), Talus, sparsely vegetated areas; 15-4,920 feet; June-September	Suitable habitat is present but not documented in the vicinity
Calyptridium quadripetalum four-petaled pussypaws (Montiaceae)	--/--/4.3	Chaparral, Lower montane coniferous forest; Microhabitat: Gravelly (sometimes), Sandy (sometimes), Serpentinite (usually); 1,035-6,695 feet; April-June	Suitable habitat is present but not documented in the vicinity
Calystegia collina ssp. *oxyphylla* Mt. Saint Helena morning-glory (Convolvulaceae)	--/--/4.2	Chaparral, Lower montane coniferous forest, Valley and foothill grassland; Microhabitat: Serpentinite; 915-3,315 feet; April-June	Suitable habitat is present but not documented in the vicinity
Calystegia collina ssp. *tridactylosa* three-fingered morning-glory (Convolvulaceae)	--/--/1B.2	Chaparral, Cismontane woodland; Microhabitat: Gravelly, Openings, Rocky, Serpentinite; 0-1,970 feet; April-June	Suitable is present but study area is above species elevation range
Camissonia lacustris grassland suncup (Onagraceae)	--/--/1B.2	Chaparral, Cismontane woodland, Lower montane coniferous forest, Valley and foothill grassland; Microhabitat: Granitic, Gravelly, Serpentinite; 590-4,005 feet; March-June	Suitable habitat is present but not documented in the vicinity
Carex praticola northern meadow sedge (Cyperaceae)	--/--/2B.2	Meadows and seeps (mesic); Microhabitat: none; 0-10,500 feet; May-July	No suitable habitat is present
Ceanothus confusus Rincon Ridge ceanothus (Rhamnaceae)	--/--/1B.1	Chaparral, Cismontane woodland, Closed-cone coniferous forest; Microhabitat: Serpentinite (sometimes), Volcanic (sometimes); 245-3,495 feet; February-June	Suitable habitat is present

Scientific Name **Common Name** **(Family)**	**Status[1]** **Federal/** **State/CRPR**	**Habitat, Elevation, and Blooming Period[2]**	**Presence of Suitable Habitat within the Study Area**
Ceanothus divergens Calistoga ceanothus (Rhamnaceae)	--/--/1B.2	Chaparral (rocky, serpentinite, volcanic); Microhabitat: none; 560-3,115 feet; February-April	Suitable habitat is present
Chlorogalum pomeridianum var. *minus* dwarf soaproot (Agavaceae)	--/--/1B.2	Chaparral (serpentinite); Microhabitat: none; 1,000-3,280 feet; May-August	Suitable is present but study area is above species elevation range
Clarkia gracilis ssp. *tracyi* Tracy's clarkia (Onagraceae)	--/--/4.2	Chaparral (openings, serpentinite); Microhabitat: none; 215-2,135 feet; April-July	Suitable habitat is present but not documented in the vicinity
Collomia diversifolia serpentine collomia (Polemoniaceae)	--/--/4.3	Chaparral, Cismontane woodland; Microhabitat: Gravelly (sometimes), Rocky (sometimes), Serpentinite (sometimes); 655-1,970 feet; May-June	Suitable is present but study area is above species elevation range
Cordylanthus tenuis ssp. *brunneus* serpentine bird's-beak (Orobanchaceae)	--/--/4.3	Chaparral, Cismontane woodland, Closed-cone coniferous forest; Microhabitat: Serpentinite (usually); 1,000-3,000 feet; July-August	Suitable habitat is present but not documented in the vicinity
Cordylanthus tenuis ssp. *capillaris* Pennell's bird's-beak (Orobanchaceae)	FE/CR/1B.2	Chaparral, Closed-cone coniferous forest; Microhabitat: Serpentinite; 150-1,000 feet; June-September	Suitable is present but study area is above species elevation range
Cryptantha dissita serpentine cryptantha (Boraginaceae)	--/--/1B.2	Chaparral (serpentinite); Microhabitat: none; 1,295-1,905 feet; April-June	Suitable habitat is present but not documented in the vicinity
Cypripedium montanum mountain lady's-slipper (Orchidaceae)	--/--/4.2	Broadleafed upland forest, Cismontane woodland, Lower montane coniferous forest, North Coast coniferous forest; Microhabitat: none; 605-7,300 feet; March-August	Suitable habitat is present but not documented in the vicinity
Delphinium uliginosum swamp larkspur (Ranunculaceae)	--/--/4.2	Chaparral, Valley and foothill grassland; Microhabitat: Seeps, Serpentinite; 1,115-2,000 feet; May-June	Suitable is present but study area is above species elevation range
Downingia willamettensis Cascade downingia (Campanulaceae)	--/--/2B.2	Cismontane woodland (lake margins), Valley and foothill grassland (lake margins), Vernal pools; Microhabitat: none; 50-3,640 feet; June-July (September)	Suitable habitat is present
Eriastrum brandegeeae Brandegee's eriastrum (Polemoniaceae)	--/--/1B.1	Chaparral, Cismontane woodland; Microhabitat: Sandy, Volcanic; 1,395-2,755 feet; April-August	Suitable habitat is present
Erigeron greenei Greene's narrow-leaved daisy (Asteraceae)	--/--/1B.2	Chaparral (serpentinite, volcanic); Microhabitat: none; 260-3,295 feet; May-September	Suitable habitat is present

Scientific Name **Common Name** **(Family)**	**Status[1]** **Federal/** **State/CRPR**	**Habitat, Elevation, and Blooming Period[2]**	**Presence of Suitable Habitat within the Study Area**
Eriogonum nervulosum Snow Mountain buckwheat (Polygonaceae)	--/--/1B.2	Chaparral (serpentinite); Microhabitat: none; 985-6,905 feet; June-September	Suitable habitat is present
Eryngium constancei Loch Lomond button-celery (Apiaceae)	FE/CE/1B.1	Vernal pools; Microhabitat: none; 1,510-2,805 feet; April-June	No suitable habitat is present
Erythranthe nudata bare monkeyflower (Phrymaceae)	--/--/4.3	Chaparral, Cismontane woodland; Microhabitat: Seeps, Serpentinite; 655-2,295 feet; May-June	Suitable is present but study area is above species elevation range
Erythronium helenae St. Helena fawn lily (Liliaceae)	--/--/4.2	Chaparral, Cismontane woodland, Lower montane coniferous forest, Valley and foothill grassland; Microhabitat: Serpentinite (sometimes), Volcanic (sometimes); 1,150-4,005 feet; March-May	Suitable habitat is present but not documented in the vicinity
Fritillaria purdyi Purdy's fritillary (Liliaceae)	--/--/4.3	Chaparral, Cismontane woodland, Lower montane coniferous forest; Microhabitat: Serpentinite (usually); 575-7,400 feet; March-June	Suitable habitat is present but not documented in the vicinity
Gratiola heterosepala Boggs Lake hedge-hyssop (Plantaginaceae)	--/CE/1B.2	Marshes and swamps (lake margins), Vernal pools; Microhabitat: Clay; 35-7,790 feet; April-August	No suitable habitat is present
Grimmia torenii Toren's grimmia (Grimmiaceae)	--/--/1B.3	Chaparral, Cismontane woodland, Lower montane coniferous forest; Microhabitat: Carbonate, Openings, Rocky, Volcanic, boulder and rock walls; 1,065-3,805 feet; no bloom period listed	Suitable is present
Harmonia hallii Hall's harmonia (Asteraceae)	--/--/1B.2	Chaparral (serpentinite); Microhabitat: none; 1,000-3,200 feet; (March) April-June	Suitable is present
Harmonia nutans nodding harmonia (Asteraceae)	--/--/4.3	Chaparral, Cismontane woodland; Microhabitat: Gravelly (sometimes), Rocky (sometimes), Volcanic; 245-3,200 feet; March-May	Suitable habitat is present but not documented in the vicinity
Hemizonia congesta ssp. *calyculata* Mendocino tarplant (Asteraceae)	--/--/4.3	Cismontane woodland, Valley and foothill grassland; Microhabitat: Serpentinite (sometimes); 740-4,595 feet; July-November	Suitable habitat is present but not documented in the vicinity
Hesperolinon adenophyllum glandular western flax (Linaceae)	--/--/1B.2	Chaparral, Cismontane woodland, Valley and foothill grassland; Microhabitat: Serpentinite (usually); 490-4,315 feet; May-August	Suitable is present

Scientific Name **Common Name** **(Family)**	**Status[1]** **Federal/** **State/CRPR**	**Habitat, Elevation, and Blooming Period[2]**	**Presence of Suitable Habitat within the Study Area**
Hesperolinon bicarpellatum two-carpellate western flax (Linaceae)	--/--/1B.2	Chaparral (serpentinite); Microhabitat: none; 195-3,295 feet; (April) May-July	Suitable is present
Horkelia bolanderi Bolander's horkelia (Rosaceae)	--/--/1B.2	Chaparral, Lower montane coniferous forest, Meadows and seeps, Valley and foothill grassland; Microhabitat: Edges, Vernally Mesic; 1,475-3,610 feet; (May) June-August	Marginal suitable is present (not mesic)
Horkelia tenuiloba thin-lobed horkelia (Rosaceae)	--/--/1B.2	Broadleafed upland forest, Chaparral, Valley and foothill grassland; Microhabitat: Mesic, Openings, Sandy; 165-1,640 feet; May-July (August)	Suitable habitat is present but not documented in the vicinity
Imperata brevifolia California satintail (Poaceae)	--/--/2B.1	Chaparral, Coastal scrub, Meadows and seeps (often alkali), Mojavean desert scrub, Riparian scrub; Microhabitat: Mesic; 0-3,985 feet; September-May	Marginal suitable is present (not mesic)
Lasthenia burkei Burke's goldfields (Asteraceae)	FE/CE/1B.1	Meadows and seeps (mesic), Vernal pools; Microhabitat: none; 50-1,970 feet; April-June	No suitable habitat is present
Layia septentrionalis Colusa layia (Asteraceae)	--/--/1B.2	Chaparral, Cismontane woodland, Valley and foothill grassland; Microhabitat: Sandy, Serpentinite; 330-3,595 feet; April-May	Suitable is present
Legenere limosa legenere (Campanulaceae)	--/--/1B.1	Vernal pools; Microhabitat: none; 5-2,885 feet; April-June	No suitable habitat is present
Leptosiphon aureus bristly leptosiphon (Polemoniaceae)	--/--/4.2	Chaparral, Cismontane woodland, Coastal prairie, Valley and foothill grassland; Microhabitat: none; 180-4,920 feet; April-July	Suitable habitat is present but not documented in the vicinity
Leptosiphon grandiflorus large-flowered leptosiphon (Polemoniaceae)	--/--/4.2	Cismontane woodland, Closed-cone coniferous forest, Coastal bluff scrub, Coastal dunes, Coastal prairie, Coastal scrub, Valley and foothill grassland; Microhabitat: Sandy (usually); 15-4,005 feet; April-August	Suitable habitat is present but not documented in the vicinity
Leptosiphon jepsonii Jepson's leptosiphon (Polemoniaceae)	--/--/1B.2	Chaparral, Cismontane woodland, Valley and foothill grassland; Microhabitat: Volcanic (usually); 330-1,640 feet; March-May	Suitable is present but study area is above species elevation range
Leptosiphon latisectus broad-lobed leptosiphon (Polemoniaceae)	--/--/4.3	Broadleafed upland forest, Cismontane woodland; Microhabitat: none; 560-4,920 feet; April-June	Suitable habitat is present but not documented in the vicinity
Limnanthes floccosa ssp. *floccosa* woolly meadowfoam (Limnanthaceae)	--/--/4.2	Chaparral, Cismontane woodland, Valley and foothill grassland, Vernal pools; Microhabitat: Vernally Mesic; 195-4,380 feet; March-May (June)	Marginal suitable habitat is present (not vernally mesic)

Scientific Name **Common Name** **(Family)**	**Status[1]** **Federal/** **State/CRPR**	**Habitat, Elevation, and Blooming Period[2]**	**Presence of Suitable Habitat within the Study Area**
Limnanthes vinculans Sebastopol meadowfoam (Limnanthaceae)	FE/CE/1B.1	Meadows and seeps, Valley and foothill grassland, Vernal pools; Microhabitat: Vernally Mesic; 50-1,000 feet; April-May	No suitable habitat is present
Lomatium repostum Napa lomatium (Apiaceae)	--/--/1B.2	Chaparral, Cismontane woodland; Microhabitat: Serpentinite; 295-3,380 feet; March-June	Suitable habitat is present but not documented in the vicinity
Lupinus sericatus Cobb Mountain lupine (Fabaceae)	--/--/1B.2	Broadleafed upland forest, Chaparral, Cismontane woodland, Lower montane coniferous forest; Microhabitat: none; 900-5,005 feet; March-June	Suitable is present
Micropus amphibolus Mt. Diablo cottonweed (Asteraceae)	--/--/3.2	Broadleafed upland forest, Chaparral, Cismontane woodland, Valley and foothill grassland; Microhabitat: Rocky; 150-2,705 feet; March-May	Suitable habitat is present but not documented in the vicinity
Mielichhoferia elongata elongate copper moss (Mielichhoferiaceae)	--/--/4.3	Broadleafed upland forest, Chaparral, Cismontane woodland, Coastal scrub, Lower montane coniferous forest, Meadows and seeps, Subalpine coniferous forest; Microhabitat: Acidic (usually), Carbonate (sometimes), Metamorphic, Roadsides (often), Vernally Mesic (usually); 0-6,430 feet; no bloom period listed	Marginal suitable habitat is present (not vernally mesic)
Monardella viridis green monardella (Lamiaceae)	--/--/4.3	Broadleafed upland forest, Chaparral, Cismontane woodland; Microhabitat: none; 330-3,315 feet; June-September	Suitable habitat is present but not documented in the vicinity
Myosurus minimus ssp. *apus* little mousetail (Ranunculaceae)	--/--/3.1	Valley and foothill grassland, Vernal pools (alkaline); Microhabitat: none; 65-2,100 feet; March-June	Marginal suitable habitat is present (disturbed grasslands, not mesic) but not documented in the vicinity
Navarretia cotulifolia cotula navarretia (Polemoniaceae)	--/--/4.2	Chaparral, Cismontane woodland, Valley and foothill grassland; Microhabitat: Adobe; 15-6,005 feet; May-June	Suitable habitat is present but not documented in the vicinity
Navarretia leucocephala ssp. *bakeri* Baker's navarretia (Polemoniaceae)	--/--/1B.1	Cismontane woodland, Lower montane coniferous forest, Meadows and seeps, Valley and foothill grassland, Vernal pools; Microhabitat: Mesic; 15-5,710 feet; April-July	Marginal suitable habitat is present (not mesic)
Navarretia leucocephala ssp. *pauciflora* few-flowered navarretia (Polemoniaceae)	FE/CT/1B.1	Vernal pools (volcanic ash); Microhabitat: none; 1,310-2,805 feet; May-June	Marginal suitable habitat is present (no volcanic ash)
Navarretia leucocephala ssp. *plieantha* many-flowered navarretia (Polemoniaceae)	FE/CE/1B.2	Vernal pools (volcanic ash); Microhabitat: none; 100-3,115 feet; May-June	No suitable habitat is present

Scientific Name **Common Name** **(Family)**	**Status[1]** **Federal/** **State/CRPR**	**Habitat, Elevation, and Blooming Period[2]**	**Presence of Suitable Habitat within the Study Area**
Orcuttia tenuis slender Orcutt grass (Poaceae)	FT/CE/1B.1	Vernal pools; Microhabitat: Gravelly (often); 115-5,775 feet; May-September (October)	No suitable habitat is present
Orobanche valida ssp. *howellii* Howell's broomrape (Orobanchaceae)	--/--/4.3	Chaparral (serpentinite, volcanic); Microhabitat: none; 590-5,710 feet; June-September	Suitable habitat is present but not documented in the vicinity
Panicum acuminatum var. *thermale* Geysers panicum (Poaceae)	--/CE/1B.2	Closed-cone coniferous forest, Riparian forest, Valley and foothill grassland; Microhabitat: Streambanks (sometimes), geothermally-altered soil; 1,000-8,105 feet; June-August	Marginal suitable habitat is present (disturbed grasslands)
Penstemon newberryi var. *sonomensis* Sonoma beardtongue (Plantaginaceae)	--/--/1B.3	Chaparral (rocky); Microhabitat: none; 2,295-4,495 feet; April-August	Suitable habitat is present
Piperia michaelii Michael's rein orchid (Orchidaceae)	--/--/4.2	Chaparral, Cismontane woodland, Closed-cone coniferous forest, Coastal bluff scrub, Coastal scrub, Lower montane coniferous forest; Microhabitat: none; 10-3,000 feet; April-August	Suitable habitat is present but not documented in the vicinity
Potamogeton zosteriformis eel-grass pondweed (Potamogetonaceae)	--/--/2B.2	Marshes and swamps (freshwater); Microhabitat: none; 0-6,105 feet; June-July	No suitable habitat is present
Sedella leiocarpa Lake County stonecrop (Crassulaceae)	FE/CE/1B.1	Cismontane woodland, Valley and foothill grassland, Vernal pools; Microhabitat: Vernally Mesic, Volcanic, vernally mesic depressions in volcanic outcrops; 1,200-2,590 feet; April-May	Marginal suitable habitat is present (not vernally mesic)
Sidalcea oregana ssp. *hydrophila* marsh checkerbloom (Malvaceae)	--/--/1B.2	Meadows and seeps, Riparian forest; Microhabitat: Mesic; 3,610-7,545 feet; (June) July-August	Marginal suitable habitat is present (not mesic)
Sidalcea oregana ssp. *valida* Kenwood Marsh checkerbloom (Malvaceae)	FE/CE/1B.1	Marshes and swamps (freshwater); Microhabitat: none; 375-490 feet; June-September	No suitable habitat is present
Streptanthus barbiger bearded jewelflower (Brassicaceae)	--/--/4.2	Chaparral (serpentinite); Microhabitat: none; 490-3,510 feet; May-July	Suitable habitat is present but not documented in the vicinity
Streptanthus brachiatus ssp. *brachiatus* Socrates Mine jewelflower (Brassicaceae)	--/--/1B.2	Chaparral, Closed-cone coniferous forest; Microhabitat: Serpentinite (usually); 1,790-3,280 feet; May-June	Suitable habitat is present

Scientific Name **Common Name** **(Family)**	**Status[1]** **Federal/** **State/CRPR**	**Habitat, Elevation, and Blooming Period[2]**	**Presence of Suitable Habitat within the Study Area**
Streptanthus brachiatus ssp. *hoffmanii* Freed's jewelflower (Brassicaceae)	--/--/1B.2	Chaparral, Cismontane woodland; Microhabitat: Serpentinite; 1,610-4,005 feet; May-July	Suitable habitat is present
Streptanthus glandulosus ssp. *hoffmanii* Hoffman's bristly jewelflower (Brassicaceae)	--/--/1B.3	Chaparral, Cismontane woodland, Valley and foothill grassland (often serpentinite); Microhabitat: Rocky; 395-1,560 feet; March-July	Suitable is present but study area is above species elevation range
Streptanthus hesperidis green jewelflower (Brassicaceae)	--/--/1B.2	Chaparral (openings), Cismontane woodland; Microhabitat: Rocky, Serpentinite; 425-2,495 feet; May-July	Suitable is present but study area is above species elevation range and species is not documented in the vicinity
Stuckenia filiformis ssp. *alpina* northern slender pondweed (Potamogetonaceae)	--/--/2B.2	Marshes and swamps (shallow freshwater); Microhabitat: none; 985-7,055 feet; May-July	No suitable habitat is present
Toxicoscordion fontanum marsh zigadenus (Melanthiaceae)	--/--/4.2	Chaparral, Cismontane woodland, Lower montane coniferous forest, Marshes and swamps, Meadows and seeps; Microhabitat: Serpentinite (often), Vernally Mesic; 50-3,280 feet; April-July	Marginal suitable habitat is present (not vernally mesic)
Trichostema ruygtii Napa bluecurls (Lamiaceae)	--/--/1B.2	Chaparral, Cismontane woodland, Lower montane coniferous forest, Valley and foothill grassland, Vernal pools; Microhabitat: none; 100-2,230 feet; June-October	Suitable is present but study area is above species elevation range
Viburnum ellipticum oval-leaved viburnum (Viburnaceae)	--/--/2B.3	Chaparral, Cismontane woodland, Lower montane coniferous forest; Microhabitat: none; 705-4,595 feet; May-June	Suitable habitat is present

Note: nomenclature corresponds to the CNPS (2023).

1. State or federal listing: F = Federal; C = California; E = endangered; T = threatened; R = rare
   CRPR 1A: Plants presumed extirpated in California and either rare or extinct elsewhere; CRPR List 1B = Plants rare, threatened or endangered in CA and elsewhere; CRPR 2B = Plants rare, threatened or endangered in California but more common elsewhere; CRPR 3 = More information is needed about plant; CRPR 4 = Plants of limited distribution, a watch list
   CRPR: '.1' = Seriously threatened in CA; '.2' = Fairly threatened in CA; '.3' = Not very threatened in CA
2. The elevation range within the study area is 2582 to 2,984 feet.

APPENDIX C

USFWS Information, Planning, and Consultation System (IPaC) Search Results

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Lake County, California

Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Northern Spotted Owl Strix occidentalis caurina Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1123	Threatened

Reptiles

NAME	STATUS
Green Sea Turtle Chelonia mydas No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6199	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Crustaceans

NAME	STATUS
California Freshwater Shrimp Syncaris pacifica Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7903	Endangered
Conservancy Fairy Shrimp Branchinecta conservatio Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/8246	Endangered

Flowering Plants

NAME	STATUS
Burke's Goldfields Lasthenia burkei Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4338	Endangered
Few-flowered Navarretia Navarretia leucocephala ssp. pauciflora (=N. pauciflora) Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8242	Endangered
Slender Orcutt Grass Orcuttia tenuis Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1063	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Allen's Hummingbird Selasphorus sasin This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9637	Breeds Feb 1 to Jul 15
Black-chinned Sparrow Spizella atrogularis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9447	Breeds Apr 15 to Jul 31
Bullock's Oriole Icterus bullockii This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 21 to Jul 25
California Thrasher Toxostoma redivivum This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Jul 31

Cassin's Finch Carpodacus cassinii — Breeds May 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9462

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Lawrence's Goldfinch Carduelis lawrencei — Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

Olive-sided Flycatcher Contopus cooperi — Breeds May 20 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3914

Wrentit Chamaea fasciata — Breeds Mar 15 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

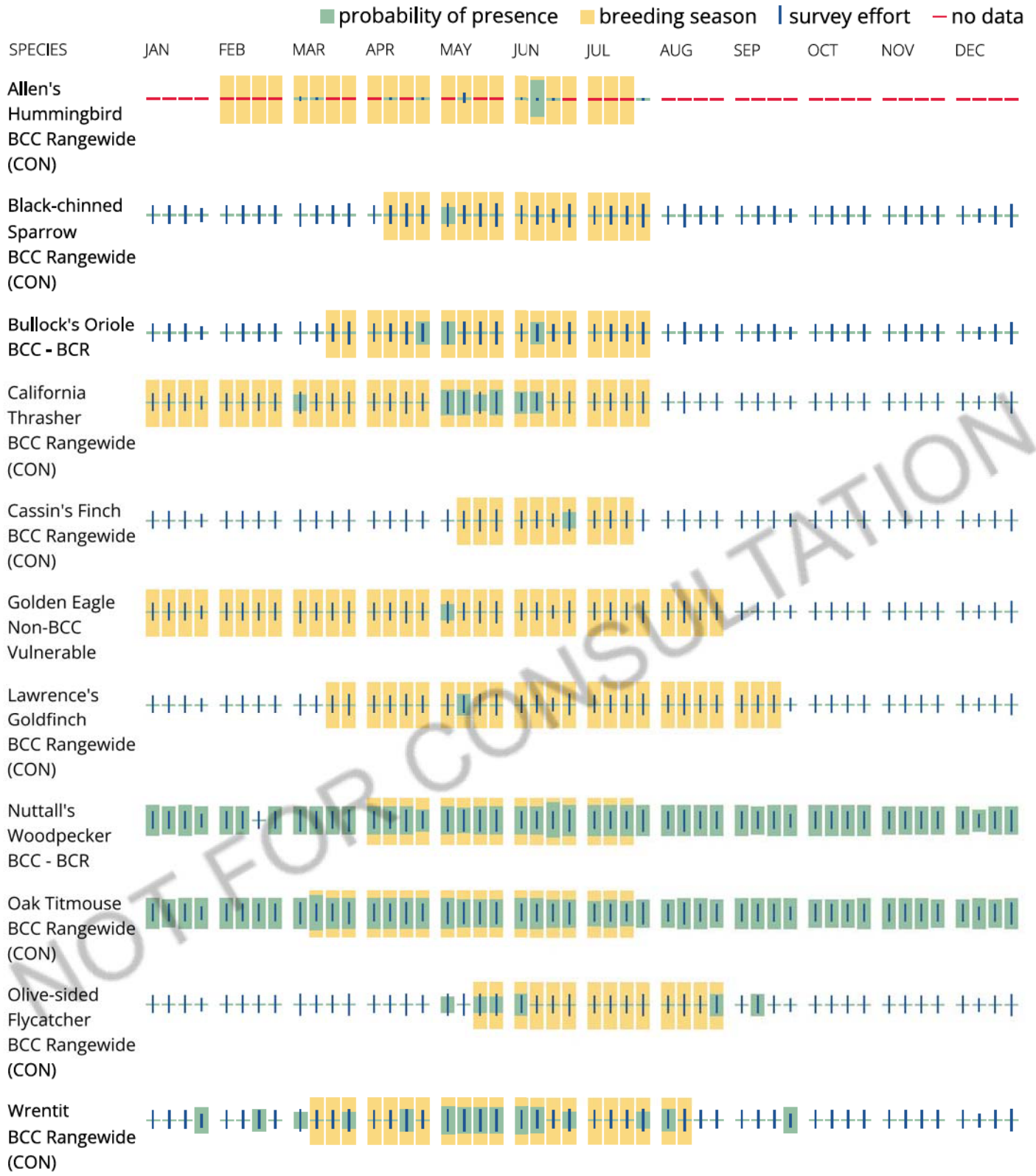
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure.

To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in

offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

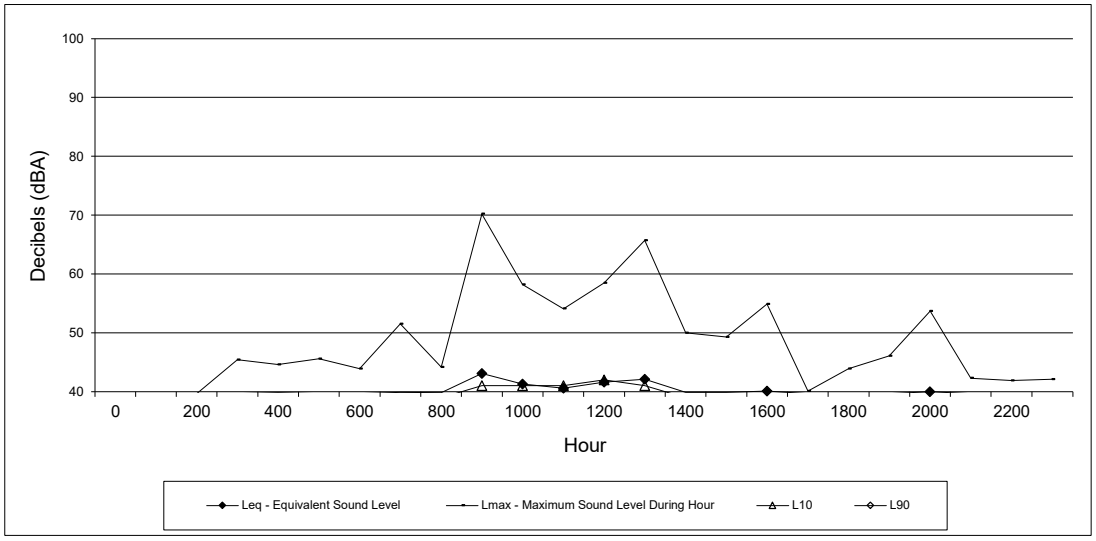
Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix D – Noise Technical Data

Noise Appendix

1. Long Term Noise Measurement Graphs for Sites 1 and 2

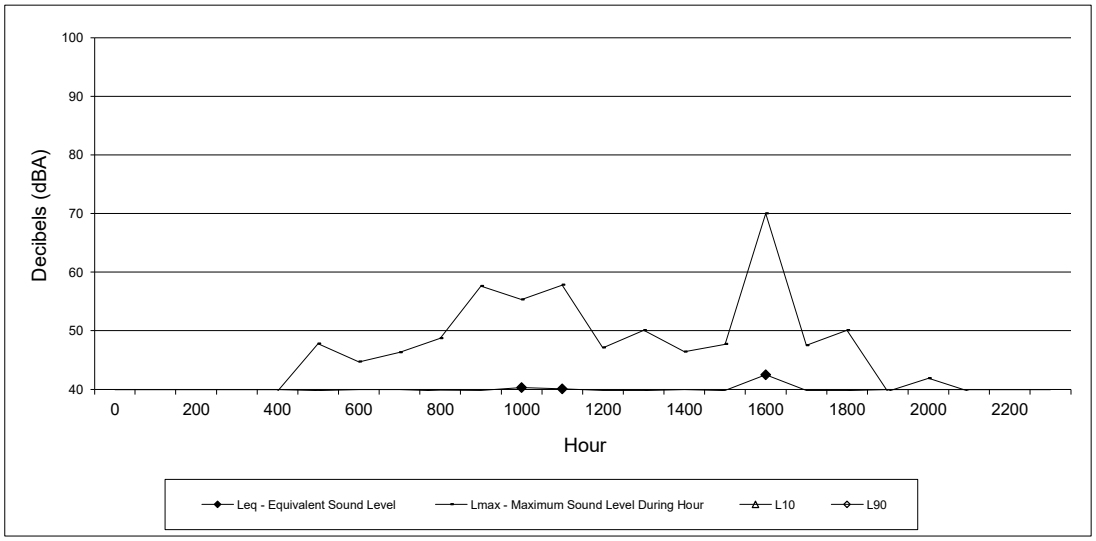
RCH GROUP
planning & environmental consulting



Site 1: Northeast area of project site, on a chainlink fence
Tuesday November 15, 2022

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	40	40	39	39
100	40	40	39	39
200	40	40	39	39
300	40	45	39	39
400	40	45	39	39
500	40	46	39	39
600	40	44	39	39
700	40	52	39	39
800	40	44	39	39
900	43	70	41	39
1000	41	58	41	39
1100	41	54	41	39
1200	42	59	42	39
1300	42	66	41	39
1400	40	50	39	39
1500	40	49	39	39
1600	40	55	39	39
1700	40	40	39	39
1800	40	44	39	39
1900	40	46	39	39
2000	40	54	39	39
2100	40	42	39	39
2200	40	42	39	39
2300	40	42	39	39

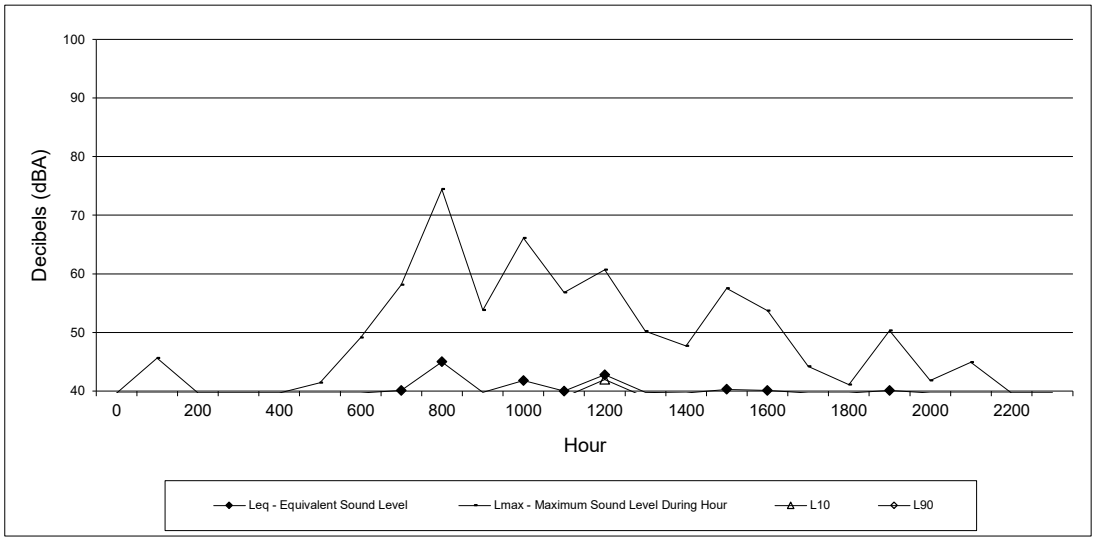
CNEL 47



Site 1: Northeast area of project site, on a chainlink fence
Wednesday November 16, 2022

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	40	40	39	39
100	40	40	39	39
200	40	40	39	39
300	40	40	39	39
400	40	40	39	39
500	40	48	39	39
600	40	45	39	39
700	40	46	39	39
800	40	49	39	39
900	40	58	39	39
1000	40	55	39	39
1100	40	58	39	39
1200	40	47	39	39
1300	40	50	39	39
1400	40	46	39	39
1500	40	48	39	39
1600	43	70	39	39
1700	40	48	39	39
1800	40	50	39	39
1900	40	40	39	39
2000	40	42	39	39
2100	40	40	39	39
2200	40	40	39	39
2300	40	40	39	39

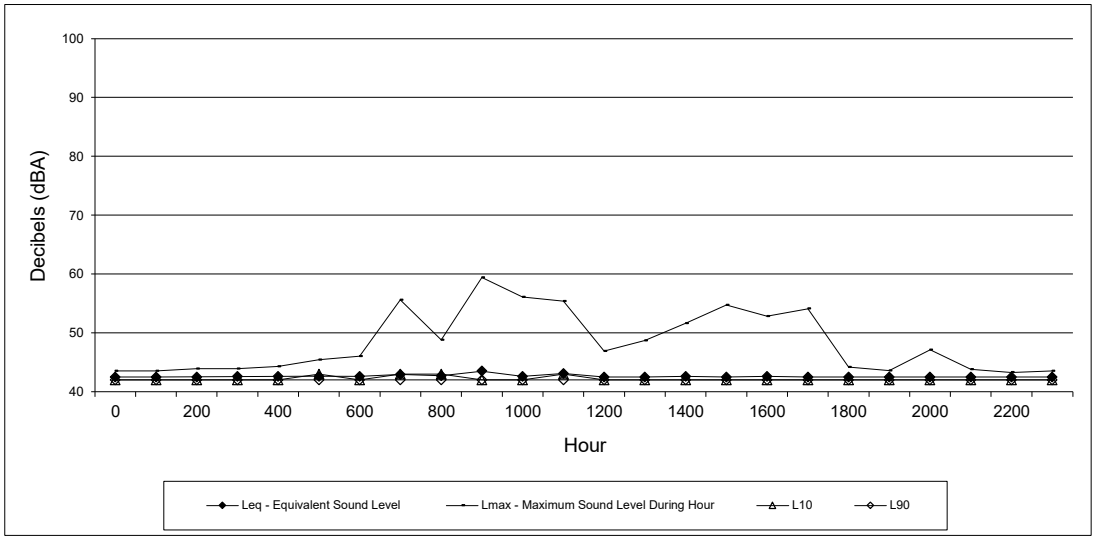
CNEL: 46



Site 1: Northeast area of project site, on a chainlink fence
Thursday November 17, 2022

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	40	40	39	39
100	40	46	39	39
200	40	40	39	39
300	40	40	39	39
400	40	40	39	39
500	40	41	39	39
600	40	49	39	39
700	40	58	39	39
800	45	74	39	39
900	40	54	39	39
1000	42	66	39	39
1100	40	57	39	39
1200	43	61	42	39
1300	40	50	39	39
1400	40	48	39	39
1500	40	58	39	39
1600	40	54	39	39
1700	40	44	39	39
1800	40	41	39	39
1900	40	50	39	39
2000	40	42	39	39
2100	40	45	39	39
2200	40	40	39	39
2300	40	40	39	39

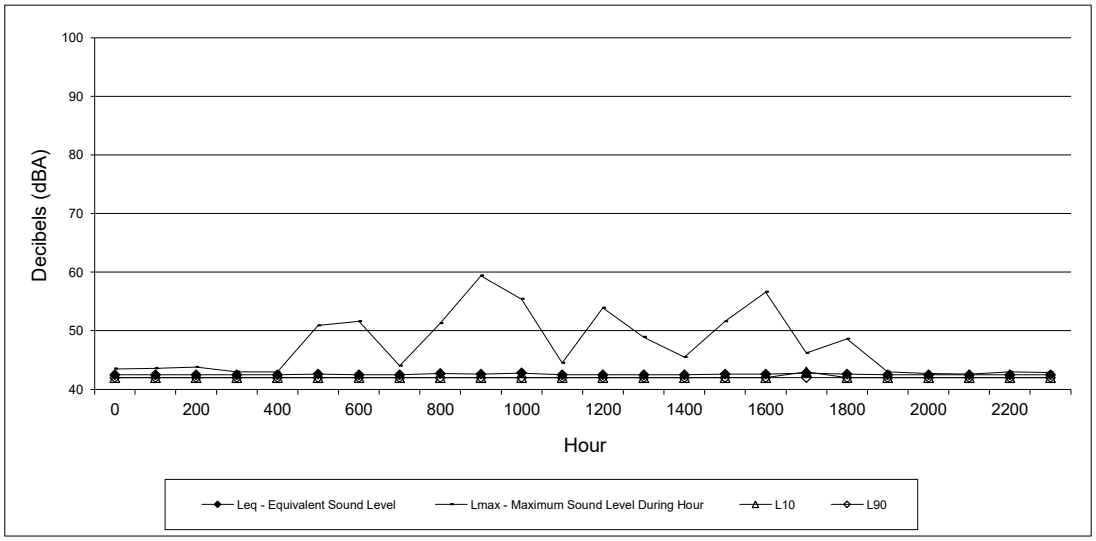
CNEL: 47



Site 2: Southeast area of project site, on a chainlink fence
Tuesday November 15, 2022

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	43	44	42	42
100	43	44	42	42
200	43	44	42	42
300	43	44	42	42
400	43	44	42	42
500	43	45	43	42
600	43	46	42	42
700	43	56	43	42
800	43	49	43	42
900	44	59	42	42
1000	43	56	42	42
1100	43	55	43	42
1200	43	47	42	42
1300	43	49	42	42
1400	43	52	42	42
1500	43	55	42	42
1600	43	53	42	42
1700	43	54	42	42
1800	43	44	42	42
1900	43	44	42	42
2000	43	47	42	42
2100	43	44	42	42
2200	43	43	42	42
2300	43	44	42	42

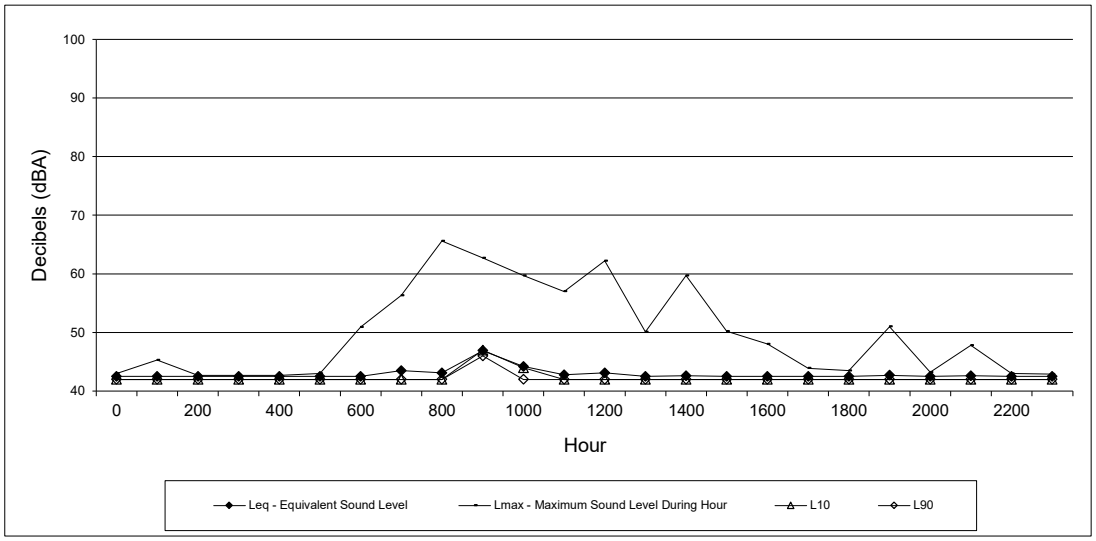
CNEL 49



Site 2: Southeast area of project site, on a chainlink fence
Wednesday November 16, 2022

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	43	44	42	42
100	43	44	42	42
200	43	44	42	42
300	43	43	42	42
400	43	43	42	42
500	43	51	42	42
600	43	52	42	42
700	43	44	42	42
800	43	51	42	42
900	43	59	42	42
1000	43	55	42	42
1100	43	45	42	42
1200	43	54	42	42
1300	43	49	42	42
1400	43	46	42	42
1500	43	52	42	42
1600	43	57	42	42
1700	43	46	43	42
1800	43	49	42	42
1900	43	43	42	42
2000	43	43	42	42
2100	43	43	42	42
2200	43	43	42	42
2300	43	43	42	42

CNEL: 49



Site 2: Southeast area of project site, on a chainlink fence
Thursday November 17, 2022

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
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100	43	45	42	42
200	43	43	42	42
300	43	43	42	42
400	43	43	42	42
500	43	43	42	42
600	43	51	42	42
700	44	56	42	42
800	43	66	42	42
900	47	63	47	46
1000	44	60	44	42
1100	43	57	42	42
1200	43	62	42	42
1300	43	50	42	42
1400	43	60	42	42
1500	43	50	42	42
1600	43	48	42	42
1700	43	44	42	42
1800	43	44	42	42
1900	43	51	42	42
2000	43	43	42	42
2100	43	48	42	42
2200	43	43	42	42
2300	43	43	42	42

CNEL: 49